IMPACT OF SCHOOL START TIMES ON JOB SATISFACTION OF US TEACHERS

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By
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ABSTRACT

While scholars have investigated the impact of school start times on adolescent students, there is limited research on how school start times affect teachers. In addition, recent reports of declining teacher morale emphasize the need for further study on influences of teacher satisfaction. Using secondary analysis of data from the 2017–18 National Teachers and Principals Survey (NTPS), this study measured relationships between school start times and other characteristics of responding teachers (n = 44,320) and their schools. The results identified trends in school start times by school level and community density. In addition, a statistically significant positive relationship between school start time and teacher satisfaction was found, as well a statistically significant negative relationship between school end time and teacher satisfaction. These findings suggest a need for further research on the association between school schedules and teacher satisfaction, but other variables appear to have a stronger influence on teacher satisfaction, such as teacher engagement in professional development.

DEDICATION

On a first date at the Kimmel Center in January 2017, I mentioned that I had been considering applying for a new doctoral program at Temple that was starting that summer. My completion of this program would not have been possible without the encouragement and support of my wife, Christine, from that day onward, and I dedicate this dissertation to her. I love you and look forward to many more chapters together.

I would also like to dedicate this dissertation to the large and loving Clancy family for their continued support—Mom, Dad, Stephen, Caitlin, Chris, Brian, Mike, Kevin, Claire, Jack, Bill, Josephine, and Jude, along with my new family of Temple alums—Caroline Maher, Tom Maher, Sr. and Tom Maher, Jr. Finally, I would like to share a note of gratitude for all the teachers who inspired me to enter public education and the students and colleagues who continue to motivate me.

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Finally, it was an honor and a privilege to be part of the first cohort of Temple's new Executive Ed.D. program, and I would like to thank the classmates who made this journey so enjoyable, especially Shannon Franczkowski & Katie Bolger.

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Chapter 1

Introduction

Over the past five years, a growing number of school districts in the Philadelphia area have adopted later school start times (SST) at the high school level. Each district approached the topic differently and adapted the decision to address local complexities. However, the decisions to push back the high school bell schedules at Unionville-Chadds Ford (2017), Phoenixville (2018), Radnor (2019), Tredyffrin-Easttown (2019), Garnet Valley (2021), Upper Darby (2021), and the School District of Philadelphia (2022) demonstrates a pattern of change throughout the region (Bertrando, 2021; Boccella, 2019; Graham, 2022; Hoover, 2019; Sattin, 2021).

Research dating back to the 1970's demonstrates that the circadian rhythm of teenagers differs from adults and younger children, where teenagers naturally wake and fall asleep later than other age groups (Carskadon, et al., 1980). Other researchers have demonstrated a relationship between later SST and longer duration of student sleep (Dexter et al., 2003; Dunster et al., 2018; Martin et al., 2016; O'Malley & O'Malley, 2008; Owens et al., 2010; Paksarian et al., 2015). The American Academy of Pediatrics has recommended that all high schools adopt 8:30 AM or later SST to improve students' academic performance and mental health (Owens et al., 2014). In the 2017–18 school year 44% of US high schools started classes before 8:00 AM, and the average SST for Pennsylvania high schools was 7:48 AM (NCES, 2020).

When districts discuss school start times, the conversation broadens to discuss many different variables, including student transportation, extra-curricular activities, and childcare availability (Wolfson & Carskadon, 2005). As numerous stakeholders hold

competing interests in discussions regarding SST, school leaders often avoid the topic to focus their political capital towards other pressing issues (Wahlstrom, 1996).

While there has been extensive research on the relationship between SST and student health and performance, few studies investigate the impact SST has on teachers and staff. While teachers are often surveyed for input on the transition to later SST, there is limited research on how that change impacts teachers professionally and personally. With schools averaging a 15% teacher turnover rate each year, districts regularly investigate teacher satisfaction to reduce costs to recruit and train new teachers (American Federation of Teachers, 2017; Carver-Thomas & Darling-Hammond, 2017).

This study will review teacher satisfaction based on responses to the *National Teachers and Principals Survey* (NTPS), a nationally representative sample of teachers and principals surveyed by the US Department of Education's National Center for Education Statistics (NCES, 2019). By analyzing responses for statistical patterns, including potential relationships between school start time and teacher responses, this study aims to provide school leaders more information to improve teacher satisfaction and retention.

A Case Study on District Level Policy Decisions

Any district level decision requires consensus among a wide range of stakeholders, including administrators, school board members, collective bargaining groups, municipal/county/state officials, parents, and community members. The following case study provides a real-world example of the complexities of district level policy changes, including school start times.

In the spring of 2018, school board members at a suburban Philadelphia school district asked the superintendent to investigate delaying SST at the secondary level. The request came during the same month that two peer school districts adopted delayed SST for their high schools for the upcoming school year. Several district administrators soon learned that other local districts began reviewing their bell schedules for possible changes to SST at the secondary level. Specifically, these were districts where administrators' children attended or spouses were employed.

The superintendent designated the district curriculum director to lead the investigation on school start times. The district curriculum director convened two panels to discuss the topic. A broad committee including administrators, teachers, parents, and students met once a month for four months while a smaller core committee of building and district administrators met on a more frequent basis to identify targeted solutions based on feedback from the broader committee. During this investigation period, students, staff, and parents were surveyed about their preferences. In addition, smaller groups of teachers at the high school, middle school, and elementary school level met to look at specific ramifications at their level.

While surveying and speaking with students at the high school level, there were two clear "non-negotiables" that emerged. High School students and staff were committed to maintaining semester-block scheduling which allows for deeper learning and more scheduling flexibility. In addition, students and staff wanted to maintain the school's optional extra period at the end of the school day, a 50 minute 5th period in addition to the four 80 minute academic blocks, because it allows students to enroll in music courses without sacrificing academic electives, provides a natural window for

extra-curricular clubs before athletic practices, and nearly eliminates early dismissals from the four academic blocks for athletes traveling to away contests.

The block scheduling and bonus period presented unique challenges when comparing this district's bell schedule to neighboring districts adopting later SST. As a result, there were no practical ways to adjust for later start times without delaying the end of the fifth period until approximately 4:00 PM, which interfered with after school athletic opportunities due to limited field lighting and gymnasium space. To minimize added costs to transportation, the proposals maintained three separate bus runs (high school, middle school, elementary).

Two of the proposals involved moving up the schedule of elementary students, as young children's circadian rhythms mirror earlier wake and sleep times of adults, and a third delayed elementary start and end times by fifteen minutes. However, many committee participants expressed concerns about elementary students waiting for buses in early morning darkness.

While many administrators had concerns about the new schedule proposals, everyone agreed the broader public needed to have a say before the school board decided. A town hall meeting was scheduled for Wednesday, March 11, 2020 to provide an overview of the proposals in the high school auditorium and then break out attendees into smaller discussion groups in high school classrooms. Despite months of investigation and weeks of planning the community engagement event, the rapid spread of COVID-19 forced the cancellation of the town hall. Two days after the canceled town hall, Friday, March 13th, would be the last in-person instructional day of the 2019–20 school year.

Amidst the immediate and unprecedented shift to virtual learning, all attention turned away from the district's discussions of school start times for months. However, the school did start classes later than usual during synchronous virtual learning in spring 2020 and during in-person optional learning in Spring 2021 for logistical reasons. In addition to pandemic related changes, the district underwent additional transformation over the 15 months that followed the canceled town hall. The district's high school welcomed their third principal since first investigating later school start times, the superintendent and middle school principal retired, and the deputy curriculum director, business manager, facilities director, and human resources director positions all turned over—all members of the start times core committee.

In the summer of 2021, several school board and community members asked the new superintendent to revisit the work of the start times committee, citing the difference later start times made on high school students' morale during the alternative instructional platforms during the pandemic. In August 2021, the curriculum director reconvened the core committee of administrators to discuss the prior proposals and future options.

New voices brought new perspectives on the existing schedule and proposals. In particular, the new high school principal challenged the district's longstanding position of not counting the optional 5th period as instructional minutes when reporting to the state. Arguing that the current arrangement shares many of the characteristics of "lunch and learn" periods offered at other local schools, the superintendent agreed that this period could be restructured to count as instructional minutes. By counting these 50 minutes, which had been integrated into the bell schedule for over 20 years, as instructional

minutes, the high school could shorten the length of the four academic blocks to allow for an 8:30 AM start time while keeping dismissal time the same.

The biggest challenge with the new proposal involved lunches at the high school, as the teachers collective bargaining agreement required a 45-minute duty-free lunch for all teachers in the district. School administration and union leadership had productive conversations and developed a potential compromise involving a trade for time elsewhere in the school week.

The previous proposals and new proposals were presented to the Educational Affairs Committee of the school board in January 2022. During this meeting, it became clear that there was an appetite for continuing the conversation, but a hesitancy to move forward too quickly. The district previously committed to undergoing a strategic planning process during the 2022–23 school year, and several administrators and board members believed it would be best to table the conversation until start times can be reviewed along with other parts of the strategic plan the following year.

Rationale of Study

Many other school districts face a similar narrative—districts begin investigating later SST after seeing stories of other nearby districts or more prominent/influential districts making a similar change. Stakeholders are often open to discussing SST changes but competing priorities and administrative turnover draw out the conversation. As a result, discussions about SST can take years in some districts, allowing for school leaders to investigate all potential implications of such a change.

As the debate about SST has grown locally and nationally, concerns for student academic and emotional well-being drive the conversation. When teachers are asked

about possible changes to the bell schedule, they often view the potential effects from an individual lens—How will this affect my commute, childcare arrangements, etc.? As a result, there is limited objective data on how SST affects teachers.

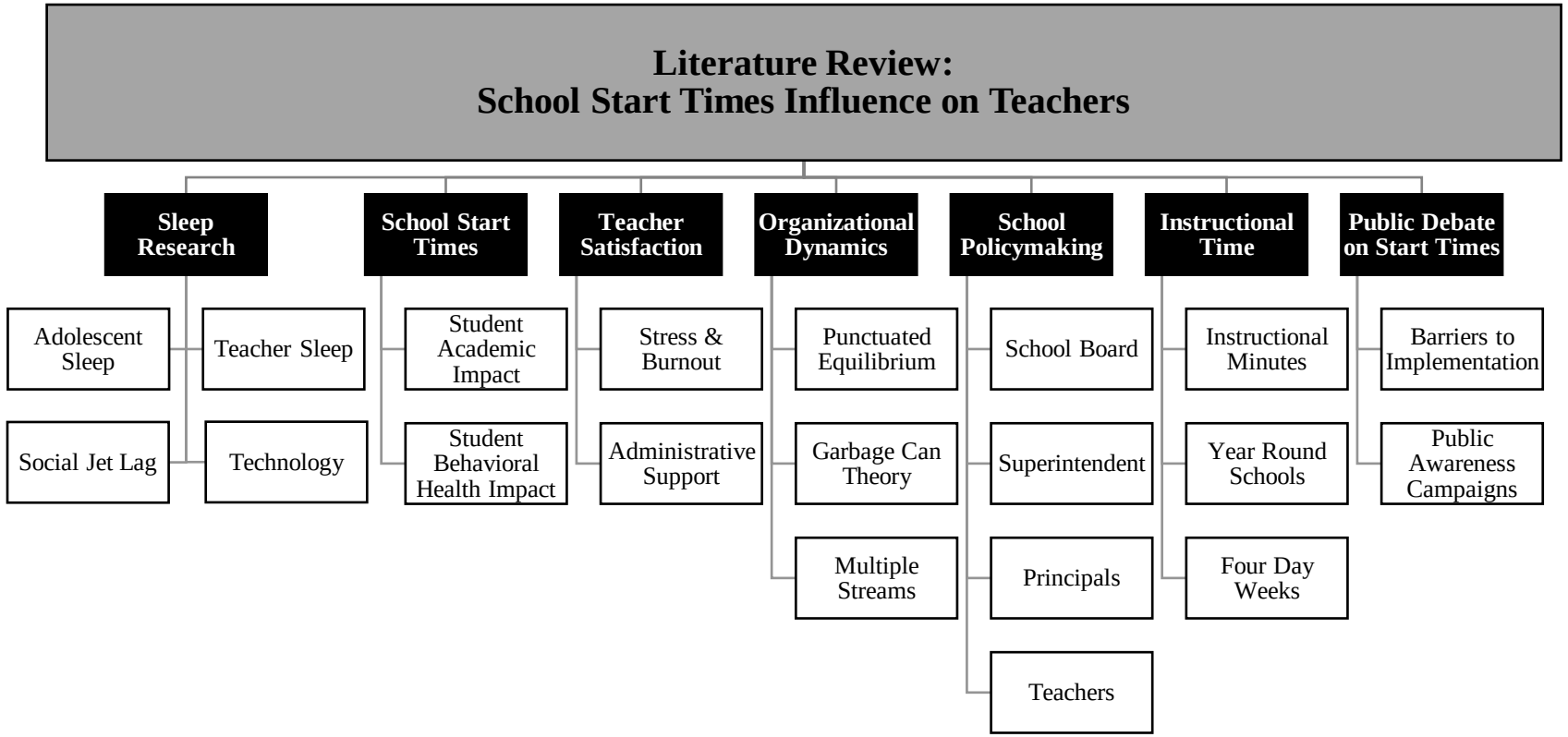
By pairing NTPS teacher responses with the corresponding start and end times (collected separately from the NTPS school survey), this study uses a novel approach to investigate the role school schedules play in teacher satisfaction. This study resulted in statistically significant findings about the relationship between SST and teacher satisfaction while controlling for other variables which influence teacher morale. These findings provide school leaders a clearer picture of the implications of schedule changes for their staff.

Chapter 2

Literature Review

The current study will focus on the impact of organizational decisions on teacher satisfaction, but this topic reflects a convergence of several other areas of research. Studies on teachers and students, as well as general theoretical frameworks, help explain the complex relationship between school policies, behavioral health, and academic achievement. This literature review will summarize a broad range of topics, outlined in Figure 1, that shape the environment in which school start times are established and how they could affect teacher satisfaction.

Figure 1: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Sleep Research

In recent years, research about the importance of quality sleep has extended beyond academic journals and into popular news publications. As more people understand the importance of sleep for our mental and physical health, we are becoming more cognizant of the structural, social, and technological influences on our daily sleep patterns.

Adolescent Sleep (Age 10–19)

Over the past 40 years, researchers have demonstrated that adolescents receive considerably less sleep than developmentally appropriate. During the 1970s, a group of scientists conducted a series of adolescent sleep studies during a series "Summer Sleep Camps" at Stanford University (Carskadon et al., 1980).

One longitudinal study tracked the developmental changes of 19 adolescent children from age 10 to age 16 and evaluated their sleep during three-day sessions over three summers. Despite prior research showing older adolescents slept less than younger adolescents, there was no difference in sleep across stages of development in this controlled environment. This suggests trends of declining sleep over the course of adolescence is an environmental phenomenon rather than biological. More importantly, the study, which controlled the sample with a consistent same bed time and rise time for all subjects, found that subjects in the later stages of puberty experienced increased sleepiness from 1:30–3:30 PM (Carskadon et al., 1980).

A later lab study by Carskadon revealed that adolescents release melatonin, a hormone that helps induce sleep, approximately an hour later than children and adults. The delayed release of melatonin delays the circadian rhythm of adolescents, leading

teenagers to naturally fall asleep and wake later than other age groups (Carskadon et al., 1997).

Teacher Sleep Patterns

While there have been extensive studies on student sleep habits, there is less research on the sleep patterns of teachers. Studies on circadian rhythms show adults tend to wake and sleep earlier than in adolescent years, but the domestic responsibilities teachers have outside the workplace (childcare, yard work, cooking, cleaning, etc.) can also cut into their sleep schedules (de Sousa et al., 2017).

Researchers at the National Institute of Occupational Safety and Health (an agency within the CDC) analyzed the self-reported sleep patterns of the 62,871 participants in the National Health Interview Survey (NHIS), and separated results out by occupation groupings (Luckhaupt et al., 2009). The researchers found that 26.7% of workers in educational services (a sub-sample of 6,092 participants) average short sleep duration (defined as less than or equal to 6 hours of sleep per 24 hours). Many other employment sectors fared much worse, including management of companies and enterprises (40.5%), transportation and warehousing (37.1%), public administration (33.5%), and health care and social assistance (31.2%), with an estimated 30.2% of all US workers reporting short sleep (Luckhaupt et al., 2009).

A follow-up study found racial differences in self-reported sleep patterns (Jackson et al., 2013). While 23% of white NHIS participants who work in educational services reported short sleep, 37% of black NHIS participants who work in educational services reported short sleep. In the aggregated data, 27% of all white NHIS participants reported short sleep, while 37% of all NHIS participants reported short sleep. In both the

educational services subsample and the aggregate sample, the gap between black and white respondents was wider among those considered “professional/management” than respondents who identified as “laborers” (Jackson et al., 2013). These results show that sleep deprivation is a widespread phenomenon in the United States, and certainly is not limited to education.

Amschler and McKenzie (2010) surveyed sleep habits and behaviors of school staff members in a rural Indiana county using the Medical Outcomes Study and Epworth Sleepiness Scale. Based on 109 responses, 43% of teachers reported six hours of sleep or less per night and 64% of teachers reported being drowsy during the day for “some,” “a good bit,” or “most of the time.” The researchers also found that female staff members got less sleep than male staff members, but there were no statistically significant differences among teachers and staff who had a second job outside school hours (Amschler & McKenzie, 2010).

Some research focused on educators has emphasized the consequences of sleep deficiency. The California Teachers Study is a cohort study running since 1995 of women enrolled in the California Teachers Retirement System (Hurley et al., 2020). The 5th questionnaire (2012–2015) had a 60% response rate, creating a sample of 41,505 responses. The study found 27% of respondents reported 6 or less hours of sleep per night, and respondents in the highest quartile of the sleep index (worst sleep) had a 25% increased likelihood of breast cancer than respondents in the lowest quartile of the sleep index (best sleep), controlling for age and race (Hurley et al., 2020).

Fujishiro, Farley, Kellemen, and Swoboda (2017), using data from the Behavioral Risk Factor Surveillance System, reviewed how state policies might influence teacher

stress and sleep. Specifically, they found higher likelihood of educators reporting 5.5 hours sleep or less each night in states that adopted Race to the Top (a federal program during the Obama administration incentivizing states to adopt policy changes) accountability measures (55% higher likelihood), states which encourage/allow performance-based bonuses (55% higher likelihood), and states which approve/certify curriculum materials at a state level, rather than allow local curriculum autonomy (84% higher likelihood) (Fujishiro et al., 2017).

Several studies have been conducted overseas regarding teacher sleep as well. Schmidt, Steenbock, and Sieverding studied 69 participating teachers' sleep in Germany using Fitbit health monitors (2022). The intervention group, which was asked to identify strategies they will use to achieve eight hours of daily sleep, averaged 49 minutes more sleep per night than the control group which simply tracked sleep (Schmidt, et al., 2022). In addition, researchers in the United Kingdom, Malaysia, and Turkey found a strong positive relationship between teachers who reported sleep deficiencies and teachers who reported burnout (Cropley et al., 2006; Merey et al., 2013; Yusof, 2012).

Jane Carla de Souza and her research team have studied teacher sleep in Brazil extensively in the past decade. De Souza's team found 60% of teachers studied rely on an alarm clock to wake up on school days, nap frequently on weekdays, and have similar sleep challenges to shift workers (de Souza et al., 2012). The researchers found sleep education programs for teachers improved sleep knowledge, increased sleep quality, reduced evening coffee consumption among participating teachers, but did not increase length of daily sleep or improve reported daytime sleepiness (de Souza et al., 2016). Female teachers reported worse sleep quality and higher daytime sleepiness on the

Epworth Sleepiness Scale than their male counterparts, despite reporting similar length of sleep (de Souza et al., 2017). Finally, teachers who begin classes at the 7:00 hour reported earlier wake times, greater sleep irregularity, and increased daytime sleepiness on the Epworth Sleepiness Scale than teachers who only teach in the afternoon session (de Souza et al., 2014). These findings may have limited reliability when applied to US schools due to Brazil's unique school schedules. Students and teachers are assigned one of two or three shifts (five hours each) offered at each school. With low salaries, teachers frequently take a second shift, often at another school, to make ends meet financially for their family (Eulich, 2014).

