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FUTURE OF FAILURE?  
STUDYING THE EFFECTS OF A SHORTENED SCHEDULE ON THE ACADEMIC  
SUCCESS OF STUDENTS

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FUTURE OF FAILURE?  
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A THESIS APPROVED FOR THE  
DEPARTMENT OF SOCIOLOGY

BY

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*I would like to dedicate this thesis to my family.*

*My husband, Stewart, who has picked up the slack for me,  
wiped my tears, kept me fed, and listened intently while I*

*babbled on about what I was learning.*

*My children, Emily, Brooke, Joshua, and Andrew, who  
continue to encourage me to reach for my dreams and  
who help keep me grounded as I watch them soar through  
their accomplishments.*

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## **Abstract**

This study examines the effects of changing from a five-day to a four-day school week on academic achievement for public schools in Oklahoma, a state which ranks high on poverty and near the bottom on educational quality compared to other states. Yet since 2013, Oklahoma school districts have increasingly adopted the four-day school week in response to less state spending on education. We use clustered-regression analysis and a sample of 1,336 schools from public-use Oklahoma State Department of Education (OSDE) data to examine the effect on the measure, a school's academic report card score, for those who have experienced the shift from a five-day to a four-day school week over the period 2012 to 2016. This research finds a negative relationship between the change to a four-day school week and school report card scores, compared to schools that maintained a five-day school week. These results differ from those found in similar studies in other states, highlighting the importance of considering unique socioeconomic factors inherent to a state when implementing policy changes that affect our vulnerable future. And for Oklahoma, the switch to a four-day school week has for the most part been felt by children in rural schools, who are already economically challenged, so this may widen the already existing academic achievement gap between richer and poorer students.

# Chapter 1

## Introduction

Inequalities are rampant within the educational system of the United States beginning with the first steps in educating our children. Children from wealthier families often attend high-quality preschools where they experience the beginning of social, cultural, and educational inputs, which Lareau called concerted cultivation (2011:1). This process begins the educational and social training of the elite. In contrast, children from less financially privileged families have limited opportunities for this level of cultivation. Some have access to headstart programs, but even these carefully-designed programs fail to provide the same level of benefit beyond the early elementary school years.

While their wealthier peers are taking part in various enrichment activities beyond their schooling, such as sports, art education, or tutoring services, many children from more impoverished families are struggling to merely survive (Lareau 2001). They may not have adequate housing. If housing is not a concern, they may still have to suffer through times when their utilities have been disconnected due to their family's inability to pay. They may also suffer from food insecurity with inadequate amounts or types of food available to them at home. These fundamental concerns of life have a detrimental effect on the education of more impoverished children because they make it difficult for these children to focus beyond their immediate physical needs.

Oklahoma is certainly not immune to these concerns, listed as the eleventh state for highest poverty levels (US Census Bureau 2017) and among the lowest ranked states for educational quality (NWEA 2016). Despite these grim statistics, the State of

Oklahoma is attempting to find ways in which to cut the state budget. Moving to a four-day-school-week is one option the districts are using to accomplish this goal. The idea is that having to bus students to school fewer days a year, along with potential utility and employment savings, will benefit the state without risk to the children they are educating. In fact, Duncan and Murnane found that influence over the ways in which schools operate affects the most vulnerable of these children – those with food security issues, financial struggles, and unequal educational cultivation – compounding inequalities and affecting “skill acquisition and educational attainments” both directly and indirectly (Loc 543:2011).

This schedule change has predominantly been undertaken by rural schools. These schools are located in communities where resources for financially challenged families are scarce. Much like the families in Lareau’s study, the wealthier families in these communities have the financial resources to provide enrichment activities and tutoring opportunities for their children. Families on the other end of the financial spectrum, however, do not necessarily have the ability to provide their children with the same opportunities. A shortened school week may represent challenges that include not only relative luxuries such as how to provide enrichment activities but also how to provide for more urgent needs, such as providing supervision and food security for children.

At a time when achievement gaps are widening (Duncan and Murnane 2011), we must be cognizant of the potential for widening that gap even further through changes such as a shortened school week. While there are many measures of child well-being that could be examined to determine the effect of this schedule change, one of the

most immediate ways to explore the academic effects is to measure the changes in testing achievement scores.

Other studies examining student achievement levels have found mixed effects relating to the implementation of a four-day school week. These mixed results in past studies, therefore, highlight the importance of this research studying the effects of a four-day school week on Oklahoma's school children. Moreover, given Oklahoma's unique educational challenges and low ranking, this research stands to inform public educational policy in the State of Oklahoma today.