Sleep Hygiene & Technology

When presented with arguments for delayed SST, there are many administrators, faculty, parents, and community members who balk at the claim that early bell schedules inherently harm teenagers (Wahlstrom, 1999). Critics of later SST point to other barriers to adequate sleep among teens, including improper sleep hygiene (Pignolet & Moore, 2021).

Sleep hygiene refers to the patterns of behavior that affect our sleep quality. Behaviors that improve sleep hygiene include keeping consistent sleep and wake times, limiting screen time before bed. Sleep hygiene suffers when people sleep in an uncomfortable bed, consume caffeine, alcohol, or tobacco within four hours of bed, and take long daytime naps (Mastin, Bryson, & Corwyn, 2006).

Specifically, there is a deep and growing base of research demonstrating that adolescent screen time is negatively related with adolescent sleep. Increased screen time leads teenagers to fall asleep later and receive less sleep. The proliferation of

smartphones, laptops, and tablets has created more opportunities for screen time than historically possible, creating increasing barriers for students to get adequate sleep when not used properly (Hale & Guan, 2015). In addition to technological advances, other negative influences on sleep hygiene adolescent employment during the school year and lack of parental supervision or curfews (Schohenals et al., 1998; Carskadon, 1990).

While technology has taken a toll on adolescent sleep hygiene in recent years, advocates for later SST point to laboratory studies of adolescent sleep, such as the Stanford Sleep Camp, that show adolescents naturally fall asleep and wake up later even when scientists control for behavioral influences on sleep (Troxel & Wolfson, 2017).

Social Jet Lag

Critics of delayed SST also argue that students can "catch up" on sleep over the weekend. However, there is growing research on the negative consequences, both for adults and adolescents, when weekday and weekend sleep patterns do not match (Wittmann et al., 2006). While human circadian rhythms are synced to biological markers (such as daylight), many people must adapt their sleep to social obligations (school, work, activities) that do not match their natural biological clock. When people sleep in later and/or stay up later over weekends, either for social reasons or natural sleep cycles, their bodies are out of rhythm when they need to return to their weekday sleep schedule. This leads to a phenomenon known as "social jet lag," where there is a weekly sleep imbalance similar to traveling across time zones (Wittmann et al., 2006).

Teenagers particularly struggle with this phenomenon, as they naturally sleep later when they can on weekends but cannot fall asleep on time Sunday night. Rather than

"catching up," students sleeping in on weekends usually end up further building their sleep debt early the following week (Touitou, 2013).

Behavioral and Performance Effects of School Start Times

While there are other obstacles to adolescent sleep, researchers have found that school start times have a significant impact on the amount of sleep students get during the school week. Over the past 30 years, there has been overwhelming research showing that students at schools who start earlier in the school day are not having their sleep needs met, while students with later start times get more sleep.

Many of the leading voices advocating for change come from the medical community. In 2014, the American Academy of Pediatrics adopted a position statement that all US middle schools and high schools should start classes at 8:30 AM or later. The position statement referenced research suggesting academic and psychological benefits later SST offers students, and also included the economic benefits of improved student performance and health far outweigh the implementation costs, which usually center around transportation (Owens et al., 2014).

The American Medical Association adopted a similar public position two years later. The press release announcing the position pointed to other health hazards of adolescent sleep deprivation which have lasting consequences, including links to obesity, diabetes, and hypertension (American Medical Association, 2016).

The National Sleep Foundation dedicated a special issue of their journal to school start times, including several articles which provided advocacy strategies for medical professionals. In the introduction to the issue, the guest editors wrote, "Going forward, researchers, health care providers, educators, and other community stakeholders need to

continue to collaborate on best practices for implementation of healthy start times and the evaluation of the impact of changes in school start times on key outcomes" (Troxel & Wolfson, 2017, p. 421).

When later school start times are proposed, many critics argue that later start times will simply encourage students to stay up later. However, research suggests a strong association between later start time and increased sleep. A study of 31 US Navy recruits participating in boot camp (mostly recent high school graduates) found that recruits scheduled for bunk time beginning at 9:00 PM and those scheduled for 10:00 PM fell asleep roughly the same time (Baldus, 2002). Even amidst the strenuous schedules of boot camp, older adolescents could not fall asleep earlier when commanded to do so, demonstrating that patterns of sleep are shaped more by biological influences than environmental factors.

When the Seattle School District moved from a 7:50 AM high school start time to an 8:45 AM start time, researchers asked students to wear activity monitors to track their sleep in the year before and after the change (Dunster et al., 2018). The 55 minute delay in class times led to students sleeping an average of 34 additional minutes per night (Dunster et al., 2018). A study of high school students in Wilton, CT found that students' self-reported bed times did not significantly change after the high school delayed start times by 40 minutes (7:35 AM to 8:15 AM), but wake times were later allowing for more sleep (O'Malley & O'Malley, 2008). A study of neighboring high schools in Wisconsin found that students at the school which starts class at 8:35 AM averaged an extra 11 minutes of sleep compared to students at the school which began classes at 7:50 AM (Dexter et al., 2003)

Researchers at the National Institute of Mental Health found schools starting classes earlier than the mean start time (8:01 AM) would expect a 30-minute delay in their SST to yield 14 minutes of additional sleep for their students (2015). This study was based on random samples of students in 81 participating schools. Later start times had the largest positive impact on boys in major metropolitan areas. When urban schools currently starting before 8:01 AM delayed start times by 30 minutes, they could expect boys to receive 33 minutes of additional sleep on weeknights. However, when rural schools currently starting before 8:01 AM delayed start times by 30 minutes, they could expect boys to receive 20 fewer minutes of sleep on weeknights (Paksarian et al., 2015). No explanation was provided by researchers for this phenomenon, but one could infer a possible relationship between agricultural work and earlier wake times for high school students in rural communities.

An independent New England boarding school delayed their high school start times from 8:00 to 8:30 for the second semester of the 2008–09 academic year, surveying students in each semester (Owens et al., 2010). Students reported an average wake time of 6:54 AM in the first semester and an average wake time of 7:25 AM in the 2nd semester. More surprisingly, the second semester's later start times also saw students report an earlier bedtime (11:21 PM) on school nights compared to the first semester with earlier start times (11:39 PM). Fewer students reported daytime sleepiness, sleeping during class, and late arrival to class in the second semester's survey (Owens et al., 2010).

In the summer of 2008, a Canadian high school was destroyed by a fire (Martin et al., 2016). To adapt to the circumstances, students from the damaged school were bussed

to a neighboring school and adopted a dual-track schedule for the following school year. Students from the host school attended classes from 7:40 AM to 1:05 PM and students from the lost school attended from 1:25 PM to 6:45 PM. Students in the afternoon session recorded more sleep and less daytime sleepiness on average than students in the host school despite receiving less exposure to sunlight. In addition, the average bed time for morning students was only one hour earlier than the average bed time of the afternoon students (Martin et al., 2016).

Student Academic Performance

School districts provide a wide array of services for students, but their primary mission and criteria of evaluation centers upon academic achievement of students. When discussing school schedules, school leaders will pay special attention to how a schedule change could impact student performance, and advocates and critics later SST have conducted numerous studies on the impact of delayed start times on academic measures.

Researchers at the University of Minnesota's Center for Applied Research and Educational Improvement (CAREI) surveyed high school and middle school students in the Minneapolis/St. Paul metropolitan area in the years before and after Minneapolis Public Schools delayed their high school start times by an hour (Wahlstrom et al., 1998). These surveys showed students reported higher grades in class after the change. However, researchers noted that Minneapolis students reported less time spent on homework than other districts and suggested there could be higher grade inflation in Minneapolis than neighboring districts. The surveys showed no difference in reported grades between middle school students in Minneapolis (9:40 start time) and middle school students in a neighboring district (7:30 AM start time) (Wahlstrom et al., 1998).

Hinrichs compared Minneapolis and St. Paul school districts (2011). While Minneapolis moved back their high school start times to 8:40 AM, St. Paul, its "twin city" with similar population size and demographics, still maintained a 7:30 start time. In the years after the change, there was a .05 standard deviation difference in ACT scores between the two districts. This marginal difference was consistent within demographic groups. Similarly, there was no statistically significant difference in attendance rates between the two districts (Hinrichs, 2011).

A study of state standardized test scores of schools along the Florida panhandle found a slight but statistically significant improvement of test scores when schools start later (Heissel & Norris, 2018). Rather than emphasizing "clock time," the researchers based their study on the average amount of sunlight prior to the start of class, noting the impact of daylight on circadian rhythms and human psychology. Schools with an extra hour of sunlight prior to class increased math and reading scores between 0.06 to 0.08 standard deviations (Heissel & Norris, 2018).

After the conclusion of the previously mentioned study at the US Navy Recruit Training Center and consulting other research on adolescent sleep needs, the Navy moved all recruit sleep times to 10:00 PM and extended scheduled sleep by two hours to give recruits eight hours of sleep. Recruits on the new sleep regimen scored 11% higher on the Armed Services Vocational Aptitude Battery exam (Miller et al., 2008).

Carrell studied students at the US Air Force Academy, who are enrolled in standard courses with identical syllabi, exams, and assignments and are graded on a curve based on performance of all students enrolled in that particular course across all sections (2011). Students assigned to a class in the first period of the day performed worse than

their peers assigned the same course (with identical syllabus, exams, and assignments) later in the day. A 50-minute delay in the start of first period at the academy provided an academic boost equivalent to raising teacher quality by one standard deviation (Carrell et al., 2011).

A study of Wake County (NC) students found a one-hour delay in the start of high school led to a 3% increase in standardized math and reading assessments (Edwards, 2012). A 55 minute delay in high school start times in Seattle was associated with a 4.5% increase in student grades (Dunster et al., 2018). A comparison of districts in Kansas with different start times found a lack of statistically significant difference in performance on Kansas state assessments (Hinrichs, 2011).

When you compare all these studies regarding the academic impacts of delayed SST, most find a positive association between later SST and academic performance. However, the marginal academic benefits have not persuaded most school districts with early SST to make the changes to transportation runs, teacher contracts, and athletic schedules in their district, in addition to the impact the change would have on family plans for childcare.

Student Mental Health

In the United States, the rate of major depressive episodes among adolescents has increased 52% from 2005 to 2017 (Twenge et al., 2019). Nearly 70% of US high school students see anxiety and depression as a major concern they have for their peers, outpacing bullying, drugs, and alcohol (Horowitz & Graf, 2019). With increased concern and attention on adolescent mental health, advocates for later SST point to studies showing behavioral and psychological benefits of delaying class times.

In an Israeli study, an experimental group started the school year with a one-hour delay in class start time (7:30 AM to 8:30 AM) before returning to their normal school start time (7:30 AM) the following week of school (Lufi et al., 2011). The control group started classes at 7:30 AM both weeks. The two groups completed the d2 Test of Attention, which measures sustained attention and visual scanning by requiring students to cross out every letter "d" in a reading passage in a short period of time. The experimental group averaged 55 minutes of additional sleep the first week over the second week and performed significantly better on the d2 Test of Attention in six of nine categories (Lufi et al., 2011).

A study of 197 adolescents completed baseline sleep hygiene surveys and completed a seven-day diary including a modified version of the Patient Health Questionnaire–4 (Peltz et al., 2017). While researchers found that there was a negative relationship between sleep hygiene and daily depressive/anxiety symptoms across all participants, the study found more reported depressive/anxiety symptoms among students with SST before 8:30 AM. In addition, students at schools with SST after 8:30 AM had a weaker association between sleep habits and depressive/anxiety symptoms, suggesting the daily variations in sleep have less of an impact on students with later SST because these students already sleep more on average than students attending schools with earlier SST (Peltz et al., 2017)

The previously referenced study from the University of Minnesota's CAREI found that students in Minneapolis schools with an 8:40 AM SST reported significantly fewer depressive feelings than students in a neighboring district with a 7:30 AM SST (Wahlstrom, 2002). Researchers from the previously referenced study of a Rhode Island

boarding school, which implemented delayed SST for the second semester, found a statistically significant decline in depressive symptoms reported by students in the second semester (8:30 SST) compared to the first semester (8:00 SST). In the first semester, 65.1% of students reported depressive symptoms, while only 45.1% reported similar symptoms in the second semester (Owens et al., 2010).

There has been research which showed no association between SST and student psychological health, but the context of these studies pose challenges in applying these findings to the broader audiences.

A Norwegian study compared a school with a 9:30 AM SST on Mondays and 8:30 AM SST the rest of the week to another school with 8:30 AM SST all week (Vedaa et al., 2012). There was no significant difference in responses on the positive and negative affects schedule, but the study did find students had longer sleep duration and improved attentiveness on Mondays based on self-reported data (Vedaa et al., 2012).

In the previously referenced Canadian study of students following a dual track schedule due to a fire, there was no statistically significant difference in student reported psychological distress. However, the trauma of the school fire and logistical challenges that followed may have influenced the afternoon students (Martin et al., 2016).

Finally, a Swiss study compared students with a 7:40 AM SST to students with an 8:40 AM SST (Perkinson-Gloor et al., 2013). Students with a later start time, who averaged an additional 13 minutes of sleep per night, did not record significantly higher scores on questions related to their “attitude on life.” However, the sample was unbalanced with only 13% of the sample attending the school with later SST (Perkinson-Gloor et al., 2013).

Proponents of later SST have a stronger argument on the behavioral health benefits of delaying high school start times than arguing academic benefits. As educators turn more focus towards student mental health, most research shows statistically significant association between later start time and lower rates of depression and anxiety. The studies that did not show statistically significant benefits of later start time had intervening factors in the structure of the research.

Teacher Satisfaction, Retention, and Turnover

Researchers, policy makers, and other polling agencies frequently study teacher morale, largely due to widely cited statistics regarding high teacher turnover. The Learning Policy Institute (LPI) found 8% of teachers leave the profession each year and an additional 8% of teachers shift schools, creating an aggregate turnover of teachers around 16%. (Carver-Thomas & Darling-Hammond, 2017). The Virginia School Survey from after the COVID–19 pandemic also cited 85% teacher retention (Miller & Reynolds, 2022).

A study of teacher retention data (2017) in 6,819 Texas schools over 10 years found that schools with an “unacceptable” rating on state accountability metrics averaged a teacher turnover rate (31%) nearly double that of schools with an “exemplary” rating (16%) (Holme et al., 2017). Specifically, schools with high minority populations and high poverty populations experience the deepest and most consequential turnover rates among teachers (Holme et al., 2017). Employees at schools with higher rates of African American, Hispanic, and/or economically disadvantaged students reported deteriorating conditions for teachers and staff in the previous two years in the Virginia School Survey (Miller & Reynolds, 2022). According to LPI, as Title I schools have 50% greater teacher

attrition (16%) than schools that do not meet Title I criteria (11%). Increased turnover in high-poverty schools creates financial strains for struggling schools, as urban school districts spend an estimated $20,000 to recruit and support each new teacher in their first year (Carver-Thomas & Darling-Hammond, 2017).

The American Federation of Teachers (AFT) members found 23% of union members with disabilities, 22% of African American members, and 18% of LGBTQ members intended to seek employment outside education in the next year, compared to 14% of all respondents (2017). While the AFT and school districts have actively sought to recruit more teachers from minority backgrounds, 80% of AFT members are white, 9% are Hispanic, 7% are African American, 3% are LGBTQ, and 4% have disabilities (American Federation of Teachers, 2017).

LPI found that 55% of teacher resignations and 66% of teachers who move schools list dissatisfaction in their school, compared to 18% of educators who leave teaching and 27% of teachers who change schools citing financial reasons (Carver-Thomas & Darling-Hammond, 2017). This demonstrates building climate and working conditions play a critical role in teacher retention.

Teacher Stress & Burnout

The AFT found all new teachers strongly agree (89%) or somewhat agree (11%) with the statement “I am enthusiastic about my profession” at the start of their career, while lower percentages of veteran teachers strongly agree (15%) or somewhat agree (38%) with this statement (2017). Approximately one in six veteran teachers (17%) strongly disagree with the statement “I am enthusiastic about my profession” (American Federation of Teachers, 2017).

In recent years, 46% of teachers reported high levels of stress, similar to findings of nurses (46%) and doctors (45%) (Farley & Chamberlin, 2021). In addition, 58% of teachers said their mental health was “not good” for at least seven days in the previous month. However, teachers in this same poll also had the 2nd highest average on the “Life Evaluation Index” where respondents reflect on their current lives and five years in the future (Gallup, 2014).

Pressley’s survey of 359 teachers (using a convenience and snowball sample) found that teachers had elevated anxiety around COVID–19, teaching, communicating with parents, and administrative support (Pressley, 2021). While the pandemic added stress for teachers as they adapted to new learning models, contact tracing, and other protocols, 80% of over 100,000 school staff respondents to the 2021 Virginia School Survey agreed or strongly agreed with the statement, “Overall, my school is a good place to work and learn” (Miller & Reynolds, 2022).

The AFT found 47% of their members found “time pressure” as the leading stressor in the workplace, outpacing “disciplinary issues,” “lack of ability to use the bathroom,” and “student aggression.” Over half of respondents (51%) rated their school facilities as “fair” or “poor” (American Federation of Teachers, 2017).

Olsen and Huang’s analysis of the 2011–12 Schools and Staffing Survey (the predecessor for the National Teachers & Principals Survey conducted by the National Center for Educational Statistics) found that principal support and teacher collaboration were the two most significant indicators of teacher satisfaction (2019). African American and Hispanic teachers held principal support in higher regard than their white peers,

while white teachers valued collaboration more than teachers of color (Olsen & Huang, 2019).

Edinger and Edinger's study of 122 elementary teachers in two rural school districts found that teacher efficacy is the most important predictor of teacher satisfaction, but perceived organizational support also plays a critical role in satisfaction (2018). Topchyan and Woehler found that full-time teachers have significantly higher job satisfaction than substitute teachers, but length of teaching career did not significantly influence satisfaction (2020).

Administrative Impact on Teacher Satisfaction

While dialogue around teacher turnaround often points to stress placed on special education teachers (Cancio et al., 2018; Hester et al., 2020), a case study by Ansley, Houchins, & Varjas found the staff of a school serving students with emotional disturbance to be generally satisfied (2019). Of the fifty-five survey respondents, teachers were generally pleased. Participants attributed job satisfaction to support teachers felt from administrators and colleagues at their school (Ansley, Houchins, & Varjas, 2019).

Ramos and Hughes survey of staff in an urban district with 26.5% teacher departures each year found disparities between teacher, parent, and administrative responses regarding the reasons for turnover (2020). Specifically, administrators downplayed the role of student discipline issues influencing faculty attrition, and administrators felt detached from student behavior issues. The researchers concluded, "Differences demonstrated through this study likely underscore why, in this instance at least, teachers report that they like their administrators more so personally than they feel they can rely on them professionally" (Ramos & Hughes, 2020, p. 14).

Organizational Dynamics & Community Decision-Making

Educational leaders face a wide range of decisions each day, many of which directly or indirectly affect hundreds of people. Policy debates in public education mirror the challenges of policy deliberations in the United States and influences on decision making often match those described by organizational theorists. The decision to rearrange school start times often reflects a practical case study in organizational dynamics and community decision making.

Organizational Theory

To casual observers, education policy decisions follow a simple and straightforward local hierarchy. The elected school board members provide direction for the superintendent, the superintendent directs school principals, and principals direct teachers, students, and staff. However, the political influences on local decisions create more ambiguity over what drives change within a school district.

Organizational theory studies the "management of collective effort through organizational design" (Greenwood and Miller, 2010, p. 78). Organizational theorists seek to explain the behavior of institutions by identifying structural and political patterns which can shape decisions. Acknowledging the roles of different stakeholders, hierarchies, and decision-making processes in shaping policy can help leaders understand the various sources of inertia and friction in organizational decisions.

While board members and administrators publicly discuss the needs of their school community, they often consciously or unconsciously consider external influences. Pfeffer and Salancik's research on external interference in organizational dynamics begins with the organization's concern for how they are viewed outside the organization

(1978). Specifically, school leaders must consider how state regulators, leaders in neighboring districts, and future home buyers in the community may view their decisions. While each district has autonomy on a wide range of policies, and even engages in competition with neighboring districts, charters, and private schools, the interdependence with other school districts and community organizations requires careful consideration (Pfeffer & Salancik, 1978). Specific to the debate of SST's, districts must consider how a change may affect coordination with other districts regarding alternative placements, vocational education programs, and interscholastic athletics.