According to Hewitt and Denny (2011), 1936 signaled the beginning of the four-day school week, although it gained popularity among school districts in 1973. When examining the effects of a four-day school week on the academic achievement scores of children, grades 3 through 10, they found slightly lower test scores for children following a four-day school week compared to those following a five-day school week. The gap was wider, however, for elementary school students with a significant difference in writing scores for these students.

Anderson and Walker (2012) found positive effects on performance in reading and mathematics when studying the effects of Colorado school data. Overall, they concluded this schedule change did not affect student performance.

Grau and Shaughnessy (1987) found both districts experienced both gains and losses when they evaluated the academic test scores of twelve Colorado districts following a four-day school week, although they do not provide details of these changes. They also found that four-day week test scores in Colorado were comparable to the scores for ten New Mexico school districts following a four-day school week.

Finally, Sagness and Salzman (1994) examined student achievement scores among students in one Idaho school district following a four-day school week. They found some scores improved while others remained steady. They found increases in all subtests at the fourth grade level, increases in reading and language skills at the fifth grade level, and increases in all test scores except work study skills at the sixth grade level. They only presented results for two grades for the upper level students. They found an increase in language skills and science scores for eighth grade students and an increase in reading skills for eleventh grade students, although they found a decrease in work study skills, math, and social studies scores for the eleventh grade students. These data only compare one year of the shorter school week to determine changes, however, because the district transitioned back to a five-day school week after just that one year. While the results are interesting, they also highlight the difficulty of evaluating the effects of a school schedule change that is implemented on a limited basis, both in location and length of time.

## Chapter 2

### Theory and Hypothesis

The State of Oklahoma presents itself as an ideal case to study because schools have been transitioning from the five-day week to the four-day week since 2013. Whether or not the officials making these budget cuts intend to do so, they do, in effect, perpetuate inequality between the students with financial resources and those without financial resources. These inequalities do not present a singular effect. Instead, they are compounded over time, multiplying the obstacles children may face. For example, Margot Jackson (2015) found poor health and limited family capital result in a cumulative disadvantage and inequality effect which results in lower academic achievement. Similarly, Lareau (2001) describes cumulative inequality in her ethnography, referring to concerted cultivation when explaining the mechanisms of the creation and continuation of cumulative disadvantage and inequality. Likewise, the children of Oklahoma are likely to face more constraint due to a higher poverty rate, 24%, compared to the national average, 21% (US Census 2017).

Verschelden (2017) explains the effects of cumulative inequality using a theory she refers to as bandwidth. “Bandwidth refers to the cognitive and emotional resources needed to deal with making good decisions, learning, caring for family, having healthy relationships, and more” (Loc. 137). This theory asserts that each of us begins each day with a set amount of bandwidth. This bandwidth allows us to function productively as we work through our daily tasks. Once we have expended our bandwidth each day, we are no longer capable of performing efficiently. Unfortunately, we do not all start out with the same bandwidth. Our individual bandwidth is decreased by the many stressors

we each face. For students, this affects their ability to effectively process knowledge attainment. Bandwidth limiters for students may include medical concerns, relational problems, learning disabilities, or even hunger caused by food insecurity. If, as we find in the study, school budget cuts in the form of a four-day school week overwhelmingly target communities with fewer economic resources for public schools, the students in these communities are already starting with a lower bandwidth level. In Oklahoma, these poorer communities and school districts are overwhelmingly located in rural areas. Their bandwidth may not outlast the longer day typically adopted by schools making this schedule change. Instead, schools may be missing the opportunity to take advantage of renewed bandwidth when they eliminate a day of school each week.

With this in mind, we propose one hypothesis through this research. We expect to find a negative effect on test scores for schools following a four-day school week compared to those following a five-day school week.

## **Chapter 3**

### **Methods**

#### *Data*

The analysis uses publicly available School Report Card data from the Oklahoma State Department of Education (OSDE) for the years 2012 to 2016. 2012 is the first year for which data are available to analyze the impact of schools in Oklahoma which have switched to a four-day week schedule. These school report card data provide a measure of success for each public school in the state on a scale from 0 to 110. The possible score is based on student performance (i.e., 50 possible points), student growth (i.e., 50 possible points), and with the opportunity to earn 10 bonus points for school attendance, special enrichment programming, etc.