While schools have transformed dramatically over the past decade in many ways, observers could also identify numerous elements of our public schools that have remained static and unchanged over the past fifty years. Hannan and Freeman discuss the importance of structural inertia in explaining change, or lack thereof, in organizations. Internal and external influences can play a major role in laying the foundation for development or reinforcing barriers to change. Organizations do not adopt changes on a whim — there must be considerable push and/or pull factors which influence such a shift. Turnover within an organization can help build internal inertia for change, as new leaders and staff bring new ideas and hold less attachment to organizational norms and traditions (Hannan & Freeman, 1984).

School leaders must also adapt to external inertia for change as broader social movements which diffuse through their school community. Local advocates often attach their goals to larger collective action frames to push for specific changes (Benford & Snow, 2000). Advocates for later SST highlight talking points to align their goals with

broader campaigns to improve academic achievement and address adolescent mental health concerns (Troxel & Wolfson, 2017).

Punctuated Equilibrium

In 1972, paleontologist Steven Jay Gould revolutionized scientists' perceptions of evolution. Gould's Punctuated Equilibrium Theory (PET) contested the Darwinian belief that species evolved in a slow, consistent, and gradual scale by arguing that fossils suggest species have long periods of consistency and subtle change (stasis) and short bursts of rapid evolution (punctuation). While researchers found little variation among fossils across multiple bedding plains, there were a limited number of bedding plains where fossils exhibited transformational change within the same sliver of geologic time. For comparison, Gould uses the example of the life of a human development, contrasting the rapid transformation during infancy and the slower aging process of adults (Gould, 1972).

While many theories have had problematic interpretations when shifting from explanation of physical sciences to explanations of social science (e.g., Social Darwinism, Environmental Determinism), PET has frequently been used to explain organizational dynamics and the evolution of agencies. Romanelli and Tushman summarize PET in organizational theory with a series of five hypotheses (1994):

- Transformations take place in short, discontinuous bursts (punctuated transformations)
- Minor changes over time do not add up to transformational change
- Transformation is more common when organization experiences declining performance
- Likelihood of transformation increases under environmental changes
- Likelihood of transformation increases under new leadership

Organizations which underwent a fundamental transformation most commonly did so in a period of less than two years (Romanelli & Tushman, 1994).

Gersick cautioned that general turbulence can mask deep structures in place for organizations which prevent punctuated transformation (1991). Flink's analysis of school district budgets in Texas reinforces this statement by demonstrating that teacher turnover and declining test results did not lead to dramatic transformations in budgetary decisions (2017). In addition, school districts that spend more than 8% of their annual budget on central administration, campus administration, and professional support were much less likely to experience a punctuated transformation than districts with less bureaucracy (Robinson, 2004).

The decision to shift school start times (SST) can have a transformational impact on a school district, influencing transportation, childcare, co-curricular programs, extra-curricular activities, and facilities scheduling. A review of school districts who adopted later SST can reveal the role of stakeholders and bureaucratic structures in the decision-making process of school leaders and provide more insight into the significance of PET in public education.

Garbage Can Theory

From 1968–1972, an era of arguably the most turbulent political and social upheavals in US history, four scholars at the University of California Irvine (a new university established in 1965) developed a cornerstone theory of organizational dynamics while informally sharing their research findings, often at a McDonald's restaurant. James March, founding dean of UC Irvine's School of Social Science, and Michael Cohen, March's research assistant, had been interviewing college presidents

from around the country. At the same time, Johan Olsen, a doctoral student from Norway, was studying the process of selecting deans at universities. Their collective studies of higher education led them to question the standard view that decisions in university settings can be characterized as orderly, rational actions (Cohen et al., 2012).

Prior to the garbage can model, scholars presumed that organizations made decisions following the rational decision-making process to identify the optimal solution for their firm. Reflecting on their research for the 40th Anniversary of the Garbage Can Theory, the authors shared that they discovered that competing interests and stakeholders inhibited the ability for universities to follow a rational process.

> We realized the educational institutions that we studied were typified by goals that were both ambiguous and in dispute. Only occasionally and with great difficulty and considerable hesitation could a course of action be derived from a single goal. Educational institutions were conflict systems in which different participants pursued different goals. Partly because of that, goals were expressed in terms that provided little concrete guidance in a specific case (Cohen et al., 2012, p. 21).

In 1972, "A Garbage Can Model of Organizing Choice," was published in Administrative Science Quarterly, providing a concise summary of Cohen, March, and Olsen's theory on decision making in "organized anarchies." Recognizing the lack of consistency in preferences, technology (processes), and participants in a university setting, Cohen et al. propose that decisions are made when problems, alternatives, decision makers, and choice opportunities all converge at the same time and space.

With more problems to solve than time or resources to solve them, decision makers address problems when practical to do so based on available solutions and support of other participants. All available options (ideas, people, resources) are mixed in the metaphorical "garbage can," and leaders essentially trash-pick from the can to match answers to problems from the pool of available preferences, processes, and participants.

In the end, problems are resolved when pragmatic opportunities appear rather than in an orderly, hierarchical process (Cohen et al., 1972).

Shortly after publication, the garbage can model was referenced regarding decision-making processes of many different types of organizations. In K–12 education, Tamir and Grabarski cite the increase in school autonomy in large school districts, creating more choice opportunities (2019). Specifically, decisions on budget allocation, staffing, and duty assignments can seem arbitrary when stakeholders do not understand all the competing influences and priorities that shape these decisions. For example, a project might get fast-tracked when a grant or donation becomes available which could fund a proposed solution to an identified problem. Similarly, teachers may not get their ideal class assignments because of competing demand for preferred courses or untimely turnover of staff (Tamir & Grabarski, 2019).

For decades, researchers have documented the problems associated with early high school start times, but the inertia for adopting solutions has not gained traction in many places because of competing priorities. Local school districts that adopt later SST often do so when unique situations present choice opportunities and/or transitions in school leadership.

Multiple Streams Framework

While garbage can theory focuses on the decisions of internal participants, a decision to adopt later SST generally includes more feedback from parents and community members outside the district leadership. Major policy changes require support from external stakeholders, and identifying such changes as agenda priorities often involve a mix of influences.

Building on Cohen, March, and Olsen's garbage can model, Kingdon's multiple streams framework (MSF) proposes a different approach to look at public policy as more of a convergence of three different "streams" than garbage can's preferences, processes, and participants (1995). The first stream, problems, focuses on the issues facing a community at a given time. The second stream, proposals, are policy goals that stakeholders are lobbying for over time. Finally, a third stream, politics, reflects the influence of competing government agencies, political parties, and public opinion. Each of these streams move independently, but the convergence of these streams presents an "open-policy window" where policies are moved up on the political agenda (Kingdon, 1995).

Reflecting on the research of MSF, Kingdon shared that social scientists looking to influence public policy need to adapt their research to meet the political needs of policymakers (Kingdon, 1993). The framework has been widely adopted and cited for over three decades and has been used to review government policy agendas across the planet (Rawat & Morris, 2016).

MSF has been used to frame and analyze numerous areas of public policy, including education policy initiatives. Researchers attribute the adoption of dyslexia education policies in 41 states to the policy window that emerged after the No Child Left Behind Act of 2001 (NCLB) forced state legislatures to re-evaluate their school systems (Gearin et al., 2020). In addition, the deadline for NCLB's 100% student proficiency created urgency for a policy exit ramp to avoid sanctions on states and LEA's that could not meet 100% proficiency, creating a policy window for NCLB Waivers based on criteria set by the Obama Administration (Angervil, 2021).

Stout and Stevens utilized MSF in a case study on a failed effort in Minnesota to create a state policy on multicultural and gender balanced curriculum during the 1990's (2000). With an opinion piece in the Minneapolis Star Tribune (and the state board of education's political inability to respond) serving as a tipping point in the debate about the policy, the authors argue that Kingdon under-valued the role of the media in shaping open-policy windows (Stout & Stevens, 2000).

While MSF was framed around federal policy settings, researchers have questioned the usefulness of this model at more local levels. Robinson and Eller surveyed Texas school superintendents on their respective district's violence prevention programs (2010). Their quantitative analysis rejected that the problem, proposal, and politics streams move independently at the local level, and found no evidence of "organized interests" dominating the policy conversation (Robinson & Eller, 2010).

While advocates for later SST have lobbied for their proposal for years independently, there is reason to believe they find policy widows when they can attach their goal to other identified problems, such as growing concerns of adolescent mental health, and/or shifting politics, such as administrative changes.

Education Policymaking

Since the early days of the American republic, decisions regarding public education have been woven into the democratic fabric of our government. Thomas Jefferson helped establish the first public grammar schools, and divided Virginia's counties into smaller regions to feed into these schools. Each local "ward" established their own board of "aldermen" to make decisions regarding the management of their local

schools, creating local, accessible democratic structures to teach public engagement to community members (Shirley, 2011).

As the nation has grown, the educational structures at each level of government (local, state, and federal) have also grown and become more interwoven. School policy evolves from the political and pragmatic interests of state legislators and bureaucrats, local school boards, school administrators, faculty/staff.

Federal & State Policymakers

Education policy reflects the complexities of federalism in the US. With competing political actors in the legislative and executive branches at federal and state levels, school districts must align local policies with mandates and guidelines from higher levels of government.

Asada et. al. studied the local impact of a federal mandate in 2006 for all school districts to adopt a local school wellness policy (2021). Focus groups of superintendents revealed initial resistance from students regarding new nutritional policies, but the policies gained acceptance over time. When the US Department of Agriculture offered more "flexibility" to implementation as part of greater deregulation, few superintendents loosened their districts' standards. Still, districts struggled to evaluate their policies, and only 22% of states monitored districts for compliance of local wellness policies (Asada et. al., 2021).

School Board & Community Influence on Policymaking

School boards are the chief legislative body of local education agencies, and they play a primary role in approving school policies. Amidst the COVID–19 pandemic,

school board meetings became must-see-TV spectacles, shortly followed by a national backlash over school curriculum and diversity initiatives (Kogan, 2022).

The broader history of school board meetings may not have always held the same universal urgency, but the political nature of school boards adds to the unpredictability of the school policymaking process. As one of the most local forms of governance, citizens are more active in school board policy debates and elections, creating a colorful and unique dynamic in the US democratic experience.

Kirst identified numerous changes in board structure influencing school governance (1994). For example, the city of Philadelphia had 43 separate school boards with 559 school board members in 1905, representing a localized, ward-based structure which has since been centralized. While superintendents held more authority over school governance from the 1920's to 1950's, boards today are more active and responsive to community input (Kirst, 1994).

In 1968, McCarty and Ramsey published an article categorizing school board power structures into four groups, based on focus groups conducted with superintendents, school board members, and formal and informal community leaders. Some districts have dominating faction of community leaders who endorse board members who will follow their advisement, leading the superintendent to serve as a functionary of their interests. Another class of districts have multiple rival factions represented on the board competing for power and influence, forcing the superintendent to balance the political landscape. The next class of districts maintain a pluralistic power structure, where majority vote carries more weight than existing community alliances, allowing the superintendent to serve as a professional advisor. The final class of districts has no defined power structure,

allowing the superintendent to serve as the primary decision maker (McCarty & Ramsey, 1968).

Greene's study of New Jersey school boards found that nearly 60% of the boards could be categorized in the "professional model," identifying school governance as a technical process (1992). The remaining 40% of boards viewed school governance from a "political model," reflecting a bargaining process between board members. superintendents and community members. However, there was limited relationship between the board's orientation and the effectiveness of school governance (Greene, 1992).

Researchers have studied the demographics of board members to identify patterns of difference in board participation and motivation. Bartanen, et al. ran a geographic information system analysis (GIS) of candidates who ran for school board in 610 Ohio school districts over two election cycles and found that residents of more affluent census blocks were more apt to run and win school board elections on a percentage basis (2018).

Mountford interviewed 20 school board members and found split motivations for joining the board, ranging from personal to altruistic (2004). While all eleven male board members rated towards the middle of the scale, three of nine female board members scored highly personal motivation for serving and two of nine female board members scored highly altruistic motivation for joining the board. Competing motivations for service can create challenges for superintendents to navigate when developing district policy (Mountford, 2004).

Blissett and Alsbury's analysis of a national survey of school board members utilized a multiple streams framework to review policy priorities (2018). They found

black school board members in communities where black residents were the smallest proportion of the district population registered the most divergent views from their white colleagues (Blissett & Alsbury, 2018).

In terms of policy and decision making, researchers have found the interaction between board members and school leaders can have important ramifications. Newton and Sackney applied a Critical Decision Making (CDM) model to their interviews of members of several Ontario school boards and film reviews of public meetings connected to non-routine decisions the boards faced (2005). The study found communication patterns between board members and school administrators heavily influenced decisions, and researchers recommended boards dedicate time in their orientation/retreat meetings to discuss the communication culture of their district to ensure everyone is on the same page (Newton & Sackney, 2005).

Asen et. al. studied three Wisconsin districts where school boards and community members sought to reference research when deliberating on policy items (2013). Policy advocates frequently cited research as evidence in support of their position, but different audience members viewed the research with their own unique lens. Other contextual factors can also influence the reception of research-based arguments from board members and community members (Asen et. al., 2013).

Collins studied the influence of meeting structure on the public trust in the policymaking process (2021). Using a random sample, participants were shown film of school board meetings with one of three formats: meetings with no public participation, meetings with public comment, and meetings with public comments followed by board member responses. Participants who watched meetings involving board deliberation and

response to the public comments expressed increased trust in the board members and a greater willingness to attend future meetings.

Superintendent Influence on Policymaking

As the chief administrative officer of a school district, the superintendent plays a vital role in school policy. While the school board holds the legislative authority for school policy, the superintendent's voice can shape the conversation as the leading executive in the district. In particular, they play a vital role in promoting good governance among board members and maintaining a consistent vision for the district amid board turnover (Bridges et. al., 2019).

Researchers have noted that the demographic characteristics of superintendents often do not match those of the broader school faculties. While women generally held school executive positions in the 19th century (partly due to differences in wages by gender), school boards began hiring men for superintendent positions more commonly as reform efforts sought to make public schools more professionalized and bureaucratic. While the number of female superintendents has increased recently, male candidates are often hired on the perception of better business and managerial experience, while female candidates are hired on the perception of providing better instructional leadership (Maranto et. al., 2018).

Furthermore, Bredeson and Kose found superintendents utilized external accountability policies to redevelop local instructional policies (2007). Analyzing surveys of all 426 superintendents of one state conducted in 1993 and 2003, the researchers found an increased investment in curriculum and instruction in the second survey. In 2003, 48.4% of respondents said superintendent involvement in curriculum and instructional

leadership had increased over the prior five years, compared to 34.1% in 1994. Federal and state programs, specifically the No Child Left Behind Act of 2001, redirected superintendents' attention back to instructional leadership in their districts, which often falls behind budgeting, staffing, and public relations on the superintendent's priorities (Bredeson & Kose, 2007). These findings mirror a case study from Michigan where a local district utilized new state policy changes to justify a curriculum overhaul (Spillane, 1996), and other surveys documenting the shifting priorities of school superintendents (Andero, 2000).

While federal and state policy guide superintendents' actions, the chief executive of the district still must interpret the implications of these policies for their local situation. Donaldson et al., interviewed superintendents to learn about their district's principal evaluation system (2021). While most states have evaluation frameworks for school administrators, only 29% of superintendents interviewed implemented state guidelines consistently. Superintendents in lower-performing districts were more apt to follow state guidelines strictly, but superintendents in mid-performing and high performing districts modified the process. One superintendent described evaluation as "fluid, constantly evolving," while another argued state guidelines are "a surface level tool" (Donaldson et al., 2021, p. 6).

Reflecting on the growing role of community interest groups on school policy, some scholars argue that superintendents must embrace the political nature of their role to provide more support for students. With 57% of survey respondents (sample of 5,336 of population of 12,604) confirming community pressure groups which influences district

decisions, Björk and Lindle argue superintendents must sacrifice some impartiality in board politics to provide more professional guidance (2007).

Petersen and Short interviewed school board presidents to learn about their perceptions of their superintendents and their board's decision-making process (2002). The researchers found that strong interpersonal communication skills of a superintendent are critical to building support from board members on agenda items with immediate consequences to the district (Petersen & Short, 2002).

Principal Influence on Policymaking

Limited research is available about the role of principals in creating district and school policies. However, there are studies on the role of principals in carrying out school policies in their buildings.

Coburn's ethnographic study of a school's response to the California Reading Initiative (2006) outlined the challenges principals face in framing and implementing policy. In this case study, differing interpretations of problem framing created friction between administration and faculty, preventing consensus and actions toward solutions (Coburn, 2006).

J. Cohen et al. surveyed and interviewed principals in New York City to study variability in teacher evaluations (2020). While some reformers questioned the effectiveness of state evaluation systems for teachers, the researchers found that the existing system functioned when implemented with fidelity. Specifically, researchers found that principals with support and greater perceived agency could use the evaluation protocol and tenure policies strategically to support effective teachers and take disciplinary action when necessary (J. Cohen, 2020).

Teacher Influence on Policymaking

When it comes to policy development, teachers often feel left out of the discussion. In 1986, both the Carnegie Foundation and the National Governors' Association called for improving teacher voice in school decisions (Conley, 1991). However, policymakers never followed through on this initiative.

In 1994, only 39% of teachers believed they had significant influence over discipline policy and only 37% believed they had significant influence over establishing curriculum (Nelson, 1994). Using data from the 1990 Schools and Staffing Survey (predecessor to NTPS), Jackson found that teachers who believed they had an influence on school policy showed a greater likelihood of staying in their school (2012).

Analyzing data from 900,000 teacher responses to the Teaching, Empowering, Leading and Learning (TELL) survey, Ingersoll, Sirinides, and Dougherty (2018) found most teachers felt accountable to high standards, but fewer felt supported by leaders, felt an atmosphere of trust, or the ability to raise concerns, on a percentage basis. Teachers did not feel included in the development of behavior policies, school improvement planning, or professional development planning (Ingersoll, Sirinides, & Dougherty, 2018).

A school's organizational structure can also restrict teacher policy influence. A study of 1,427 New York City public schools in 2015 found that teachers in charter schools had less influence on school policy than traditional public schools. The researchers acknowledged that responses of charter schoolteachers may be skewed based on teacher expectations. Teachers may have opted to work in a charter school anticipating greater freedom and autonomy, given the rhetoric presented by charter schools, only to be

disappointed that teacher voices do not carry the weight they expected. (Shannon & Saatcioglu, 2018).

This is problematic as teachers play a critical role in implementing school policy, as they work closest with students. When teachers do not support policy changes, they may jeopardize the effectiveness of the policy by not implementing it with full fidelity. (Kumar & Scuderi, 2000). Stosich found that administrative structures often limited teacher input on instructional leadership teams, but schools which gave teachers more voice in policy decisions reached improved decision quality and fidelity of implementation (2021).

Policies & Practices Related to Instructional Time

One of the most basic responsibilities of local school districts involves the establishment of a school calendar and the hours of instruction. While this task may sound simple, decisions about instructional time can have broad impacts on families and staff. As a result, modifications to school calendar or schedules often require careful evaluation and reflection. While school leaders generally wish to make these decisions in the best interest of students, the effectiveness of these changes is not always apparent.

Instructional Time & Student Achievement

Each of the fifty US States and the District of Columbia mandate a minimum number of instructional minutes and/or instructional days for K–12 students, but these mandates vary state to state. For example, New Jersey requires 1,080 hours, Delaware requires 1,060 hours, and Pennsylvania Requires 990 hours of instructional time for students in grades 7–12 (NCES, 2020).

Yesil Dağlı reviewed the existing literature regarding increases in instructional time in the US (2019). His findings concluded that increasing instructional minutes is related with improved student achievement, but schools face diminishing marginal improvements with more added time. Specifically, reading and math achievement decreased when instructional time extended beyond six hours per week in either subject (Dağlı, 2018).

In 2012, the Florida legislature mandated that the lowest performing schools extend their instructional day by a minimum of one hour. While this policy did improve student achievement, the 0.05 standard deviation improvement cost an estimated $800 more per student. As a result, policymakers were left to evaluate if additional instructional time provided the most efficient investment for student achievement (Figlio, Holden, & Ozek, 2018).

Cattaneo, Oggenfuss, and Wolter found that an additional hour of instruction only yielded 30–40% of the anticipated gains in student achievement when reviewing performance on the Program for International Student Achievement (PISA) exam (2016). In addition, the research team found that increased instructional time increased the variance of test results, rather than closing achievement gaps (Cattaneo, Oggenfuss, & Wolter, 2016).

A late policy change in the Madrid region of Spain moved up the standardized assessments for 7th to 10th grade students, effectively cutting two weeks of instructional time off the 2017–18 school year prior to the exams. This quasi-natural experiment revealed a decrease in standardized test scores, but the working paper revealed more

pronounced declines for students at the 75th percentile than those at the 25th percentile (Sanz & Tena, 2021).

Year-Round School Calendars

Some education reformers have called on a reform of the traditional school calendar and the elimination of the summer break. Arguing the traditional model is a relic of the agrarian age, advocates for year-round schooling point to the inequity of learning loss which takes place over summer vacation (Finnie et al., 2019). In our 2017-18 NTPS data set, 2.5% of respondents work in a year-round school.

McMullen and Rouse found year-round schooling had no impact on the academic achievement, controlling for other variables, in 22 schools in Wake County, NC which switched from a traditional model to a year-round model, as the calendar offered more frequent, shorter breaks instead of one long summer break (2007). Finnie et al. also found insufficient evidence of academic benefits of a year-round model in their literature review (2019). Brusseau et al. found elementary age students attending year-round schools tested better on the PACER cardiovascular test in physical education and reported lower BMI gain than students attending schools with the traditional calendar, but acknowledged participation in sports and summer camps can offset these differences (2019).

Four-Day School Weeks

Another intriguing trend in school scheduling involves the pattern of rural school districts adopting a four-day school week with longer school days than the traditional five-day week. Originally conceived to reduce transportation and facility utility/maintenance costs, the concept has gained popularity in rural districts in several western US states.

Anderson & Walker (2015) compared 4th & 5th grade results on the Colorado State Assessment Program (CSAP) between schools with four-day and five-day instructional schedules and found a positive relationship between a four-day week and student test scores. These findings were statistically significant, but not substantive, and called for further study for other age groups (Anderson & Walker, 2015).

In contrast, Thompson found declines between 0.044 and 0.054 standard deviations among Oregon students with four-day schedules (2019). However, Thompson et al. later reported wide disparities in the implementation of four-day school weeks, including which day in the week was taken off, student and teacher activities offered on the "off day," and number of instructional minutes in a week, explaining different findings on student achievement between districts adopting a four-day model (2021).

Morton found Oklahoma school districts which adopted a four-day school week decreased annual expenses by 2.03% while maintaining a null effect on student achievement (2021). The savings largely came from operations, transportation, and food service, (Morton, 2021).

Turner, Finch, & Ximena surveyed faculty samples from three Missouri school districts which switched to a four-day week (2018). Of the 136 respondents, 87% agreed or somewhat agreed the four-day week "had a positive impact on what is taught in class," 91% agreed or somewhat agreed the four-day week improved staff morale, and 60% agreed or somewhat agreed the four-day week helped prevent at-risk students from dropping out (Turner, Finch, & Ximena, 2018).

Public Debate on School Start Times

Despite the canon of research supporting delaying start times, the logistical barriers continue to prevent educational leaders from backing up the later start of high school classes. Even before the rapid transformations sprung by the pandemic, schools have adapted to countless changes in the 21st century, including federal and state school accountability mandates, increased reliance on instructional technology and course management systems, accommodations for a growing population of non-native English language students, and the continued evolution of special education services. The hurdles of changing start times seem too tall for most districts. Still, advocates for later SST have been actively organizing community members to adopt the policy change through a variety of methods to persuade districts to move the bell schedule closer to students' circadian rhythm.

Barriers to Adopting Later SST

School bell schedules have a profound impact on the whole community, and most school administrators do not wish to disturb the status quo, particularly when there are so many mandated changes. In a 2005 national study of 4,116 high schools, 40% of responding school administrators had considered changing class times (Wolfson & Carskadon, 2005). However, most of these school districts were not considering later start times for their high schools: 17% of respondents considered later start times, 12% of respondents considered earlier start times, and 11% only considered changing end times. Athletic practices were the most cited challenge with changing school start times (55%), but teacher concerns (32%), transportation concerns (30%), and parent concerns (28%) also posed barriers to change. When asked about current bell schedules, high schools in

districts utilizing two or three bus tiers were most likely to report earlier start times, which implied that delaying start times could increase transportation costs or require elementary students to wait at bus stops before sunrise (Wolfson & Carskadon, 2005).

Shortly after Minneapolis adopted later high school start times, local superintendents in surrounding districts were asked about the concept in a forum. Despite positive feedback in Minneapolis, other superintendents would not raise the topic in their districts fearing political backlash (Wahlstrom, 1996).

Public Awareness Campaigns Regarding School Start Times

The National Sleep Foundation compiled a series of case studies of campaigns which successfully promoted later school start times in their communities, and the foundation published a stand-alone special issue of their academic journal Sleep Health on SST (Troxel & Wolfson, 2017). Guest editors Troxel and Wolfson explained the significance of sharing case studies as a means of providing practical ideas for implementation and reducing pressure on school leaders to "reinvent the wheel" (2017).

A group of pediatricians in southern Maine banded together to lobby for several local school districts to make the change in unison (Collins et al., 2017). The strategy to push several districts to move as a block to later SST came from a need to align each school's SST with the regional vocational technical high school that serves multiple districts. When students at one high school expressed concerns about the impact delaying the start time would have on homework, administrators arranged for these students to meet with students at another school which recently went through a similar transition to reassure them. With special permission from the Maine Municipal Association, the

districts involved held a joint vote, approving the change to bell schedules across all participating districts (Collins et al., 2017).

Cherry Creek School District in suburban Denver, serving a population of 300,000 residents and 54,695 students, focused on community engagement in the decision making process (Meltzer et al., 2017). By holding community meetings and using several rounds of online surveys, school leaders were able to build consensus around a schedule change. While the district regularly surveys stakeholders about potential changes, the response rates among parents (36%), students (40%), and staff (45%) were unprecedented for the district. The district learned that 65% of respondents believed high school students should start class between 8:00 and 8:30 AM, but support dropped for proposals starting later than 8:30. The district was also able to analyze the data further to differentiate perceived concerns and true concerns of the community. For example, 57% of all respondents stated it was important for older students to be dismissed before younger students for childcare. However, the district realized that 76% of students felt dismissing older students later would pose childcare concerns, yet only 46% of adults (parents and staff) felt it was important to dismiss older students first. In the end, the district settled on bell schedules of 8:00–2:45 for elementary students, 8:20–3:30 for high school students, and 8:50–3:45 for middle school students (Meltzer et al., 2017).

Malone, Ziporyn, and Butterheim focused on research in human behavioral tendencies which could influence advocacy efforts (2017). As humans accept the default option over making changes, the researchers suggested states establish a default start time for school districts that aligns with medical recommendations and require districts to

justify setting up bell schedules before the start time. In addition, the researchers suggested promoting adolescent sleep needs as an important social norm (similar to vaccination), and streamlining messaging about school start times (Malone, et al., 2017).

Finally, the special issue of Sleep Health focused on legal strategies that can be implemented by advocates if they feel litigation could induce faster action than legislation (Lee et al., 2017). A lawsuit on behalf of students against a district could argue the district failed to meet its obligations to provide a healthy learning environment, established time requirements with an adverse effect on students, or acted in negligence of existing research on the adverse effect of early high school start times. However, the authors acknowledge the challenges of winning in court and that litigation can sour public opinion on the topic as others pursue local changes (Lee et al., 2017).

Research Questions

Several researchers have studied the impact of school start times on student performance and mental health, and many others have studied the influences on teacher satisfaction and burnout. Organizational theory can also provide insight on how school leaders reach decisions to change their start times in their district. While surveys of teachers' thoughts and concerns about the logistical implementation of later school start times, there is limited objective research on how the structure of the school day can impact teachers.

Using a nationally representative sample of educator survey responses, this study investigated the role school start time has on the health and satisfaction of schoolteachers. Specifically, the study addressed the following research questions:

1. What are the differences among school districts and schools as to established starting times?
2. What are the differences among teachers by the starting times of the schools they work in? Gender differences? Racial/ethnic differences? Teacher efficacy?
3. Controlling for differences among the respondents, how is job satisfaction affected by different school starting times?

Chapter 3

Methodology

This study involved a secondary analysis of survey responses to a nationally representative sample of public school teachers as part of the 2017–2018 *National Teachers and Principals Survey* (NTPS). The data collected by the NTPS allowed for comparisons of teacher job satisfaction based on school profile, teacher experience, and teacher demographic profiles.

Secondary analysis uses existing, accessible data for research purposes, avoiding the numerous challenges of data collection. This allows for more efficient use of time and resources for conducting research, particularly when existing data provide larger data sets than the researcher could generate independently (Johnston, 2014; Smith, 2008). Skeptics of secondary analysis argue that this form of research relies on the reliability and validity of the previously collected data and is subject to data collection errors. Using official government data, such as census data or other vetted surveys, can alleviate concerns (Smith, 2008).

Data Collection

NTPS is a program within the US Department of Education's National Center for Education Statistics (NCES). In this survey program, NCES has surveyed principals and teachers on a regular basis for over three decades. Previously known as the *Schools and Staffing Survey* from 1987-2011, the program was remodeled as NTPS for the 2015-16 school year and replicated in the 2017-18 and 2020-21 school years. NTPS involves six separate surveys in each data collection window – three for public schools and three for private schools (NCES, 2022).

To identify public schools for participation, NCES used its Common Core of Data (CCD) to develop a sampling frame of publicly funded schools serving grades 1–12 in the 50 states and District of Columbia. US territories, protectorates, and Department of Defense overseas schools were excluded (NCES, 2019).

Data collection proceeded through three stages. After schools were selected by NCES from the sampling frames, surveys were sent out each school to compile data about the school's enrollment, programs, curriculum, and student body demographics. Significant to this study, the survey for schools specifically asked for the official start time and official end time of classes on a typical school day. Next, principals of participating schools were surveyed on their administrative experience, school climate, principal engagement, principal and teacher evaluation, and professional development (PD). These surveys provide a snapshot of administrative outlook on participating schools and the broader field of education. Finally, teachers at participating schools were surveyed on their teaching experience, content area, school climate, teacher engagement, evaluation, and PD. These surveys also collected demographic information of respondents, which allows for analysis within cohorts of the sample (NCES, 2019).

The surveys are linked together, allowing researchers to link teacher responses to the corresponding school's data. Therefore, researchers can compare teacher responses which relate with their job satisfaction with information about school start times and community demographics.

Sampling Frames

The 2017–18 NTPS selected 10,600 schools to participate, with a response rate of 72.5% on the school survey. All principals of participating schools were asked to participate in the principal's survey, with a response rate of 70.2% (NCES, 2019).

Any staff member who taught a regularly scheduled class at a participating school was included in the sample frame. Schools were asked to submit a Teacher Listing Form (TFL) with a roster of staff who met this qualification, and a sample of teachers from each TFL submitted were surveyed. With 87.1% of selected schools returning a TFL and 76.7% of selected teachers responding, the effective response rate for the teacher survey was 67% (NCES, 2019).

NCES adjusted the design of the 2017–18 NTPS from the 2015–16 surveys to ensure that adequate samples were collected for state level estimates for public schools, public school teachers, and public school principals. The 2015–16 sample was only designed to produce national level estimates (NCES, 2019).

Sample Characteristics

The 2017–18 NTPS received 44,320 responses from teachers, representing a broad cross-section of the workforce in public education. The survey for public school teachers included public charter schools and public schools with special programs, including magnet schools, gifted schools, special education schools, vocational/technical schools, and alternative schools (NCES, 2019).

School Characteristics

Teacher responses were linked to the school survey of their workplace, allowing a review of school characteristics of the sample schools. A greater percentage of

elementary school (12,360, 94.3%) and middle school (9,680; 93.6%) respondents worked in a regular school, without special programming, than high school (10,190; 86.4%) or combined school (3,830; 83.8%) respondents. Specifically, a notable number of high school respondents (530; 4.5%) worked in career/technical/vocational high schools and combined school respondents (340; 7.5%) worked in an alternative school setting with a non-traditional curriculum. See Table 3.1 for further details.

Table 3.1

NTPS teacher respondents school level by program offerings

School level	Regular school programs	Special program emphasis	Special education school	Career/ technical/ vocational school	Alternative/ other school	Total respondents
Primary	12360 (94.3%)	440 (3.4%)	150 (1.1%)	10 (0.1%)	140 (1.1%)	13100 (100%)
Middle	9680 (93.6%)	440 (4.2%)	60 (0.6%)	10 (0.1%)	160 (1.5%)	10340 (100%)
High	10190 (86.4%)	400 (3.4%)	100 (0.9%)	530 (4.5%)	570 (4.8%)	11790 (100%)
Combined	3830 (83.8%)	200 (4.3%)	180 (4.0%)	20 (0.4%)	340 (7.5%)	4570 (100%)
Total	36060 (90.6%)	1470 (3.7%)	490 (1.2%)	560 (1.4%)	1210 (3.0%)	39800 (100%)

χ^2= 2,244.09, $p < .001$, Cramer's V = .137

Note: Per IES guidelines, all unweighted sample sizes were rounded to the nearest 10

The teachers were distributed across the school levels. A greater percentage of female teachers work in elementary schools (13,370; 40.5%) than male teacher (1,230; 10.8%). On the other hand, a greater percentage of male work in high schools (5,430;

47.9%) than female (7,830; 23.7%). Gender and school level were statistically significant (χ^2= 4,061.70, $p < .001$). See Table 3.2 for further details.

Table 3.2 Gender of NTPS Teacher Respondents by School Level

Gender	Elementary	Middle	High School	Combined	Total
Male	1,230 (10.8%)	3,030 (26.7%)	5,430 (47.9%)	1,650 (14.6%)	11,350 (100%)
Female	13,370 (40.5%)	8,460 (25.7%)	7,830 (23.7%)	3,320 (10.1%)	32,970 (100%)
Total	14,600 (32.9%)	11,490 (25.9%)	13,260 (29.9%)	4,970 (11.2%)	44,320 (100%)

χ^2= 4,061.70, $p < .001$, Cramer's V = .303

Note: Per IES guidelines, all unweighted sample sizes were rounded to the nearest 10

The US Department of Education provides federal grants, known as Title I programs, to provide additional supports for students experiencing poverty. These funds allow for schools to pay for curriculum materials, PD, intervention programs, and other supports (PA Dept. of Education, 2023). A greater percentage of teacher respondents at the elementary level (8,250; 62.6%) worked in schools with building-wide Title I programs than middle school (5,490; 52.7%) or high school respondents (4,920; 41.5%). On a percentage basis, respondents working in suburban communities were less represented among school-wide Title I programs. At the elementary level, a higher percentage of respondents working in city (2,890; 71.8%), town (1,460; 73.9%), and rural communities (1,810; 65.2%) have building-wide programs compared to suburban respondents (2,080; 47.3%). Similar differences exist at middle school, high school, and combined grade level schools. School community density and Title I programs are statistically significant (χ^2 = 2348.55, $p < .001$,). See Table 3.3 for further details.

Table 3.3

NTPS Teachers' School Level and Density by Title I Services

School level / Density	School not eligible for Title I services	School eligible for partial Title I services	School eligible for school-wide Title I program	Total
Elementary School Teachers				
City	930 (23.1%)	200 (5.1%)	2,890 (71.8%)	4,030 (100%)
Suburb	1,300 (25.6%)	1,020 (23.1%)	2,080 (47.3%)	4,400 (100%)
Town	260 (13.0%)	260 (13.1%)	1460 (73.9%)	1,980 (100%)
Rural	390 (14.0%)	580 (20.8%)	1810 (65.2%)	2,780 (100%)
Total	2,880 (21.8%)	2,060 (15.6%)	8,250 (62.6%)	13,180 (100%)
Middle School Teachers				
City	940 (31.0%)	160 (5.3%)	1,920 (63.7%)	3,020 (100%)
Suburb	1,460 (38.0%)	910 (23.5%)	1,480 (38.4%)	3,840 (100%)
Town	400 (25.8%)	170 (11.1%)	970 (63.1%)	1,540 (100%)
Rural	480 (23.8%)	420 (20.8%)	1,120 (55.4%)	2,020 (100%)
Total	3,280 (31.4%)	1,660 (15.9%)	5,487 (52.7%)	10,420 (100%)
High School Teachers				
City	1,430 (39.2%)	290 (8.1%)	1,920 (52.7%)	3,640 (100%)
Suburb	2,090 (48.7%)	840 (19.7%)	1,360 (31.6%)	4,290 (100%)
Town	780 (42.8%)	180 (10.5%)	750 (43.7%)	1,710 (100%)
Rural	950 (42.7%)	380 (17.0%)	900 (40.4%)	2,230 (100%)
Total	5,250 (44.2%)	1,700 (14.3%)	4,920 (41.5%)	11,860 (100%)

Table 3.3 (Continued)

NTPS Teachers' Level and Density by Title I Services

School level / Density	School not eligible for Title I services	School eligible for partial Title I services	School eligible for school-wide Title 1 program	Total
Combined School Teachers				
City	370 (36.3%)	60 (6.3%)	580 (57.5%)	1,010 (100%)
Suburb	420 (42.6%)	220 (22.0%)	350 (35.4%)	990 (100%)
Town	220 (37.4%)	80 (14.1%)	290 (48.6%)	590 (100%)
Rural	460 (22.7%)	470 (23.1%)	1,090 (54.2%)	2,020 (100%)
Total	1,470 (31.8%)	830 (18.0%)	2,310 (50.2%)	4,600 (100%)
All NTPS Teachers				
City	3,660 (31.3%)	720 (6.2%)	7,310 (62.5%)	11,690 (100%)
Suburb	5,270 (39.0%)	2,980 (22.1%)	5,270 (39.0%)	13,520 (100%)
Town	1,660 (28.5%)	690 (11.9%)	3,460 (59.6%)	5,810 (100%)
Rural	2,280 (25.2%)	1840 (20.4%)	4,920 (54.4%)	9,050 (100%)
Total	12,870 (32.1%)	6,240 (15.6%)	20,970 (52.3%)	40,070 (100%)

Elementary School $\chi^2 = 1{,}046.65$, $p < .001$,, Cramer's V = .199

Middle School $\chi^2 = 774.14$, $p < .001$,, Cramer's V = .193

High School $\chi^2 = 475.08$, $p < .001$,, Cramer's V = .142

Combined School $\chi^2 = 287.71$, $p < .001$,, Cramer's V = .177

Total $\chi^2 = 2{,}348.55$, $p < .001$,, Cramer's V = .171

Note: Per IES guidelines, all unweighted sample sizes were rounded to the nearest 10

Of the 44,320 teacher respondents, 4,610 worked in a charter school. When controlling for charter school employment, a greater percentage of teacher respondents work in an elementary school level (1,560; 33.9%) than at the middle school (1,080; 23.4%) or high school level (1,180; 25.6%). Of the 4,607 teacher respondents who work in a charter school, more than half (2,450; 53.2%) work in a city. At the same time, only 420 (9.1%) of charter teacher respondents work in a rural setting. These differences were statistically significant at the .001 level. See Table 3.4 for more details.

Table 3.4

NTPS charter schoolteacher respondents' community density by school level

Density	Elementary School	Middle School	High School	Combined School	Total charter respondents
City	810 (33.0%)	580 (23.7%)	690 (28.0%)	370 (15.3%)	2,450 (100%)
Suburb	540 (35.8%)	330 (22.3%)	380 (25.1%)	250 (16.8%)	1,500 (100%)
Town	70 (27.8%)	70 (27.8%)	50 (21.6%)	60 (22.8%)	240 (100%)
Rural	150 (36.3%)	100 (23.4%)	70 (15.8%)	100 (24.6%)	420 (100%)
Total	1,560 (33.9%)	1,080 (23.4%)	1180 (25.6%)	780 (17.0%)	4,610 (100%)

χ^2= 54.58, $p < .001$, Cramer's V = .063

Note: Per IES guidelines, all unweighted sample sizes were rounded to the nearest 10

Of NTPS teacher respondents who work in charter schools, a larger percentage of them worked in independent/stand-alone charter schools (2,010; 34.7%) compared to respondents working in a non-profit network (1,240; 27.0%) or a for profit network (260;

5.7%). Further, a larger percentage of high school teacher respondents worked in an independent charter school (47.9%) than did elementary teachers (650; 41.5%) or middle school teachers (450; 41.5%). Meanwhile, a greater percentage of elementary school respondents (340; 21.5%) and middle school respondents (250; 23.1%) worked in a charter school managed by a traditional public school district than high school respondents (190; 16.2%). The relationship between school level and charter organization model is statistically significant (χ^2= 44.66, p < .001). See Table 3.5 for more details.