Student performance scores are dependent on the performance of eligible students in each school on state testing exams during the previous school year. Students are exempted from these exams if they have been enrolled in a U.S. school for the first time within the previous twelve months and do not take an English language proficiency assessment. Also excluded are students who demonstrate mastery of a subject through other assessment measures, such as the SAT or ACT college entrance exams. The state exams include “the Oklahoma Core Curriculum Tests (OCCT), End-of-Instruction (EOI) Exams, and the Oklahoma Alternative Assessment Program (OAAP)” (OSDE). These exams assess language arts, math, science, social studies, history, and geography over several testing sessions throughout the school year. Scores of students who are repeating the same test session within an academic year are excluded, as are the scores of students who were not students of the school for the full



academic year or those who are designated as “other placement.” A student designated as “other placement” has been “placed by state or court order in a facility within a district other than the student’s original district of residence, or a student placed in a healthcare facility in a district other than the student’s original district of residence” (OSDE).

Student growth scores measure individual student growth and are based solely on math and language arts assessments, as these are the only subjects consistently assessed on a yearly basis. Student scores are only included in this measure if there is an identical state testing number and valid scores for the current and previous test record. For grades three through eight, the previous test record would be from the assessment in the year immediately prior to the current year. For high school students, the previous test record would be from each student’s eighth grade assessment and are only included the first time they take the EOI exam during high school. In addition, the exam scores used must be from matched exam types. For instance, math scores must be matched with math scores and OCCT exam scores must be matched with OCCT exam scores to be included in the student growth measurement. Furthermore, these scores are only included in the student growth measurement if they are also included in the student performance measurement. Students who are excluded from the student performance measurement are also excluded from the student growth measurement.

The student growth measurement is split into two sub-categories including overall student growth (measured for all students in a school) and the growth demonstrated by the bottom 25 percent of students in a school. It is important to note here that any school with fewer than 10 students being assessed in a subject area will be

excluded from both the student performance and student growth scores for that subject area. Because some schools in Oklahoma are extremely small, this causes us to exclude some schools from our analysis.

In addition to the student performance and growth measures, schools also have the opportunity to earn up to 10 bonus points applied to their final grade. These point values vary by school type (elementary, middle, or high school), and are awarded as an all-or-nothing system. In other words, a school is not able to earn partial bonus points for any category. Elementary schools are able to earn 10 bonus points for achieving a 94 percent or higher attendance rate (OSDE). The attendance bonus points for middle schools are lowered to 6 points at 94 percent or higher, and an opportunity to earn points is added for achieving a dropout rate of 0.9 percent or lower (2 points) and achieving an advanced coursework participation index of 30 or higher (2 points) (OSDE). High schools have the opportunity to earn 5 points for a four-year cohort graduation rate of 90 percent or higher. In addition, they are able to earn points for student participation in advanced placement classes (1 point), student participation in ACT or SAT college entrance exams (1 point), graduation rate of low-performing eighth graders (1 point), EOI performance (1 point), and growth from year-to-year in any of these areas (1 point) (OSDE). These bonus points allow schools the potential to score 110 percent on their report card, although that benchmark is hit by a very few number of schools in our analytical sample.

### *Sample*

Our data initially included approximately 1792 schools. Each school is assigned a unique identification number by OSDE which includes a county code, district code,

and site code. Using those codes, we excluded schools which did not appear in all five years of our data or which did not have a school report card score for all five years. School districts have to close schools for a variety of reasons, but often the schools closing in Oklahoma are in rural areas where a community is no longer able to support the school financially. When this happens, the community will often partner with another nearby community to provide a school serving students from both. Sometimes, however, that option is unavailable, and students are required to travel further in order to attend school. Regardless, schools which are not in all five years of our data represent an analytical challenge to overcome without providing a significant benefit for our study. Thus, we chose to exclude those schools, reducing our analytical sample by 137.

Next, because the overwhelming majority of schools switching to a four-day week are located in rural communities, we chose to exclude the largest ten school districts in Oklahoma. These larger school districts are urban districts with vastly different challenges than the rural schools we are studying. This eliminated 310 schools from our analytical sample. These exclusions leave an analytical sample of 1336 Oklahoma public schools.

Nine schools in our sample made the switch to a four-day week, then switched back to the original five-day schedule. While it would be interesting to explore the reasons why schools made this decision, that research is beyond the scope of this study.

### *Measures and Descriptive Statistics*

Our dependent variable is the school report card score. The schools in our sample had a combined mean report card score of 78.66 in 2012, with scores ranging from 39.8 to 100. The mean of the scores in 2013 was 79.25 with a range of 35 to 105.