Table 3.5

NTPS Charter Teacher Respondents School Level by Charter Management

School level	Independent or stand-alone charter school	Non-profit charter organization or network	For-profit charter organization or network	Part of a traditional school district	Other	Total charter schoolteachers
Elementary	650 (41.5%)	410 (26.3%)	110 (6.7%)	340 (21.5%)	60 (4.0%)	1,560 (100%)
Middle	450 (41.5%)	300 (27.4%)	60 (5.6%)	250 (23.1%)	30 (2.3%)	1,080 (100%)
High	560 (47.9%)	340 (28.6%)	40 (3.7%)	190 (16.2%)	40 (3.6%)	1,180 (100%)
Combined	350 (44.6%)	200 (25.4%)	50 (6.5%)	170 (21.1%)	20 (2.4%)	780 (100%)
Total	2,010 (43.7%)	1,240 (27.0%)	260 (5.7%)	940 (20.4%)	150 (3.2%)	4,610 (100%)

χ^2= 44.66, p <.001, Cramer's V = .057

Note: Per IES guidelines, all unweighted sample sizes were rounded to the nearest 10

Principal Characteristics

While this study primarily focused on teachers and the schools where they worked, the NTPS data allowed for teacher respondents to be linked to responses by their school's principal on the NTPS Principals Survey. It is important to note that the tables below represent the number of teachers with principals meeting the corresponding characteristics, not the number of principals themselves who responded. As a result, some of these findings may over-represent principals with larger staff and under-represent principals with a small faculty.

On a percentage basis, teacher respondents most commonly work for principals who served as classroom teachers for 6–10 years before entering administration (15,440; 39.3%). A greater percentage of teacher respondents work for male principals with 0–5 years teaching experience (3,970, 19.1%) than female principals with 0–5 years teaching experience (2,500, 13.5%). In addition, a greater percentage of teacher respondents work for female principals with 16 or more years teaching experience (4,520, 24.4%) than respondents who work with male principals with similar teaching experience (3,200, 15.4%). This statistically significant ($\chi^2 = 322.84$, $p < .001$) relationship between principal gender and principal teaching experience suggests male principals move into administration earlier than female principals. See Table 3.6 for further details.

Table 3.6

Principal's gender by principal's teaching experience (Corresponding NTPS Teachers)

Gender	0–5 years	6–10 years	10–15 years	16+ years	Total
Male	3,970 (19.1%)	8,850 (42.5%)	4,790 (23.0%)	3,200 (15.4%)	20,810 (100%)
Female	2,500 (13.5%)	6,590 (35.6%)	4,890 (26.4%)	4,520 (24.4%)	18,490 (100%)
Total	6,470 (16.5%)	15,440 (39.3%)	9,680 (24.6%)	7,720 (19.6%)	39,300 (100%)

χ^2= 756.19, $p < .001$, Cramer's V = .139

Note: Per IES guidelines, all unweighted sample sizes were rounded to the nearest 10

Most teacher respondents work for a principal who strongly agreed with the statement, "I am generally satisfied with being principal at this school" (24,630; 62.7%), while fewer teachers work for principals who strongly disagreed on a percentage basis (810; 2.1%). Fewer principals in their first five years on the job strongly agreed (60.2%) when compared to more experienced principals on a percentage basis, and principals with 16 or more years of experience in their role strongly agreed most frequently (820, 70.3%). See Table 3.7 for further details.

Table 3.7

Principal's experience by principal's satisfaction (Corresponding NTPS teachers)

Principal's experience	Strongly disagree	Somewhat disagree	Somewhat agree	Strongly agree	Total
0–5 years	650 (2.3%)	1,320 (4.7%)	9,310 (32.8%)	17,070 (60.2%)	28,360 (100%)
6–10 years	80 (1.1%)	200 (2.7%)	1,960 (27.3%)	4,940 (68.9%)	7,170 (100%)
10–15 years	50 (1.7%)	80 (3.1%)	690 (26.3%)	1,800 (69.0%)	2,610 (100%)
16+ years	40 (3.5%)	30 (2.1%)	280 (24.0%)	820 (70.3%)	1,170 (100%)
Total	810 (2.1%)	1,620 (4.1%)	12,240 (31.1%)	24,630 (62.7%)	39,300 (100%)

χ^2= 322.84, $p < .001$, Cramer's V = .052

Note: Per IES guidelines, all unweighted sample sizes were rounded to the nearest 10

Principals were asked "How much ACTUAL influence do you think you have as a principal on decisions …" with a series of topics to follow. When asked about influence on "Setting discipline policy at this school," the majority of teachers work for a principal who believes they have a major influence, on a percentage. A lower percentage of principals in their first five years on the job believe they have a major influence on school discipline policy (20,310; 71.9%) than more experienced principals, and principals with 16 years or more experience had the greatest percentage of respondents believing they had a major influence over school discipline (990; 84.9%). See Table 3.8 for more details.

Table 3.8

Principal's experience by perceived impact on school discipline policy

(Measured by corresponding NTPS teacher respondents)

Principal's experience	No influence	Minor influence	Moderate influence	Major influence	Total
0–5 years	120 (0.4%)	1,160 (4.1%)	6,650 (23.5%)	20,310 (71.9%)	28,240 (100%)
6–10 years	40 (0.5%)	290 (4.0%)	1,640 (22.9%)	5,170 (72.5%)	7,140 (100%)
10–15 years	30 (1.0%)	90 (3.3%)	520 (19.7%)	1,980 (75.8%)	2,610 (100%)
16+ years	0 (0.0%)	30 (2.4%)	150 (12.7%)	990 (84.9%)	1,170 (100%)
Total	190 (0.5%)	1,560 (4.0%)	8,950 (22.9%)	28,450 (72.7%)	39,150 (100%)

χ^2= 143.29, $p < .001$, Cramer's V = .035

Note: Per IES guidelines, all unweighted sample sizes were rounded to the nearest 10

Teacher Characteristics

When gender and years of experience are considered, it appears the null hypothesis of no relationship can be rejected (χ^2= 13.80, $p = .008$), but there is no substantive difference. See Table 3.9 for further details.

While white teachers, on a percentage basis, have more years of experience, compared to Hispanic teachers, the reverse is true in the least experienced category. The null hypothesis of no relationship can be rejected ($\chi^2 = 400.20$, $p < .001$). See Table 3.10 for further details.

Table 3.9

Gender of NTPS Teacher Respondents by Teaching Experience

Gender	0–5 years	6–10 years	11–15 yrs.	16–24 yrs.	25+ years	Total
Male	2,720 (24.0%)	2,100 (18.5%)	2,040 (18.0%)	2,810 (24.8%)	1,670 (14.7%)	11,350 (100%)
Female	8,160 (24.8%)	6,360 (19.3%)	6,000 (18.2%)	7,950 (24.1%)	4,500 (13.6%)	32,970 (100%)
Total	10,890 (24.6%)	8,460 (19.1%)	8,040 (18.1%)	10,770 (24.3%)	6,170 (13.9%)	44,320 (100%)

χ^2= 13.80, p = .008, Cramer's V = .018
Note: Per IES guidelines, all unweighted sample sizes were rounded to the nearest 10

Table 3.10

NTPS Teacher Respondents Race/Ethnicity by Years of Teaching Experience

Race / Ethnicity	0–5 years experience	6–10 years experience	11–15 years experience	16–24 years experience	25+ years experience	Total
Hispanic	1,160 (32.1%)	790 (21.8%)	680 (18.6%)	730 (20.1%)	270 (7.4%)	3,630 (100%)
Asian	600 (29.0%)	390 (18.8%)	400 (19.2%)	450 (21.8%)	230 (11.1%)	2,060 (100%)
Black	940 (29.7%)	640 (20.2%)	540 (16.9%)	690 (21.8%)	360 (11.3%)	3,160 (100%)
White	8,180 (23.1%)	6,640 (18.7%)	6,440 (18.1%)	8,900 (25.1%)	5,310 (15.0%)	35,460 (100%)
Total	10,880 (24.6%)	8,460 (19.1%)	8,040 (18.1%)	10,760 (24.3%)	6,170 (13.9%)	44,300 (100%)

χ^2 = 404.202, p < .001, Cramer's V = .055
Note: Per IES guidelines, all unweighted sample sizes were rounded to the nearest 10

When race/ethnicity and locale are considered, it appears that, on a percentage basis, Black teachers (1,440; 53.2%) are most concentrated in cities, followed by Hispanic teachers (1,360, 43.2%). On the other hand, white teachers are more concentrated in rural areas (8,280; 25.5%). This relationship is statistically significant (χ^2 = 1,772.19, $p < .001$). See Table 3.11 for further details.

Table 3.11

NTPS Teacher Respondents Race/Ethnicity by School Community Density

Race / Ethnicity	City	Suburb	Town	Rural	Total
Hispanic	1,360 (42.3%)	1,260 (39.2%)	280 (8.7%)	320 (9.8%)	3,210 (100%)
Asian	620 (34.4%)	660 (36.6%)	230 (12.8%)	290 (16.2%)	1,790 (100%)
Black	1,440 (53.3%)	700 (27.1%)	190 (7.1%)	270 (10.4%)	2,600 (100%)
White	8,280 (25.5%)	10,900 (33.6%)	5,120 (15.8%)	8,170 (25.2%)	32,470 (100%)
Total	11,690 (29.2%)	13,510 (33.7%)	5,810 (14.5%)	9,040 (22.6%)	40,060 (100%)

χ^2 = 1,772.19, $p < .001$, Cramer's V = .121

Note: Per IES guidelines, all unweighted sample sizes were rounded to the nearest 10

Not unexpectedly considering their concentration in city schools, Black (560; 21.4%) and Hispanic teachers (640; 20.1%) are more apt to teach in charter schools, on a percentage basis. Asian (250; 13.8%) and white teachers (3,160; 9.7%) are not. Further, there is no substantive difference in employment in charter schools when gender is considered. These findings are statistically significant (χ^2 = 588.551, $p < .001$). See Table 3.12 for further details.

Table 3.12

NTPS Teacher Respondents Race, Ethnicity, Gender by Charter School

Gender/Race/Ethnicity	Charter	Non-Charter	Total
Male			
Hispanic	160 (17.9%)	720 (82.1%)	880 (100%)
Asian	70 (14.3%)	410 (85.7%)	480 (100%)
Black	130 (18.2%)	560 (81.8%)	690 (100%)
White	770 (9.4%)	7,450 (90.6%)	8,220 (100%)
Total Male	1,120 (10.9%)	9,140 (89.1%)	10,260 (100%)
Female			
Hispanic	490 (20.9%)	1840 (79.1%)	2330 (100%)
Asian	180 (13.6%)	1130 (86.4%)	1310 (100%)
Black	430 (22.5%)	1,480 (77.5%)	1,910 (100%)
White	2,390 (9.9%)	21,850 (90.1%)	24,250 (100%)
Total Female	3,490 (11.7%)	26,310 (88.3%)	29,790 (100%)
All NTPS Teachers			
Hispanic	640 (20.1%)	2,560 (79.9%)	3,210 (100%)
Asian	250 (13.8%)	1,540 (82.6%)	1,790 (100%)
Black	560 (21.4%)	2,040 (78.6%)	2,600 (100%)
White	3,160 (9.7%)	29,310 (90.3%)	32,470 (100%)
Total	4,610 (11.5%)	35,450 (88.5%)	40,060 (100%)

Male $\chi^2 = 108.12$, $p < .001$, Cramer's V = .103

Female $\chi^2 = 489.51$, $p < .001$, Cramer's V = .128

Total $\chi^2 = 588.55$, $p < .001$, Cramer's V = .121

Note: Per IES guidelines, all unweighted sample sizes were rounded to the nearest 10

On a percentage basis, white (11,070; 34.1%) and Asian (630; 34.9%) teachers are more apt to teach in schools where *no* students receive Title I services, compared to Black (50; 19.2%) and Hispanic teachers (660; 20.6%). In addition, male teachers (3,770; 36.8%) were more apt to teach in schools where no students receive Title I services, on a percentage basis, than female teachers (9,090; 30.5%). These patterns are statistically significant (Total χ^2= 1,477.388, $p < .001$), and are reflected further in Table 3.13.

Table 3.13

NTPS teacher respondents' gender, race, and ethnicity by Title I programs

Gender / Race / Ethnicity	No Title I support	Some students receive Title I support	School-wide Title I program	Total
Male Teachers				
Hispanic	230 (25.6%)	60 (6.7%)	600 (67.7%)	880 (100%)
Asian	180 (36.8%)	50 (9.4%)	260 (53.8%)	480 (100%)
Black	160 (22.6%)	40 (5.4%)	490 (72.0%)	690 (100%)
White	3,220 (39.1%)	1,380 (16.8%)	3,620 (44.0%)	8,220 (100%)
Total	3,770 (36.8%)	1,530 (14.9%)	4,970 (48.4%)	10,260 (100%)
Female Teachers				
Hispanic	440 (18.8%)	230 (9.7%)	1,670 (71.6%)	2,330 (100%)
Asian	450 (34.2%)	100 (7.7%)	760 (58.1%)	1,310 (100%)
Black	340 (17.9%)	90 (4.7%)	1,480 (77.3%)	1,910 (100%)
White	7,860 (32.4%)	4,300 (17.7%)	12,090 (49.9%)	24,250 (100%)
Total	9,090 (30.5%)	4,720 (15.8%)	15,990 (53.7%)	29,790 (100%)
All NTPS Teachers				
Hispanic	660 (20.6%)	280 (8.9%)	2,260 (70.5%)	3,210 (100%)
Asian	630 (34.9%)	150 (8.2%)	1,020 (56.9%)	1,790 (100%)
Black	500 (19.2%)	130 (4.9%)	1,970 (75.9%)	2,600 (100%)
White	11,070 (34.1%)	5,680 (17.5%)	15,710 (48.4%)	32,470 (100%)
Total	12,860 (32.1%)	6,240 (15.6%)	20,960 (52.3%)	40,060 (100%)

Male χ^2= 448.30, $p < .001$, Cramer's V = .148

Female χ^2= 1,058.13, $p < .001$, Cramer's V = .133

Total χ^2= 1,477.39, $p < .001$, Cramer's V = .136

Note: Per IES guidelines, all unweighted sample sizes were rounded to the nearest 10

On a percentage basis, Hispanic men are least apt to have a master's degree (390; 40.2%) and Black women are the most apt to have a Master's degree (1,500; 63.9%). Thus, there is a statistical and substantive significance. See Table 3.14 for further details.

Table 3.14

NTPS teacher respondents' gender, race, and ethnicity by master's degree

Gender/Race/Ethnicity	Master's Degree	No Master's	Total
Male Teachers			
Hispanic	390 (40.2%)	580 (59.8%)	980 (100%)
Asian	290 (53.8%)	250 (46.2%)	540 (100%)
Black	430 (53.0%)	380 (47.0%)	810 (100%)
White	5,030 (55.8%)	3,980 (45.2%)	9,010 (100%)
Total	6,140 (54.2%)	5,200 (45.8%)	11,340 (100%)
Female Teachers			
Hispanic	1,170 (43.9%)	1,490 (56.1%)	2,650 (100%)
Asian	850 (55.9%)	670 (44.1%)	1,510 (100%)
Black	1,500 (63.9%)	850 (36.1%)	2,350 (100%)
White	14,800 (55.9%)	11,060 (44.1%)	26,450 (100%)
Total	18,310 (55.5%)	14,660 (44.5%)	32,970 (100%)
All NTPS Teachers			
Hispanic	1,560 (42.9%)	2,070 (57.1%)	3,630 (100%)
Asian	1,140 (53.3%)	920 (44.7%)	2,060 (100%)
Black	1,930 (61.1%)	1,230 (38.9%)	3,160 (100%)
White	19,820 (55.9%)	15,640 (44.1%)	35,460 (100%)
Total	24,440 (55.2%)	19,860 (44.8%)	44,300 (100%)

Male $\chi^2 = 101.54$, $p < .001$, Cramer's V = .095

Female $\chi^2 = 221.89$, $p < .001$, Cramer's V = .082

Total $\chi^2 = 279.47$, $p < .001$, Cramer's V = .079

Note: Per IES guidelines, all unweighted sample sizes were rounded to the nearest 10

Data Preparation

The NTPS includes 42 survey items for schools, 61 survey items for teachers, and 37 survey items for principals. The surveys cover a wide variety of topics, ranging from school staffing, teacher preparation, school demographics, perceptions of school climate, and teacher salaries. The surveys are linked together to allow for comparisons between school responses, teacher responses, and principal responses (NCES, 2022).

Responses to these surveys were compiled together using IBM Statistical Package for Social Sciences (SPSS). The data were cleaned to address missing values and data errors deemed impossible (Verma, 2013). In addition, some items with numeric responses were recoded into grouping categories to allow for crosstabulation analysis. For example, some statistical analysis utilized the exact number of years of experience for a teacher, while others required grouping teachers into experience cohorts, as shown in Table 3.1.

IES Sample Protocols

As this study uses data from the NTPS, representatives from the Institute for Educational Sciences (IES), the parent agency for NCES within the US Department of Education, reviewed this study after the dissertation defense and before publication. As this study uses unweighted data, IES guidelines require all unweighted samples to be rounded to the nearest 10 in order to ensure the anonymity of respondents.

Based on their review, all samples published in this dissertation were rounded to the nearest 10. Each cell was rounded individually, so rounding errors may appear when calculating across rows and columns within tables. However, the percentages were not modified and remain true to the original data.

Theoretical and Operational Definitions of Variables

For some variables, scales were developed to aggregate data from several survey items to provide a more comprehensive inference to respondents' views (Boateng, et. al., 2018). For example, Likert scale responses were compiled to study breadth and depth of variables. At times, this process involved reversing the Likert scale for items that were phrased with a different positive or negative outlook from other survey items in the scale.

Teacher satisfaction. In a theoretical sense, teacher job satisfaction infers how happy faculty members are with their current work environment. To operationalize this concept, a teacher satisfaction scale was calculated by assigning one to four points per item based on Likert scale responses to the NTPS teacher survey items listed below, providing a satisfaction score ranging from 7 to 28 points.

> *To what extent do you agree or disagree with the following statements about your work at this school?*
> - *The stress and disappointments involved with teaching at this school aren't really worth it.**
> - *The teachers at this school like being here; I would describe us as a satisfied group*
> - *I like the way things are run at this school*
> - *If I could get a higher paying job I'd leave teaching as soon as possible.**
> - *I think about transferring to another school.**
> - *I don't seem to have as much enthusiasm now as I did when I began teaching.**
> - *I think about staying home from school because I'm too tired to go.**

Statements marked with an asterisk (*) denote survey items where scores were reversed so higher scores reflect higher respondent job satisfaction. Within the teacher satisfaction scale, Cronbach's alpha was calculated at .835. This measure of internal consistency demonstrates a high reliability within the scale.

Professional development (PD) scale. Teachers have ample opportunity to become lifelong learners, with professional development (PD) opportunities within their school district or from external agencies. The utilization and frequency of PD varies teacher to teacher.

To operationalize this variable, Likert scale responses to the NTPS teacher questions below were tabulated into a single scale for regression, with “strongly disagree” worth one point to “strongly agree” with four points.

To what extent do you agree or disagree with the follow statements about YOUR professional development as a teacher at THIS school?

- *I have sufficient resources available for my professional development.*
- *I have access to about the same amount of resources for professional development as other teachers.*
- *My professional development opportunities are aligned with this school's performance goals.*
- *The techniques I am learning about in my professional development will help improve student achievement.*
- *I feel capable of incorporating the kinds of techniques I am learning a professional development.*
- *The types of professional development available to me are consistent with my own professional goals.*
- *I have the opportunity to provide feedback to school leaders about my professional development experience to determine its value and impact.*

Scores on this PD scale ranged from 7 to 28. Of note, most questions in this scale are more closely aligned with the teacher's personal engagement with PD, rather than school wide PD mandates. There was no distinction between PD conducted in-person or virtually or in synchronous or asynchronous formats in this variable.

Collaboration scale. Teacher collaboration is the interaction between teachers for the purpose of improving instruction and student achievement. Responses to the NTPS teacher survey items below were calculated into a collaboration scale by scoring one point for "Did not participate" responses, two points for "Once or a few times a year," three points for "Once of a few times a month, and four points for "Once or a few times a week." Scores on this collaboration scale ranged from 8 to 32 points.

During the past 12 months, how frequently, if at all, did you participate in each of the following professional development activities?

- *Planned lessons or courses with other teachers*
- *Consulted with other teachers about individual students*
- *Collaborated with other teachers on issues of instruction excluding administrative meetings*
- *Acted as a coach or mentor to other teachers or staff*
- *Received coaching or mentoring from other teachers or staff*
- *Participated in online or web-based professional development*
- *Participated in a workshop*
- *Attended a conference*

Age of teacher In order to determine if a teacher's age is related with job satisfaction, this variable was included in the regression.

Novice teachers – Three or less years of experience. The sample of teachers surveyed included faculty members with a wide range of experience. In order to identify potential association between early career teachers and teacher job satisfaction, novice teachers were defined by respondents who answered three years or less on the following NTPS teacher survey item: "Excluding time spent on maternity/paternity leave or sabbatical, how many school years have you worked, either full-time or part-time, as a K–12 or comparable ungraded level teacher in public, public charter, or private schools?" This item was recoded to create a binary variable identifying if the teacher had three years or less experience in teaching (coded 1) or had taught longer (coded 0).

Teacher Base Salary. This variable reflects the reported base salary of respondents to the NTPS teacher survey. The base salary does not include payment for extra-curricular activities, teacher mentor stipends, attendance at professional development, summer school instruction, etc.

Coach/Activity Sponsor. School districts rely on faculty members to support the school's educational goals through extracurricular duties. The 2017–18 NTPS Teachers

Survey asked, “DURING THE CURRENT SCHOOL YEAR, do you, or will you, earn any additional compensation from this school system for extracurricular or additional activities such as coaching, student activity sponsorship, mentoring teachers, or teaching evening classes?” Respondents who answered yes were coded “1,” and respondents who responded no were coded “0.”

Principal Gender. By transferring responses from the NTPS principal survey to the corresponding teacher respondents, allowing the regression to measure teacher satisfaction based on the gender of the school principal. It must be noted that the gender questions on the 2017–18 NTPS asked teachers and principals, “Are you Male or Female?” The lack of a non-binary option may have affected some responses. For this regression, male principals were coded “1” and female principals were coded “0.”

***Private School Prior Year*.** Item 106 of the NTPS teacher survey asked, “During the LAST school year (2016–17), what was your MAIN activity?” To investigate potential impact of transition from teaching in a private school to a public school on job satisfaction, the responses were recoded into a binary variable. For this variable, “Teaching in a PRIVATE elementary, middle, or secondary school” was coded 1 and all other responses coded 0.

Charter school. Charter schools are publicly funded schools which operate outside the traditional structures of public schools. These schools may be run by a non-profit board, a for-profit company, or under the jurisdiction of a local school board. NTPS school survey item 0500 asks if the school is a charter school, and these responses transferred to the teacher response data.

Schools Offering Tenure. Tenure is an employment protection for educators which requires due process for removing a teacher after the teacher has completed a probationary period (generally three years) with satisfactory ratings. After receiving tenure, a teacher may only be removed due to enrollment declines, program elimination, or due process finds "just cause" for removal (Kahlenberg, 2016). NTPS teacher's survey item 0922 asks, "Does your school, district, or school system offer tenure?" Respondents who answered yes were coded 1 and respondents who responded no were coded 0.

School start time (SST). As a central variable to this regression, school start time (SST) reflects the time classes begin on a standard school day. The responses to NTPS school survey item 0117 were transferred to the NTPS teacher survey responses. SST fell between 7:25 and 7:59 for 95% of respondents.

This data needed to be cleaned prior to running statistical tests. When registered on the teacher data set, SST was registered numerically in military (24 hour) time without the colon symbol (:) typically used when writing the time. For example, SST of "8:00 AM" registered as "0800."

Reading these item entries in the dataset, this format could be easily understood and followed. However, this format created challenges when running statistical tests, as it weighted the start of an hour 40 minutes higher than the last minute of the previous hour. For example, SST of 7:59 registered as 0759 while an SST 8:00 registered as 0800, with no possible values between "0760" and "0799."

To run valid statistical tests, the SST values were converted to minutes beyond the first recorded SST of 7:00 AM (0700). Therefore, a teacher who starts class at 7:15 AM

is recorded as “15” and a teacher that begins class at 8:30 AM is recorded as “90.” This allows for the regression to measure units of change on a per minute interval.

School end time (SET). Alongside SST, SET influences the daily schedules of teachers, students, and community members. This study investigated patterns with SET alongside those of SST to determine the potential impact of school dismissal times on teacher job satisfaction. The Pearson Correlation, *r* value, between SST and SET was .584, and the two-tailed significance, *p* value, was < .001. SET fell between 2:10 PM and 3:58 PM for 95% of respondents.

As SET was initially entered in the same numeric fashion as SST, this variable was also recoded to measure minutes past the first recorded end time of 11:00 AM (1100). For example, an SET of 2:45 PM was recoded into “225” and an SET of 3:20 PM was recoded to “260.”

Teacher Performance Pay. Over the past several decades, state and local education agencies have experimented with payment incentives for teachers of students who perform better on standardized assessments. While value-added assessment models, popularized by Sanders and Horn (1998), provide more nuanced analysis of student performance, the application of these models to performance pay have been questioned for lack of reliability when applied to small samples, such as classroom level data (Holloway-Libell, 2012; Strauss, 2014).

Specifically, the NTPS teacher survey asked respondents the following question: *DURING THE CURRENT SCHOOL YEAR, do you, or will you, earn any additional compensation from this school system based on the students’ performance (e.g. through*

merit pay or pay-for-performance agreement)? Respondents who answered yes were coded 1, and respondents who selected no were coded 0.

Teacher Gender. As mentioned with principal gender, the 2017–18 NTPS asked teachers if they are male or female, without a non-binary option. For this study's regression, male respondents were coded 0 and female respondents were coded 1.

Chapter 4

Results

Utilizing the data from the 2017–18 NTPS, this study addressed three research questions related to school start times:

1. What are the differences among school districts and schools as to established starting times?
2. What are the differences among teachers by the starting times of the schools they work in? Gender differences? Racial/ethnic differences? Teacher efficacy?
3. Controlling for differences among the respondents, how is job satisfaction affected by different school starting times?

Research Question #1: Differences Among School District Start Times

The first step in the progression of research questions involved identifying patterns among school start times from NTPS responses. After conducting a series of Chi-Square tests, differences in school start times (SST) and school end times (SET) became apparent among demographic groups, community composition, and school structure.

A greater percentage of high schools begin classes prior to 7:45 AM (3,680; 31.1%) than middle schools (1,850; 17.8%) or elementary schools (1,170; 8.9%). On the other hand, a greater percentage of elementary schools begin class after 8:30 AM (4,720; 35.8%) than middle schools (2,550; 24.5%) or high schools (1,810; 15.2%). These findings are statistically significant (χ^2= 3,705.87, $p < .001$). See Table 4.1 for further details.

Further, a greater percentage of high schools conclude classes by 2:29 PM (2,640; 22.3%) than middle schools (1,480; 14.2%) or elementary schools (1,480; 11.3%). On a percentage basis, elementary schools are more apt to conclude classes between 3:20–3:44 PM (3,430; 26.0%) than middle schools (2,140; 20.5%) or high schools (2,100; 17.7%). These findings are statistically significant (χ^2= 1,268.08, $p < .001$). See Table 4.2 for further details.

Table 4.1

NTPS teachers' school level by school start time (SST)

School level	≤ 7:44	7:45–7:59	8:00–8:14	8:15–8:29	≥ 8:30	Total
Elementary	1,170 (8.9%)	2,170 (16.5%)	3,280 (24.9%)	1,840 (14.0%)	4,720 (35.8%)	13,190 (100%)
Middle	1,850 (17.8%)	1,970 (18.9%)	2,660 (25.5%)	1,380 (13.3%)	2,550 (24.5%)	10,420 (100%)
High	3,680 (31.1%)	2,150 (18.1%)	2,890 (24.4%)	1,330 (11.2%)	1,810 (15.2%)	11,860 (100%)
Combined	580 (12.7%)	800 (17.4%)	1,580 (34.3%)	650 (14.2%)	990 (21.5%)	4,600 (100%)
Total	7,290 (18.2%)	7,090 (17.7%)	10,410 (26.0%)	5,210 (13.0%)	10,070 (25.1%)	40,070 (100%)

χ^2= 3,705.87, $p < .001$, Cramer's V = .176

Note: Per IES guidelines, all unweighted sample sizes were rounded to the nearest 10

Table 4.2

NTPS teachers' school level by school end time (SET)

School level	≤ 2:29	2:30–2:59	3:00–3:19	3:20–3:44	≥ 3:45	Total
Elementary	1,480 (11.3%)	2,940 (22.3%)	4,170 (31.6%)	3,430 (26.0%)	1,170 (8.9%)	13,190 (100%)
Middle	1,480 (14.2%)	2,940 (28.2%)	2,600 (24.9%)	2,140 (20.5%)	1,260 (12.1%)	10,420 (100%)
High School	2,640 (22.3%)	3,140 (26.4%)	2,820 (23.8%)	2,100 (17.7%)	1,160 (9.8%)	11,860 (100%)
Combined	430 (9.3%)	1,010 (21.9%)	1,540 (33.4%)	1,170 (25.5%)	460 (9.9%)	4,600 (100%)
Total	6,040 (15.1%)	10,020 (25.0%)	11,130 (27.8%)	8,840 (22.1%)	4,050 (10.1%)	40,070 (100%)

χ^2 = 1,268.08, $p < .001$, Cramer's V = .103

Note: Per IES guidelines, all unweighted sample sizes were rounded to the nearest 10

SST by Community Density

When considering the community density of schools, a greater number of suburban schools begin classes before 7:45 AM (3,107; 23.0%) on a percentage basis than schools in cities (2,100; 18.0%), towns (730; 12.6%), or rural areas (1,360; 15.0%). This is most apparent in high schools, where suburban high schools are most apt to begin before 7:45 AM on a percentage basis (1,830; 42.7%). However, the greatest number of schools starting classes after 8:30 AM are also located in the suburbs, on a percentage basis (4,040; 29.9%). Specifically, suburban elementary schools are most apt to begin after 8:30 AM (2,070; 46.9%), on a percentage basis, while fewer city (1,330; 33.0%) and rural elementary schools (760, 27.2%) begin after 8:30 AM. In rural areas, the greatest number of elementary (820; 29.5%), middle (550; 27.3%), and high schools (650; 28.9%) began class between 8:00 and 8:14 AM, on a percentage basis. Schools in towns were also most apt to begin class between 8:00 and 8:14 AM (1,930; 33.2%), on a percentage basis. These findings are statistically significant ($\chi^2 = 3{,}075.87$, $p < .001$). See Table 4.3 for further details.

Table 4.3

Community Density and School Level by School Start Time, based on NTPS teacher respondents

Density / Level	≤ 7:44	7:45–7:59	8:00–8:14	8:15–8:29	≥ 8:30	Total
Teachers in city schools						
Elementary	480 (11.8%)	730 (18.2%)	980 (24.4%)	510 (12.6%)	1,330 (33.0%)	4,030 (100%)
Middle	490 (16.4%)	600 (19.9%)	770 (25.6%)	370 (12.4%)	780 (25.7%)	3,020 (100%)
High	1,010 (27.7%)	600 (16.6%)	800 (22.0%)	480 (13.3%)	750 (20.5%)	3,640 (100%)
Combined	120 (12.2%)	160 (15.7%)	320 (31.3%)	130 (12.6%)	280 (28.1%)	1,010 (100%)
City Total	2,100 (18.0%)	2,095 (17.9%)	2,870 (24.5%)	1,490 (12.8%)	3,140 (26.8%)	11,690 (100%)
Teachers in suburban schools						
Elementary	340 (7.8%)	480 (10.8%)	910 (20.7%)	610 (13.7%)	2,070 (46.9%)	4,400 (100%)
Middle	730 (19.0%)	580 (15.1%)	800 (20.7%)	560 (14.6%)	1,180 (30.6%)	3,840 (100%)
High	1,830 (42.7%)	810 (18.8%)	860 (20.1%)	260 (6.1%)	530 (12.3%)	4,290 (100%)
Combined	200 (20.4%)	140 (14.2%)	270 (27.4%)	100 (10.2%)	280 (27.8%)	990 (100%)
Suburb Total	3,110 (23.0%)	2,000 (14.8%)	2,840 (21.0%)	1,530 (11.3%)	4,040 (29.9%)	13,520 (100%)
Teachers in town schools						
Elementary	120 (6.0%)	400 (20.1%)	570 (28.6%)	320 (16.4%)	570 (28.9%)	1,980 (100%)
Middle	210 (13.8%)	340 (21.9%)	530 (34.7%)	210 (13.5%)	250 (16.2%)	1,540 (100%)
High	330 (19.1%)	310 (18.3%)	590 (34.4%)	270 (15.8%)	210 (12.4%)	1,710 (100%)
Combined	70 (12.4%)	110 (18.8%)	240 (40.9%)	100 (16.8%)	70 (11.0%)	590 (100%)
Town Total	730 (12.6%)	1,160 (19.9%)	1,930 (33.2%)	900 (15.5%)	1,100 (18.9%)	5,810 (100%)

Table 4.3 (Continued)

Community Density and School Level by School Start Time

Density / Level	≤ 7:44	7:45–7:59	8:00–8:14	8:15–8:29	≥8:30	Total
Teachers in rural schools						
Elementary	240 (8.5%)	560 (20.3%)	820 (29.5%)	410 (14.6%)	760 (27.2%)	2,780 (100%)
Middle	420 (20.6%)	460 (22.7%)	550 (27.3%)	240 (12.0%)	350 (17.4%)	2,020 (100%)
High	520 (23.3%)	420 (19.0%)	650 (28.9%)	320 (14.1%)	330 (14.6%)	2,230 (100%)
Combined	190 (9.2%)	390 (19.3%)	750 (37.2%)	330 (16.2%)	360 (18.0%)	2,020 (100%)
Rural Total	1,360 (15.0%)	1,840 (20.3%)	2,770 (30.6%)	1,290 (14.3%)	1,800 (19.9%)	9,050 (100%)
All NTPS teachers						
Elementary	1,170 (8.9%)	2,170 (16.5%)	3,280 (24.9%)	1,840 (14.0%)	4,720 (35.8%)	13,190 (100%)
Middle	1,850 (17.8%)	1,970 (18.9%)	2,660 (25.5%)	1,380 (13.3%)	2,550 (24.5%)	10,420 (100%)
High	3,680 (31.1%)	2,150 (18.1%)	2,890 (24.4%)	1,330 (11.2%)	1,810 (15.2%)	11,860 (100%)
Combined	580 (12.7%)	800 (17.4%)	1,580 (34.3%)	650 (14.2%)	1,000 (21.5%)	4,600 (100%)
Total	7,290 (18.2%)	7,090 (17.7%)	10,410 (26.0%)	5,210 (13.0%)	10,070 (25.1%)	40,070 (100%)

City: χ^2= 457.00, $p < .001$, Cramer's V = .114

Rural: χ^2= 444.62, $p < .001$, Cramer's V = .128

Suburb: χ^2= 2,351.83, $p < .001$, Cramer's V = .241

Total: χ^2= 3,075.87, $p < .001$, Cramer's V = .160

Town: χ^2= 333.50, $p < .001$, Cramer's V = .138

Note: Per IES guidelines, all unweighted sample sizes were rounded to the nearest 10

SET by Community Density

On a percentage basis, suburban schools were most apt to conclude classes by 2:29 PM (2,890; 21.3%), compared to city schools (1,670; 14.3%), town schools (500; 8.5%), and rural schools (980; 10.8%). This trend is most apparent in suburban high schools (1,390; 32.5%). Schools located in towns (1,580; 27.2%) and rural areas (2,400; 26.6%) are more likely to finish classes between 3:20 and 3:44 PM, on a percentage basis, than schools in cities (2,370; 20.3%) or suburbs (2,490; 18.4%). However, suburban elementary schools (1,230; 27.9%) are not substantively different from elementary schools in towns (510; 26.0%) or rural areas (780; 28.1%), on a percentage basis, when considering dismissals between 3:20 and 3:44 PM. These findings are statistically significant (Total: $\chi^2 = 1{,}268.08$, $p < .001$). See Table 4.4 for further details.

Table 4.4

Community Density and School Level by School End Time

Density / Level	≤ 2:29	2:30–2:59	3:00–3:19	3:20–3:44	≥ 3:45	Total
Teachers in city schools						
Primary	530 (13.2%)	1,060 (26.3%)	1,150 (28.5%)	910 (22.5%)	390 (9.6%)	4,030 (100%)
Middle	380 (12.6%)	840 (27.8%)	720 (23.8%)	590 (19.7%)	480 (16.0%)	3,020 (100%)
High	660 (18.0%)	890 (24.6%)	900 (24.6%)	650 (17.8%)	550 (15.0%)	3,640 (100%)
Combined	110 (10.6%)	230 (22.5%)	280 (28.2%)	220 (21.7%)	170 (17.0%)	1,010 (100%)
Total	1,670 (14.3%)	3,020 (25.8%)	3,050 (26.0%)	2,370 (20.3%)	1,580 (13.5%)	11,690 (100%)
Teachers in suburban schools						
Primary	610 (13.7%)	910 (20.6%)	1,270 (28.8%)	1,230 (27.9%)	400 (9.0%)	4,400 (100%)
Middle	720 (18.9%)	1,150 (29.9%)	820 (21.3%)	610 (16.0%)	540 (14.0%)	3,840 (100%)
High	1,390 (32.5%)	1,350 (31.4%)	720 (16.7%)	500 (11.7%)	330 (7.7%)	4,290 (100%)
Combined	160 (16.5%)	290 (29.0%)	290 (29.5%)	150 (14.7%)	100 (10.2%)	990 (100%)
Total	2,890 (21.3%)	3,690 (27.3%)	3,100 (22.9%)	2,490 (18.4%)	1370 (10.1%)	13,520 (100%)
Teachers in town schools						
Primary	140 (7.3%)	430 (21.9%)	760 (38.2%)	510 (26.0%)	130 (6.5%)	1,980 (100%)
Middle	140 (9.0%)	400 (26.2%)	460 (30.0%)	440 (28.6%)	100 (6.2%)	1,540 (100%)
High	170 (10.2%)	430 (25.2%)	550 (31.9%)	470 (27.6%)	90 (5.1%)	1,710 (100%)
Combined	40 (6.8%)	140 (24.1%)	230 (38.2%)	150 (26.0%)	30 (4.9%)	590 (100%)
Total	500 (8.5%)	1,410 (24.2%)	1,990 (34.2%)	1,580 (27.2%)	340 (5.9%)	5,810 (100%)

Table 4.4 (Continued)

Community Density and School Level by School End Time

Density / Level	≤ 2:29	2:30–2:59	3:00–3:19	3:20–3:44	≥ 3:45	Total
Teachers in rural schools						
Primary	200 (7.3%)	540 (19.3%)	1,000 (35.9%)	780 (28.1%)	260 (9.4%)	2,780 (100%)
Middle	240 (11.8%)	550 (27.2%)	600 (29.6%)	490 (24.2%)	150 (7.2%)	2,020 (100%)
High	420 (18.9%)	470 (21.0%)	670 (29.8%)	477 (21.4%)	200 (8.8%)	2,230 (100%)
Combined	120 (5.8%)	350 (17.5%)	740 (36.5%)	660 (32.6%)	150 (7.6%)	2,020 (100%)
Total	980 (10.8%)	1,910 (21.1%)	3,000 (33.1%)	2,400 (26.6%)	760 (8.4%)	9,050 (100%)
All NTPS Teachers						
Primary	1,480 (11.3%)	2,940 (22.3%)	4,170 (31.6%)	3,430 (26.0%)	1,170 (8.9%)	13,190 (100%)
Middle	1,480 (14.2%)	2,940 (28.2%)	2,600 (24.9%)	2,140 (20.5%)	1,260 (12.1%)	10,420 (100%)
High	2,640 (22.3%)	3,140 (26.4%)	2,820 (23.8%)	2,100 (17.7%)	1,160 (9.8%)	11,860 (100%)
Combined	430 (9.3%)	1,010 (21.9%)	1,540 (33.4%)	1,170 (25.5%)	450 (9.9%)	4,600 (100%)
Total	6,040 (15.1%)	10,020 (25.0%)	11,130 (27.8%)	8,840 (22.1%)	4,050 (10.1%)	40,070 (100%)

City: χ^2= 182.25, $p < .001$, Cramer's V = .072

Rural: χ^2= 361.37, $p < .001$, Cramer's V = .115

Suburb: χ^2= 1,089.56, $p < .001$, Cramer's V = .164

Total: χ^2= 1,268.08, $p < .001$, Cramer's V = .103

Town: χ^2= 48.17, $p < .001$, Cramer's V = .053

Note: Per IES guidelines, all unweighted sample sizes were rounded to the nearest 10

SST & SET by School Week Structure

When comparing responses from teachers in schools with a four-day school week with teachers with a standard five-day school week, there are two substantive observations. A greater percentage of schools following a four-day week begin classes between 8:00 and 8:14 AM (300; 48.7%) than schools with a traditional five-day school week (10,110; 25.6%). In addition, schools with a four-day week were less apt to start classes at 7:44 or earlier (70; 11.9%) or at 8:30 AM or later (70; 11.6%) than schools with a five-day week on a percentage basis (7,220; 18.3% and 10,000; 25.3%). These findings are statistically significant ($\chi^2 = 201.34$, $p < .001$). See Table 4.5 for further details.