The mean of the scores in 2014 was 77.56 with a range of 28 to 105. In 2015, the mean of the scores was 76.81, ranging from 30 to 108. Finally, in 2016, the mean of the scores was 75.98 with a range of 32 to 106.

Table 1: Descriptive Statistics

	Mean	SD	Min	Max
Dependent Variable – School Grades				
2012	78.66	12.75	39.8	100
2013	79.25	11.66	35.0	105
2014	77.56	11.58	28.0	105
2015	76.81	11.31	30.0	108
2016	75.98	11.06	32.0	106
Independent Variable – 4-Day Week				
2012	0.00	0.00	0.0	0
2013	0.03	0.17	0.0	1
2014	0.04	0.19	0.0	1
2015	0.05	0.21	0.0	1
2016	0.07	0.25	0.0	1
Control Variables				
School Type				
Elementary School	0.32	0.47	0.0	1
Middle School	0.38	0.49	0.0	1
High School	0.30	0.46	0.0	1
Title 1 School (low SES)	0.98	0.16	0.0	1

Source: Oklahoma State Department of Education (OSDE) Report Card data, 2012-2016.  
N=1,336

Our independent variable is the four-day week. The 2012 school year is the first year in our data, but schools did not switch to a four-day week until 2013, so there are no descriptive statistics for this variable in 2012. In 2013, three percent of the schools in our sample switched to a four-day week. In 2014, that number increased to 4 percent. The number further increased in 2015 (5 percent) and 2016 (7 percent).

Table 2 represents the descriptive statistics of the 426 elementary schools in our sample. The majority of the schools (415) continued a five-day schedule throughout the study. The mean school score for non-switchers was 76.17 in 2012 with a range of scores from 39.8 to 100. The mean score for non-switching schools in 2013 was 77.94

with a range of 44 to 104. In 2014, the mean of scores was 77.23, ranging from 30 to 103. In 2015, the mean of scores increased to 78.49 with a range of 41 to 108. The mean rose again in the final year of analysis, 2016, at 79.68 with a low of 35 and a high of 106.

Table 2: Descriptive Statistics of Elementary School Average Report Card Scores (n=426)

	Mean	SD	Min	Max
<b>Five-Day Schools (415)</b>				
2012	76.17	0.62	39.8	100.0
2013	77.94	0.54	44.0	104.0
2014	77.23	0.55	30.0	103.0
2015	78.49	0.51	41.0	108.0
2016	79.68	0.52	35.0	106.0
<b>Switch to Four-Day Week – 2013 (4)</b>				
2012	68.95	1.59	66.4	73.0
2013	77.50	3.59	72.0	88.0
2014	72.50	2.84	64.0	76.0
2015	81.50	2.72	77.0	89.0
2016	77.75	4.42	66.0	87.0
<b>Switch to Four-Day Week – 2014 (1)</b>				
2012	46.40	.	46.4	46.4
2013	65.00	.	65.0	65.0
2014	73.00	.	73.0	73.0
2015	74.00	.	74.0	74.0
2016	50.00	.	50.0	50.0
<b>Switch to Four-Day Week – 2015 (2)</b>				
2012	69.90	3.30	66.6	73.2
2013	77.00	2.00	75.0	79.0
2014	68.50	0.50	68.0	69.0
2015	77.50	2.50	75.0	80.0
2016	76.00	4.00	72.0	80.0
<b>Switch to Four-Day Week – 2016 (4)</b>				
2012	69.90	2.36	63.2	73.2
2013	77.25	6.49	63.0	94.0
2014	76.25	6.75	65.0	92.0
2015	80.00	7.49	68.0	99.0
2016	74.75	9.43	64.0	103.0

Source: Oklahoma State Department of Education (OSDE) Report Card data, 2012-2016.  
N=1,336

There were 4 elementary schools that switched to a four-day week in 2013. These schools had a school score mean of 68.95 in 2012, which was the year before the schedule change. The mean of scores for this group was 77.5 in 2013 (the year of the schedule change), 72.5 in 2014, 81.5 in 2015, and 77.75 in 2016. The scores range from a low of 64 (2014) to 89 (2015).

There was only one elementary school that switched to a four-day week in 2014. Before the schedule change, this school had scores of 46.4 in 2012 and 65 in 2013. These scores initially jumped to 73 in the year of the schedule change, then 74 in the next year, 2015. However, the score drops again, hitting 50 in 2016.

There were two elementary schools that switched to a four-day schedule in 2015. Before the switch, these schools had mean scores of 69.9, 77, and 68.5 in the years before the schedule change. After the schedule change, the mean of school scores was 77.5 and 76.