Schools with a four-day week were more apt to report dismissal times between 3:20 and 3:44 PM (240; 39.7%) or dismissal at 3:45 PM or later (250; 41.3%) than schools with a traditional week (8,600; 21.8% and 3,800; 9.6%) on a percentage basis. These findings are statistically significant ($\chi^2 = 913.34$, $p < .001$). See Table 4.6 for further details.

Table 4.5

NTPS Teachers' School Week by School Start Time

School schedule	≤ 7:44	7:45–7:59	8:00–8:14	8:15–8:29	≥ 8:30	Total
Traditional week	7,220 (18.3%)	6,970 (17.7%)	10,110 (25.6%)	5,170 (13.1%)	10,000 (25.3%)	39,460 (100%)
Four-day week	70 (11.9%)	130 (20.6%)	300 (48.7%)	40 (7.2%)	70 (11.6%)	610 (100%)
Total	7,290 (18.2%)	7,090 (17.7%)	10,410 (26.0%)	5,210 (13.0%)	10,070 (25.1%)	40,070 (100%)

χ^2= 201.34, $p < .001$, Cramer's V = .071

Note: Per IES guidelines, all unweighted sample sizes were rounded to the nearest 10

Table 4.6

NTPS Teachers' School Week by School End Time

School schedule	≤ 2:29	2:30–2:59	3:00–3:19	3:20–3:44	3:45	Total
Traditional Week	6,000 (15.2%)	10,000 (25.4%)	11,060 (28.0%)	8,600 (21.8%)	3,800 (9.6%)	39,460 (100%)
Four Day Week	30 (5.1%)	20 (2.9%)	70 (10.9%)	240 (39.7%)	250 (41.3%)	610 (100%)
Total	6,040 (15.1%)	10,020 (25.0%)	11,130 (27.8%)	8,840 (22.1%)	4,050 (10.1%)	40,070 (100%)

χ^2= 913.34, $p < .001$, Cramer's V = .151

Note: Per IES guidelines, all unweighted sample sizes were rounded to the nearest 10

On a percentage basis, charter schools are more apt to begin classes between 8:00 and 8:14 AM (1,590; 34.5%) than traditional public schools (8,820; 24.9%). Fewer charter schools begin classes after 8:30 AM (950; 20.6%) than traditional public schools (9,120; 25.7%), on a percentage basis. These findings are statistically significant (χ^2 = 913.34, $p < .001$). See Table 4.7 for further details.

A greater percentage of charter schools finish classes between 3:00 and 3:19 PM (1,540; 33.4%) than traditional public schools (9,590; 27.0%). Charter schools are also more apt to conclude classes after 3:45 PM (810; 17.5%) than traditional public schools (3,240; 9.1%), on a percentage basis. A greater percentage of traditional public schools conclude classes before 2:30 PM (5,710; 16.1%) or between 2:30 and 2:59 PM (9,220; 26.0%) than charter schools (330; 7.2% and 810; 17.5%). These findings are statistically significant (χ^2 = 684.82, $p < .001$). See Table 4.8 for further details.

Table 4.7

NTPS teacher respondents charter school employment by school start time (SST)

Charter status	≤ 7:44	7:45–7:59	8:00–8:14	8:15–8:29	≥ 8:30	Total
Charter	744 (16.1%)	780 (16.9%)	1,590 (34.5%)	546 (11.9%)	947 (20.6%)	4607 (100%)
Non-Charter	6,550 (18.5%)	6,311 (17.8%)	8,817 (24.9%)	4,664 (13.2%)	9,123 (25.7%)	35,465 (100%)
Total	7,294 (18.2%)	7,091 (17.7%)	10,407 (26.0%)	5,210 (13%)	10,070 (25.1%)	40,072 (100%)

$\chi^2 = 208.66$, $p < .001$, Cramer's V = .072

Note: Per IES guidelines, all unweighted sample sizes were rounded to the nearest 10

Table 4.8

NTPS teacher respondents charter school employment by school end time (SET)

Charter status	≤ 2:29	2:30–2:59	3:00–3:19	3:20–3:44	≥ 3:45	Total
Charter	330 (7.2%)	807 (17.5%)	1,537 (33.4%)	1,128 (24.5%)	805 (17.5%)	4,607 (100%)
Non-Charter	5,705 (16.1%)	9,215 (26.0%)	9,588 (27.0%)	7,713 (21.7%)	3,244 (9.1%)	35,465 (100%)
Total	6,035 (15.1%)	10,022 (25.0%)	11,125 (27.8%)	8,841 (22.1%)	4,049 (10.1%)	40,072 (100%)

$\chi^2 = 684.82$, $p < .001$, Cramer's V = .131

Note: Per IES guidelines, all unweighted sample sizes were rounded to the nearest 10

Research Question #2: Teacher Characteristics by Start Time

Teachers generally do not get to choose their hours, as school bell schedules are fixed in advance. However, NTPS data can reveal patterns among teacher work schedules based on demographic information. While most of these findings can be explained by school-based characteristics (grade level, locale, etc.), these data still provide some context when considering the impact of school start times and school end times on teachers.

Gender, Race, and Ethnicity by School Start Time

A greater percentage of male teacher (2,320; 22.6%) begin classes prior to 7:45 AM than female teachers (4,980; 16.7%). When race and ethnicity are considered, white male teachers (1,910; 23.2%) are substantively more apt to begin classes prior to 7:45 AM than female teachers (4,980; 16.7%), on a percentage basis. Further, more female teachers begin class 8:30 AM or later (7,970; 26.7%) than male teachers (2,100; 20.5%). Again, this phenomenon is most apparent among white teachers, with a greater percentage of white female teachers (7,970; 26.7%) begin classes after 8:30 AM than white male teachers (1,650; 20.1%). While these findings may be explained by gender differences among high school and elementary schools, particularly in suburban communities which loop bus runs more frequently, these findings are statistically significant ($\chi^2 = 130.33$, $p < .001$). See Table 4.9 for further details.

Table 4.9

Gender, race, and ethnicity by school start time (SST)

Gender/Race/Ethnicity	≤ 7:44	7:45–7:59	8:00–8:14	8:15–8:29	≥ 8:30	Total
Male teachers						
Hispanic	180 (20.4%)	190 (21.8%)	220 (25.2%)	100 (11.4%)	190 (21.3%)	880 (100%)
Asian	70 (15.0%)	90 (18.9%)	170 (34.7%)	70 (13.7%)	90 (17.7%)	480 (100%)
Black	160 (22.9%)	110 (15.8%)	170 (24.1%)	80 (11.8%)	170 (25.4%)	690 (100%)
White	1,910 (23.2%)	1500 (18.3%)	2,160 (26.3%)	990 (12.1%)	1,650 (20.1%)	8,220 (100%)
Total	2,320 (22.6%)	1,890 (18.5%)	2,710 (26.4%)	1,240 (12.1%)	2,100 (20.5%)	10,260 (100%)
Female teachers						
Hispanic	420 (18.0%)	470 (20.4%)	610 (26.3%)	280 (12.0%)	540 (23.3%)	2,330 (100%)
Asian	160 (11.9%)	290 (21.8%)	400 (30.3%)	190 (14.2%)	280 (21.7%)	1,310 (100%)
Black	380 (19.9%)	340 (17.8%)	460 (24.2%)	220 (11.6%)	510 (26.5%)	1,910 (100%)
White	4,020 (16.6%)	4,090 (16.9%)	6,220 (25.7%)	3,280 (13.5%)	6,630 (27.4%)	24,250 (100%)
Total	4,980 (16.7%)	5,190 (17.4%)	7,690 (25.8%)	3,970 (13.3%)	7,970 (26.7%)	29,790 (100%)
All NTPS teachers						
Hispanic	600 (18.7%)	670 (20.7%)	830 (26.0%)	380 (11.8%)	730 (22.8%)	3,210 (100%)
Asian	230 (12.7%)	380 (21.1%)	560 (31.5%)	250 (14.1%)	370 (20.6%)	1,790 (100%)
Black	540 (20.7%)	450 (17.3%)	630 (24.2%)	300 (11.6%)	680 (26.2%)	2,600 (100%)
White	5,930 (18.3%)	5,600 (17.2%)	8,380 (25.8%)	4,280 (13.2%)	8,290 (25.5%)	32,470 (100%)
Total	7,290 (18.2%)	7,090 (17.7%)	10,400 (26.0%)	5,210 (13.0%)	10,070 (25.1%)	40,060 (100%)

Male: $\chi^2 = 50.55$, $p < .001$, Cramer's V = .041 Female $\chi^2 = 110.96$, $p < .001$, Cramer's V = .035

Total: $\chi^2 = 130.33$, $p < .001$, Cramer's V = .032

Note: Per IES guidelines, all unweighted sample sizes were rounded to the nearest 10

There are no substantive differences in school end time between male and female teachers. When race, ethnicity, and gender are considered, Hispanic female teachers are more apt to finish classes between 3:00 and 3:19 PM (680; 29.0%) than Hispanic male teachers (210; 23.3%), on a percentage basis. These findings are statistically significant (130.33, $p < .001$). See Table 4.10 for further details.

Table 4.10

Gender, race, and ethnicity by school end time (SET)

Gender/Race/Ethnicity	Up to 2:29	2:30–2:59	3:00–3:19	3:20–3:44	3:45 or later	Total
Male teachers						
Hispanic	110 (12.7%)	210 (24.2%)	210 (23.5%)	170 (18.8%)	180 (20.8%)	880 (100%)
Asian	140 (28.3%)	90 (19.2%)	130 (26.2%)	80 (17.4%)	40 (8.9%)	480 (100%)
Black	80 (11.6%)	180 (26.5%)	170 (24.5%)	140 (19.9%)	120 (17.5%)	690 (100%)
White	1,430 (17.4%)	2,180 (26.5%)	2,180 (26.5%)	1,740 (21.1%)	700 (8.5%)	8,220 (100%)
Total	1,760 (17.1%)	2,670 (26.0%)	2,680 (26.1%)	2,120 (20.7%)	1,050 (10.2%)	10,270 (100%)
Female teachers						
Hispanic	350 (15.1%)	510 (21.9%)	680 (29.0%)	450 (19.2%)	340 (14.8%)	2,330 (100%)
Asian	350 (26.3%)	290 (22.0%)	330 (25.3%)	230 (17.8%)	110 (8.5%)	1,310 (100%)
Black	280 (14.4%)	420 (21.9%)	520 (27.4%)	350 (18.2%)	350 (18.1%)	1,910 (100%)
White	3,310 (13.6%)	6,140 (25.3%)	6,920 (28.5%)	5,690 (23.5%)	2,200 (9.1%)	24,250 (100%)
Total	4,280 (14.4%)	7,350 (24.7%)	8,450 (28.3%)	6,720 (22.5%)	3,000 (10.1%)	29,800 (100%)
All NTPS teachers						
Hispanic	460 (14.4%)	720 (22.6%)	880 (27.5%)	610 (19.1%)	530 (16.4%)	3,210 (100%)
Asian	480 (26.9%)	380 (21.3%)	460 (25.6%)	320 (17.7%)	150 (8.6%)	1,800 (100%)
Black	360 (13.7%)	600 (23.1%)	690 (26.6%)	490 (18.7%)	470 (18.0%)	2,600 (100%)
White	4,740 (14.6%)	8,320 (25.6%)	9090 (28.0%)	7,430 (22.9%)	2,900 (8.9%)	32,470 (100%)
Total	6,040 (15.1%)	10,020 (25.0%)	11,120 (27.8%)	8,840 (22.1%)	4,050 (10.1%)	40,070 (100%)

Male: $\chi^2 = 233.26$, $p < .001$, Cramer's V = .087 Female $\chi^2 = 417.14$, $p < .001$, Cramer's V = .068

Total: $\chi^2 = 591.28$, $p < .001$, Cramer's V = .070

Note: Per IES guidelines, all unweighted sample sizes were rounded to the nearest 10

Research Question #3: Impact of School Start Time on Teachers' Job Satisfaction

The final research question aims to determine the role school schedules play in the satisfaction of faculty members. While teachers are often asked for their opinions regarding potential *changes* to start time, a multivariate regression of data from the 2017–18 NTPS offers a glimpse of the impact of school start times and end times in a general sense.

Variables Entered in Regression

This regression measured 14 independent variables against the dependent variable of the teacher satisfaction scale. Specifically, this regression tested the relationship between the teacher satisfaction scale and the following variables: the teacher professional development scale, the teacher collaboration scale, teacher age, novice teachers with 3 years or less experience, teacher base salary, teachers with a paid supplemental position in their school district, teachers who taught in a private school the previous year, teachers in charter schools, teachers in schools which offer tenure, school start time (SST), school end time (SET), schools that offer performance pay, and female teachers. See Table 4.11 for further details regarding the means and standard deviations of scale variables and the sample proportion and standard deviation of nominal variables.

The regression omitted numerous variables which were deemed statistically insignificant, including (but not limited to) school grade levels, for-profit charter networks, and alternative teacher certification. In addition, there was no statistically significant relationship between year-round school calendars or four-day school weeks with teacher satisfaction.

Table 4.11

Variables studied in regression related to teacher job satisfaction

Regression variable	Mean / Proportion	Standard deviation	Range
Teacher PD scale	21.496	4.679	7–28
Teacher collaboration scale	18.304	3.93	7–28
Teacher age	43.3	11.32	20–99
≤ 3 years teaching experience	.148		
Teacher base salary	$55,992.70	$18,320.78	$10,000–$195,000
Coach/Activity sponsor	.434		
Male principal of school	.470		
Private school prior year	.004		
Charter school	.104		
School offers tenure	.572		
School start time (SST)	8:06 AM	0:29	7:00 AM–9:40 AM
School end time (SET)	3:02 PM	0:34	11:00 AM–6:00 PM
Teacher performance pay	.128		
Female teacher	.744		
(Constant)	20.86	4.81	7–28

Correlation Between Regression Variables

When multiple variables are entered in a regression, it is important to ensure no variable studied is significantly related to another variable. To ensure that variables were independent of each other, Pearson correlation coefficients were calculated to measure the linear association between each pair of variables.

The three largest correlation coefficients were measured between SST and SET (.584), between teacher satisfaction scale and teacher professional development scale (.413), between teacher age and three years teaching experience (–.390), between teacher age and teacher base salary (.319), and between teacher collaboration scale and teacher professional development scale (.260). See Table 4.12 for further details.

Table 4.12

Pearson correlation coefficients between variables studied in regression related to teacher job satisfaction

Variable	Teacher PD scale	Teacher collaboration Scale	Teacher age	≤ 3 years teaching experience	Teacher base salary	Coach / Activity sponsor	Male principal of school	Private school prior year	Charter school	School offers tenure	School start time (SST)	School end time (SET)	Teacher performance pay	Female Teacher
Teacher Satisfaction Scale	0.413	0.107	0.06	0.026	0.033	0.031	0.054	0.011	-0.009	0.067	0.009	-0.02	-0.033	-0.035
Teacher PD scale		0.26	-0.015	0.042	-0.03	0.016	-0.014	0.01	0.012	-0.007	0.018	0.019	0.011	0.005
Teacher collaboration Scale			-0.123	0.083	-0.029	0.021	-0.053	0.003	0.029	-0.04	0.039	0.028	0.037	0.07
Teacher age				-0.39	0.319	-0.059	0.025	-0.024	-0.092	0.064	0.007	-0.047	-0.031	-0.035
≤ 3 years teaching experience					-0.27	-0.042	-0.022	0.011	0.108	-0.073	0.003	0.05	0.06	0.001
Teacher base salary						0.037	0.005	-0.024	-0.125	0.285	0.032	-0.135	-0.15	-0.047
Coach/Activity sponsor							0.077	-0.018	-0.048	0.033	-0.051	-0.001	-0.021	-0.144
Male principal of school								-0.008	-0.052	0.047	-0.087	-0.027	-0.006	-0.098
Private school prior year									0.027	-0.004	0.005	0.003	0.005	-0.002
Charter school										-0.274	-0.04	0.119	0.247	0.01
School offers tenure											0.028	-0.164	-0.233	-0.02
School start time (SST)												0.584	-0.003	0.08
School end time (SET)													0.041	0.029
Teacher performance pay														0.014

Regression Findings

The regression registered a R^2 value of .183, and a p-value of < .001. This implies statistically significant findings, but the independent variables studied only affect 18.3% of the teacher satisfaction scale. Controlling for all other variables, the regression identified the following variables with positive relationships to the teacher satisfaction scale, with statistical significance at the $p < .001$ level. See Table 4.12 for further details.

- A one point increase on the teacher professional development (PD) scale are associated with a 0.416 point increase in the teacher satisfaction scale score, on average.
- A one point increase on the teacher collaboration scale are associated with a 0.019 point increase in the teacher satisfaction scale score, on average.
- A one year increase in teacher age are associated with a 0.032 point increase in the teacher satisfaction scale score, on average.
- Teachers who are paid coaches, activity supervisors, teacher mentors, or evening class instructors were associated with a 0.214 increase in the teacher satisfaction scale score, on average.
- Teachers who work at a school with a male principal were associated with a 0.442 point increase in the teacher satisfaction scale score, on average.
- Teachers who work in a school that offers teacher tenure were associated with a 0.506 point increase in the teacher satisfaction scale score, on average.
- Teachers with three years or less teaching experience are associated with a .676 point increase in the teacher satisfaction scale score, on average.

Table 4.13

Regression of teacher job satisfaction scale by variable

Regression variable	Regression coefficient (B)	Beta	t
Teacher PD scale	0.416	0.406	86.707***
Teacher collaboration Scale	0.019	0.015	3.257***
Teacher age	0.032	0.077	14.970***
≤ 3 years teaching experience	0.676	0.050	10.061***
Teacher base salary[1]	0.033	0.013	2.451*
Coach/Activity sponsor	0.214	0.022	4.813***
Male principal of school	0.442	0.046	10.069***
Private school prior year	0.734	0.010	2.130*
Charter school	0.226	0.015	3.084**
School offers tenure	0.506	0.052	10.471***
School start time (SST)[2]	0.004	0.023	4.059***
School end time (SET)[3]	– 0.004	– 0.029	– 4.975***
Teacher performance pay	– 0.414	–0.030	– 6.221***
Female teacher	– 0.290	– 0.027	– 5.749***
(Constant)	12.109		13.462

R^2 = 0.183, *F stat* = 640.565, $p < .001$

*$p < .05$, ** $p < .01$, *** $p < .001$

[1] Per $10,000 added base salary
[2] Per 1 minute later start time
[3] Per 1 minute later end time

In addition, to the variables which were statistically significant at the .001 level, the following variables are also positively related with the teacher satisfaction scale and are statistically significant. See Table 4.12 for further details.

- Teacher salary has a statistically significant but small ffect on teacher satisfaction ($p < .001$) Each $10,000 increase in teacher base salary is associated with an increase of .033 points on the teacher satisfaction scale, on average.
- Teachers who taught in charter schools were associated with a 0.226 point higher teacher satisfaction scale score, on average ($p = .002$)
- Teachers who taught at a private school the previous year, and now teach in a public school, were associated with a 0.734 point higher teacher satisfaction scale score, on average ($p = .03$)

Finally, two variables outside school schedules were found to have a negative relationship with the teacher satisfaction scale. Teachers in schools with performance pay were associated with a 0.414 lower teacher satisfaction scale score, on average, and female teachers were associated with a 0.290 point lower teacher satisfaction scale score, on average ($p < .001$). See Table 4.12 for further details.

Relationship Between Teacher Satisfaction & School Schedules

This study found a positive association between SST and teacher satisfaction, as well as a negative relationship between SET and teacher satisfaction. With a regression coefficient of .004, each minute later of SST is associated with a .004 increase on the teacher satisfaction scale. Similarly, each minute later of SET relates to a .004 decrease

on teacher satisfaction scale. These findings are statistically significant, with a p-value <.001. See Table 4.12 for further details.

The Pearson correlation between SST and SET is .584, suggesting a positive association correlation between start time and end time. However, the strength of this correlation is not high enough to presume start times and end times are completely tethered. Each school district sets the length of school day, and districts differ on how to structure their school days to meet the minimum number of instructional hours.

Chapter 5

Discussion

Over the past decade, there has been increased attention on the role of school start times on adolescent sleep, behavioral health, and academic performance (Heissel & Norris, 2018; Owens et al., 2014; Peltz, et al., 2017; Touitou, 2013; Troxel & Wolfson, 2017). Since the COVID–19 pandemic, journalists and scholars have also placed more focus on teacher satisfaction and burnout (Meltzer, 2023; Miller & Reynolds, 2022). This study aimed to investigate whether changes to school start time had any association with teacher satisfaction.

These findings are consistent with previous research suggesting that high schools are more apt to start and end classes earlier than elementary schools (Fitzpatrick, 2016). This is most common in suburban districts which cycle busses to conduct different runs for different school levels, reducing the fleet and driver expenses for the district (Wolfson & Carskadon, 2005). There are statistically significant differences in school start times by race and gender; however, these differences are most likely explained demographic patterns of employment, as a greater percentage of males work in high schools and a greater percentage Black and Hispanic teachers work in cities.

To answer the central research question of this study, the data suggest a positive relationship between school start time and teacher job satisfaction, with an anticipated increase on the satisfaction scale (0.004 scale points) with each minute later that classes start. There was a matching negative association between school end time and teacher job satisfaction, with an anticipated decrease on the satisfaction scale (0.004 scale points)

with each minute later that classes end. Dismissal time has a slightly more powerful association with teacher satisfaction than the start time of classes.

In practical terms, this regression would predict that a 30-minute shift backwards in the SST could produce a 0.12 item increase on the teacher satisfaction scale, but this increase in satisfaction could be counteracted if school shifted the dismissal time back simultaneously.

Implications

Public scholarship calls researchers to focus their talents on projects which offer practical value to the broader community. This study was conducted to address growing questions about the practical considerations and consequences related to SST and can provide insights for school leaders developing policy and planning school district initiatives.

For over 20 years, researchers have studied the implications of school start times on the health and wellness of school students (Wahlstrom, et al., 1998; Owens et al., 2010; Lufi, et al., 2011; Edwards, 2012). Specifically, critics argue the high percentage of US high schools which begin classes prior to 8:00 AM challenge the biological sleep patterns of adolescent students (Troxel & Wolfson, 2017). With the ramifications on childcare, transportation, extra-curricular activities, and teenage employment, etc., discussions about changing SST can produce emotionally charged debates in community forums and policy meetings (Wolfson & Carskadon, 2005; Fitzpatrick, 2016).

By matching teacher survey responses, which included no reference to SST, to the SST data from the corresponding school survey, this study found statistically significant association between start time and teacher satisfaction, as well as end time and teacher

satisfaction. This is a novel approach to studying the impact of SST on teachers, and there does not appear to be any previous studies on this topic utilizing a national sample of this size. Identifying a statistically significant relationship between SST and teacher satisfaction utilizing a generalized data set warrants further discussion for researchers and school leaders, specifically in the following areas.

Teacher Engagement in SST Conversations

These findings reinforce the importance of engaging teachers in conversations about SST, particularly when a district is considering changing their bell schedules. While SST may not have a leading influence on teacher satisfaction on teacher turnover, changes in school start time could have profound effects on the daily routines of teachers (commuting, childcare, etc.). In addition, leaving teachers out of policy conversations can inhibit an effective transition and adoption of change within a school (Kumar and Scuderi, 2000).

True inclusion in policy conversations requires personal interactions and engagement of teachers in the shaping of new policy. While surveys can offer broad overviews of opinions, they can be perceived as impersonal in a profession built upon human interaction. In addition, there are signs that the abundance of surveys in the field of education leads to participation fatigue, inhibiting the reliability of survey data (Adams & Umbach, 2012).

The most efficient means of gaining personal feedback from teachers would be using focus groups. While virtual meeting platforms may increase scheduling flexibility, in person focus groups produce more reliable observations, including participant posture and body language (Greenspan et al., 2021). Conduct the focus groups on campus for

convenience and familiarity for the participants, but an outside facilitator could provide more honest feedback (Carey & Asbury, 2012). While focus groups typically last 90–120 minutes in a research setting (Mertens, 2014), shorter focus groups would be more effective based on teachers' schedules and familiarity with the district.

Implications for State Policymakers

In the US, public education is very localized compared to other parts of the world. However, state education agencies still have broad authority in shaping school policy. Recently, the debate surrounding SST has reached state capitol buildings. In 2019, the PA Joint State Government Commission released a report outlining a case for later SST, and referenced bills proposed for statewide mandates for later high school SST in California, Connecticut, Maine, Maryland, South Carolina, and Texas (Hursh, 2019). California was the first state to pass a law requiring high school classes to begin after 8:30 AM, which went into effect at the start of the 2022–23 school year (Simon, 2022). On March 9, 2023, three Florida state legislators proposed a bill to require all high school classes begin after 8:30 AM and all middle school classes begin after 8:00 AM (Sachs, 2023).

While statewide policies can be valuable for creating consistency and accountability across districts, there would be a valid argument for devolving authority on school schedules to local districts. By offering school boards authority to determine how their district will meet required instructional hours, state legislators can respect the unique needs of each community which shape school schedules. For example, a district in a vacation resort may find value in using longer school days to shorten the school year, freeing up high school students and school staff to staff the hotels, restaurants, and other services essential to the local economy each summer. At the same time, an agrarian

community may prefer to start classes later so students can attend to farm chores prior to attending classes. School bell schedules and school calendars reflect community values, and statewide policies which do not match local needs will face resistance in implementation.

The most common mechanism for teacher input on state education policy involves lobbying from teachers' unions. State affiliates of the National Education Association and American Federation of Teachers are among the largest and most effective political action groups in each state (Piazza, 2019). These affiliates will certainly offer input in these policy conversations. However, union lobbying efforts can elicit partisan responses, inhibiting productive dialogue (Kahlenberg, 2012).

Perhaps state legislators should seek out feedback directly from teachers in their jurisdictions. Whether that involves asking for time at faculty meeting at several schools in their district or inviting teachers from multiple schools to attend a focus group with the legislator and staffers, elected leaders can gain valuable feedback by going directly to teachers for input. These personal interactions could also build teachers' confidence in their legislators, which could also be beneficial during campaign season.

Placing Teacher Satisfaction in Context of SST Conversation.

While the relationship between SST and teacher satisfaction is statistically significant, the relationship is not strong enough to unilaterally override other policy implications of changing SST. The effects of this potential policy change on transportation challenges, impacts on extracurricular activities, and childcare can have a profound impact on students, parents, faculty, and community members. School leaders

must perform their due diligence when considering changes to school schedules and ensure that all voices are heard while the policy change is under consideration.

This study does not suggest that SST can influence teacher turnover or retention on a broader level, yet SST policy conversations can have direct or indirect effects on teacher's employment choices. If a district delays their high school's SST from 7:30 to 8:30 AM, our findings suggest that teacher satisfaction would increase on average, but it could be the final straw for a teacher who was questioning their future at the school and now faces major shifts in their commute and childcare arrangements. Equally important, staff members who felt left out (or worse – blindsided) by such a change could lose trust in their employer and seek a change as well. While these hypothetical examples may not carry enough weight to change SST or maintain the status quo, school leaders must prepare for such a scenario. While the departure of a teacher may seem substantial in the policy conversation, each faculty member has a unique imprint on their school's climate and culture, and their departure could leave a void if they are not replaced by a faculty member with similar certification, skills and/or temperament.

Importance of Teacher Professional Development (PD)

Perhaps the most significant takeaway from this study was the unexpected strength of the relationship between teacher professional development and teacher satisfaction. The strong relationship between teacher PD and teacher satisfaction corroborates the research of Yoon and Kim (2022). Utilizing data from the subsample US responses to the Teaching and Learning International Survey (TILS), facilitated by the Organization for Economic Co-operation and Development (OECD), Yoon and Kim conducted a latent class analysis to identify categories of teachers based on the teacher's

propensity to participate in professional development. Teachers in the higher classes of PD participation were also more apt to rate higher on self-efficacy and job satisfaction (Yoon & Kim, 2022).

The similarities between the findings of this study, based on the NTPS, and Yoon and Kim's findings, based on TILS, support the validity of the findings in both studies that teacher professional development is highly associated with teacher job satisfaction. School leaders should provide teacher agency and support for PD opportunities, whether school wide or self-directed, to improve teacher satisfaction and retention.

Limitations

Time and available resources confine all research projects. Efforts were made to ensure validity and reliability of findings, but some issues could not be solved. The following limitations must be noted before considering the broader implications of these findings.

Data Issues

This study relied on data provided by NCES from the 2017–18 NTPS, which included thousands of schools and over 44,000 teacher respondents. Any databases of this size are subject to imperfections and inconsistencies.

Specifically, data concerns became apparent when reviewing the school levels attributed to survey respondents, as several "elementary schools" as identified in the database included students as old as 12th grade. These irregular data points likely represent respondent errors or data entry errors. School grade level was not included in the final regression on teacher satisfaction.

Limited Regression Variance

The final regression of teacher satisfaction only registered a coefficient of determination (R^2) of .186, which implies that the regression only explains an estimated 18.6% of the variability in responses which made up the teacher satisfaction scale. As there is limited research on the role of school schedules on teacher satisfaction, this regression still provides enough empirically valid data to begin the conversation of the relationship between these variables. However, the connection between school schedules and teacher satisfaction cannot be fully measured without a better variance of teacher satisfaction.

Missing Data Items & Delayed Data Set

One short anecdote may further explain the limited coefficient of determination. Struggling to identify variables that would improve the variance of the regression, I asked my wife (a high school teacher) what she believed to be the greatest influence on teacher job satisfaction. The response was immediate and emphatic – *the students!*

Teachers generally enter education believing they can make a meaningful impact on the lives of students (Bruinsma & Jansen, 2010; Rutten & Badiali, 2020; Tang et. al., 2020). However, there were no items in the data set regarding the interactions with or behavior of students the respondents work with daily.

Several NTPS teacher survey items were not available on the dataset provided, specifically a series of questions about teacher self-efficacy:

In your teaching, to what extent can you do the following?

- *Get students to believe they can do well in schoolwork*
- *Help my students value learning*
- *Craft good questions for my students*
- *Control disruptive behavior in the classroom*
- *Motivate students who show low interest in schoolwork*
- *Make my expectations about student behavior clear*
- *Help students think critically*
- *Get students to follow classroom rules*
- *Calm a student who is disruptive or noisy*
- *Use a variety of assessment strategies*
- *Provide an alternative explanation when students are confused*
- *Vary instructional strategies in my classroom*
- *Help students develop cross-curricular skills (e.g. creativity, critical thinking, problem solving)*
- *Support students learning through the use of digital technology (e.g. computers, tablets, smart boards)*
- *Support student collaborative learning through the use of digital technology (e.g. computers, tablets, smart boards)*

Research has shown teacher self-efficacy to play a critical role in job satisfaction and teacher burnout (Blackburn, Bunchm, & Haynes, 2017; Perera et al., 2018; Skaalvik & Skaalvik, 2007; Skaalvik & Skaalvik, 2017). Including a scale of teacher self-efficacy using the missing items above could have provided a more meaningful regression of teacher satisfaction.

In addition, the 2020–21 NTPS principal survey included a series of questions regarding school climate, including the perceived frequency of physical conflicts, vandalism, bullying, racial tensions, and verbal abuse/disrespect of teachers (NCES, 2022). Unfortunately, the 2017–18 NTPS teacher survey did not include these questions, which could have produced a valuable scale to add to the regression.

Finally, this study originally intended to include data from the 2020–21 NTPS for comparison, but the more recent dataset, scheduled for release in September 2022, faced several delays. NCES finally announced the release of the restricted data files on

February 28, 2023, but the files were not accessible in time for inclusion in this dissertation (NCES, 2023).

The 2020–21 NTPS replicated several of the questions from the 2017–18 teacher survey, but also introduced new survey items which could shed greater light on the impact of school start times on teachers.

Areas for Further Research

This study did not find substantive significance in the central research question regarding the relationship between SST and teacher satisfaction, but the findings do provide new insight into the discussion related to school schedules and teacher satisfaction. Researchers are encouraged to continue studying this subject further with focus on the following topics.

Comparison to 2020–21 NTPS Results

As previously mentioned, the 2020–21 NTPS dataset should become available soon. Replicating the statistical tests from this study with the 2020–21 dataset would provide a significant comparison for historical purposes, as the most recent survey took place in April 2021 while a high percentage of US schools were still using adapted learning formats due to COVID–19 protocols. In addition, the unprecedented mixture of online, in person, and hybrid learning models taking place, many districts changed SST during COVID protocols for logistical reasons, ranging from shorter synchronous classes with asynchronous assignments to eliminating lunch periods in efforts to avoid transmission in cafeterias (Barmore, 2021; Kuschner, 2020; Nierenburg & Pasick, 2020; Nye, 2020;).

In addition, the 2020–21 NTPS teacher survey included many new survey items which could pose greater insight on teacher satisfaction, especially when linked to corresponding SST entries on the NTPS school survey. These new teacher survey items include, but are not limited to, questions about teacher influence on school policy, teacher agency on curriculum and instructional practices, student discipline issues, and how long a teacher plans to remain teaching (NCES, 2022).

Finally, item T1756 on the 2021–22 NTPS teacher survey asks a new question which has largely been only asked of students in the national dialogue regarding SST: *"On average, how many hours of sleep do you get in a typical school night?"* (NCES, 2022). Even focusing on the subsample of teachers who were primarily in person, researchers could have a significant sample size for a study linking the self-reported sleep habits of teachers to SST. This could provide valuable insight for school leaders discussing start times.

The delayed release of the 2020–21 NTPS dataset was a frustrating setback in this study, and the more recent data had to be abandoned to complete this dissertation in this semester. However, comparing the two datasets would provide deeper insight into the relationship between school start times and teacher satisfaction.

Staff Focused Case Studies

In the late 20th century critics of public administration research believed the field lacked scientific rigor. Hummel made a compelling argument to the academic community in support of case studies for conveying findings to civil servants, "On the grounds that managers live and work in an environment different from that of scientists" (1991, p. 32). Hummel argued that managers are equally reflective as scientists, but process and

prioritize information differently. Specifically, they value objectivity less than nuanced consideration of circumstances and question the effectiveness of replicable research which does not account for the human variability between the time, context, and people involved in administrative decision making. By embracing narrative as a mechanism to communicate research, Hummel believed scholars could present studies which are more relatable to the work of managers on the front lines of public administration (1991).

Discussions on sleep and school start times are filled with scientific studies regarding the circadian rhythms and sleep hygiene of adolescents (Carskadon, 1990; Schohenals et al., 1998; Touitou, 2013), as well as the academic and behavioral health consequences of early SST (Lufi et al., 2011; Owens et al., 2014; Troxel & Wolfson, 2017; Wahlstrom et al., 1998). However, some of the most compelling arguments for SST changes have come from case studies outlining the community engagement and policy implementation processes (Collins et al., 2017; Malone et al., 2017; Meltzer et al., 2017). In many cases, word of mouth and community dialogue offered the most impactful diffusion of information.

Teachers and school leaders are highly educated, and most are capable of digesting scientific research. Still, Hummel's argument for narrative research is applicable to educators, who work in a field defined by human interaction. More case studies focused on the experiences of faculty and staff surrounding schedule changes could provide more reassurance or caution for school officials considering changes to SST.

Further Research on Four Day School Week

As previously mentioned, nominal variables pertaining to year-round school calendars and four-day school weeks were removed from the regression due to lack of statistical significance. However, only a small subset of the sample – 612 out of 44,319 respondents, 1.4% of the sample – currently utilize this model. The four-day school week appears to gain more traction and warrants further study considering other current circumstances (Garcia, 2023; Wilkins, 2023).

Some districts temporarily adopted the model to provide more planning time for teachers as they adapted to hybrid and online instruction (Barmore, 2021; Thompson, 2021). Other districts are now looking into a four-day week to help recruit teachers amid staffing shortages (Garcia, 2023; Wilkins, 2023). Research on the four-day school week has not provided damaging evidence against the schedule shift, and some research provides support for the concept when it fits the community's interests (Anderson & Walker, 2015; Turner, Finch, & Ximena, 2018; Thompson, 2019; Thompson, et. al., 2021; Morton, 2021).

This comes as more employers are finding successful increased production in experiments reducing employee hours while maintaining the same pay, with employees citing better health and more efficiency when at work (Kelley, 2023). Of recent note, a trial study of 61 firms in the UK who adopted a four-day work week found benefits for employers and employees, with 56 firms saying they would continue past the pilot program (Autonomy Research, 2023). Federal and state legislators are proposing bills to reduce the standard work week from 40 hours to 32 hours to facilitate a four-day work week (Kaplan & Ayette, 2023; Lehman, 2023). Others are skeptical of the effectiveness

of the four-day week, including some employees of firms who have experimented with a four-day model (Tarrant, 2023).

In addition, a growing number of workers remain in remote work or hybrid (part-time office / part-time home) work arrangements. Researchers from Harvard Business School found worker efficiency improved 4.4% amidst work from home arrangements during the pandemic (Choudhury, et. al., 2021).

An online public opinion survey sponsored by EdChoice released February 6, 2023 found only 41% of parents said schooling should take place "completely outside the home" when asked the following question:

> *After the pandemic, if given the option, to what extent would you prefer schooling to be scheduled each week at home with a parent or tutor to provide the best education for your child?*
> - *Completely outside of the home (41%)*
> - *1 day at home (8%)*
> - *2 days at home (16%)*
> - *3 days at home (15%)*
> - *4 days at home (5%)*
> - *Completely at home (15%)*

These results should be read with caution due to reliability concerns of online surveys (Chang & Vowles, 2013; Smyk, et. al., 2021) and sponsorship by an organization which promotes school choice policies, such as vouchers and homeschool supports (EdChoice, 2023).

Time will tell if the growth of the four-day school week another failed fad in education or for communities a transformative tool is. In either event, an analysis of this trend using Kingdon's Multiple Streams Framework – the problems of transportation and operations costs, the proposal of a four-day week, and the political climate where this discussion takes place – could provide meaningful insight for future discussion regarding

school policymaking and the relationship between school schedules and teacher satisfaction. Researchers should also study if students who attend a school with a four-day week suffer social jet lag at the same rate as students with a traditional school week.

Conclusion

School leaders face competing interest within their community at any given time. While most policy discussions take place with little fanfare, discussions about SST can generate lively debate and community engagement.

This study was designed to remove personal biases as best as possible. Most studies on the impact of start time on teachers involve surveys taking place shortly before or after a change in SST. By matching the NTPS teacher surveys to the NTPS school and principal surveys, this study was able to run statistical tests on the influence of school start times on teacher satisfaction without asking faculty direct questions which could be perceived as loaded and/or leading.

This secondary analysis reached an impartial, if not predictable, series of findings. Most notably, the link between start time and teacher satisfaction is statistically significant, inviting further research on the topic, particularly with the impending release of the NTPS 2020–21 data set.

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