Finally, four elementary schools switched to a four-day schedule in the final year of our analysis, 2016. Before the schedule change, the mean school scores for this group were 69.9 in 2012, 77.25 in 2013, 76.25 in 2014, and a high of 80 in 2015. After the schedule change, the scores dropped to 74.75. This score drop could be a result of the school adjusting to the first year of a new schedule. However, it is the only one of the schedule changers that dropped in the initial year. Each of the schedule changers dropped in 2016, however, while the non-changing schools improved their score that year.

The number of elementary schools making the schedule change over the analytical time is small. It would be difficult to analyze this sample reliably without

combining it with the upper-level schools that also made the schedule change. However, we can still glean valuable information from these descriptive statistics. We see the elementary schools that made the schedule change all scored lower before they began that change than the schools that continued a five-day schedule. The exception to this was the last group of changers, those who switched in 2016. In the last year this group followed a five-day schedule, they scored 1.51 points higher than the non-changers.

Table 3 profiles the middle schools in our sample using descriptive statistics. Among this group, 462 schools continued a five-day schedule throughout the study period. These schools had a mean school score of 76.95 in 2012. This score dropped each of the next three years, scoring 74.19 in 2013, 73.52 in 2014, and 72 in 2015. The score then rose slightly to 73.42 in 2016. The low score for this group over the five years was 30 (2014 and 2015), and the high was 104 (2013).

Table 3: Descriptive Statistics of Middle School Average Report Card Scores (n=509)

	Mean	SD	Min	Max
<b>Five-Day Schools (462)</b>				
2012	76.95	0.56	39.8	100.0
2013	74.19	0.49	35.0	104.0
2014	73.52	0.51	30.0	99.0
2015	72.00	0.49	30.0	97.0
2016	73.42	0.48	32.0	99.0
<b>Switch to Four-Day Week – 2013 (21)</b>				
2012	68.44	3.08	46.4	93.4
2013	69.33	2.02	49.0	86.0
2014	67.52	2.71	44.0	89.0
2015	68.95	2.63	41.0	87.0
2016	65.76	1.95	44.0	81.0
<b>Switch to Four-Day Week – 2014 (5)</b>				
2012	74.64	8.27	53.4	100.0
2013	73.80	7.28	54.0	99.0
2014	75.80	5.05	66.0	95.0
2015	68.80	8.65	53.0	102.0
2016	68.00	6.47	51.0	87.0
<b>Switch to Four-Day Week – 2015 (6)</b>				
2012	69.30	6.27	46.4	90.0
2013	70.00	4.03	59.0	86.0
2014	73.83	2.69	68.0	86.0
2015	64.00	3.63	48.0	75.0
2016	70.50	4.51	58.0	87.0
<b>Switch to Four-Day Week – 2016 (15)</b>				
2012	73.43	3.63	46.4	100.0
2013	68.47	2.88	54.0	95.0
2014	67.87	2.77	54.0	99.0
2015	66.33	3.27	42.0	99.0
2016	66.20	3.00	49.0	97.0

Source: Oklahoma State Department of Education (OSDE) Report Card data, 2012-2016.  
N=1,336

There were 21 middle schools that switched to a four-day schedule in 2013. The mean school score for these schools was 68.44 in 2012, before the schedule change. The mean score then rose slightly in 2013, at 69.33. The mean school scores in the years after the schedule change were 67.52 in 2014, 68.95 in 2015, ending in a low of 65.76 in 2016. The scores for this group ranged from a low of 41 in 2015 to a high of 93.4 in 2012.



There were 5 middle schools that made the schedule change in 2014. Before the schedule change, those schools had a mean school score of 74.64 (2012) and 73.8 (2013). The school score rose slightly in 2014, hitting a high for this group of 75.8. The mean school score then dropped to 68.8 in 2015 and 68 in 2016. The scores for this group ranged from a low of 51 in 2016 to a high of 102 in 2015.

The number of middle schools that made the schedule change rose to 6 in 2015. Before the schedule change, these schools had a mean score of 69.3 (2012), 70 (2013), and 73.83 (2014). Those scores hit a low of 64 in the year of the schedule change, followed by 70.5 in 2016. The low score for this group was 46.4, and the high was 90, both in 2012.

Finally, there were 15 schools that switched to a four-day week in 2016. These schools showed a school score decline over all five years, beginning at 73.43 in 2012. It dropped progressively each year to a low of 66.2 in the year this group of schools made the schedule change to a four-day week. These scores ranged from 42 in 2015 to 100 in 2012.

These scores, much like the elementary schools' scores, reveal the middle schools making a schedule change start out lower than the schools which stayed on a five-day schedule. In addition, the scores for the four-day week schools appear to be lower over all the years.

Table 4: Descriptive Statistics of High School Average Report Card Scores (n=401)

	Mean	SD	Min	Max
<b>Five-Day Schools (366)</b>				
2012	85.09	0.59	40.0	100.0
2013	87.67	0.44	58.0	105.0
2014	83.82	0.52	53.0	105.0
2015	81.97	0.53	36.0	107.0
2016	76.38	0.57	33.0	102.0
<b>Switch to Four-Day Week – 2013 (13)</b>				
2012	80.62	2.98	60.2	100.0
2013	85.15	2.37	72.0	101.0
2014	82.00	2.79	64.0	98.0
2015	75.00	3.69	55.0	93.0
2016	72.92	2.87	57.0	85.0
<b>Switch to Four-Day Week – 2014 (5)</b>				
2012	78.04	6.64	60.0	100.0
2013	89.40	4.65	75.0	104.0
2014	82.60	6.47	64.0	102.0
2015	83.80	3.97	77.0	98.0
2016	76.20	6.34	61.0	97.0
<b>Switch to Four-Day Week – 2015 (6)</b>				
2012	70.03	4.06	60.0	86.8
2013	92.83	2.54	85.0	103.0
2014	84.33	3.71	74.0	96.0
2015	82.00	4.19	70.0	95.0
2016	77.00	1.29	72.0	81.0
<b>Switch to Four-Day Week – 2016 (11)</b>				
2012	78.01	3.58	60.0	93.4
2013	86.36	2.80	72.0	99.0
2014	79.82	2.72	61.0	91.0
2015	76.64	2.72	58.0	89.0
2016	75.18	2.85	60.0	91.0

Source: Oklahoma State Department of Education (OSDE) Report Card data, 2012-2016.  
N=1,336

Table 4 represents the descriptive statistics for the high schools in our sample. Of the 401 high schools included, 366 maintained a five-day school schedule. The mean school scores for this group were 85.09 in 2012, rising to 87.67 in 2013. The scores then began dropping, beginning at 83.83 in 2014, hitting 81.97 in 2015, and landing at 76.38 in 2016. These scores ranged from a low of 33 in 2016 to a high of 107 in 2015.

There were 13 high schools that switched to a four-day week in 2013. Before the switch, their score was lower than the five-day schools in the same year, at 80.62. The score for this group rose in the first year of the shorter schedule, at 85.15. These scores then declined over the years following the schedule change, with this group scoring 82 in 2014, 75 in 2015, and 72.92 in 2016. The scores for this group ranged from a low of 55 in 2015 to a high of 101 in 2013.

As with the middle schools, there were 5 high schools that switched to a four-day week in 2014 and 6 that made this change in 2015. The 2014 group of changers had a mean school score of 78.04 in 2012 and 89.4 in 2013. After the schedule change, the scores dropped to 82.6 in 2014, falling to 83.8 in 2015, and ending at 76.2 in 2016. These scores ranged from a low of 60 in 2012 to a high of 104 in 2013.

The schools that made the schedule change in 2015 appear to have had the most dramatic variance in mean scores. This group scored 70.03 in 2012. They hit a high of 92.83 in 2013, but then saw a decline to 84.33 in 2014. The scores continued to drop, with the schools earning an 82 in 2015, the year of change, and 77 in 2016.

Finally, 11 high schools made the change to a four-day schedule in 2016. As was the case with each group of high schools, this group saw their largest mean school scores in 2013. Their initial score was 78.01 in 2012, before earning that high score of 86.36 in 2013. Their scores then declined steadily. This group earned a mean school score of 79.82 in 2014, 76.64 in 2015, and 75.18 in 2016.

Table 5: Descriptive Statistics of All School (Elementary, Middle, High School) Average Report Card Scores

	Mean	SD	Min	Max
Five-Day Schools (1,243)				
2012	79.09	0.36	39.8	100.0
2013	79.41	0.33	35.0	105.0
2014	77.79	0.33	28.0	105.0
2015	77.10	0.32	30.0	108.0
2016	76.38	0.31	32.0	106.0
Switch to Four-Day Week – 2013 (38)				
2012	72.66	2.17	46.4	100.0
2013	75.61	1.84	49.0	101.0
2014	73.00	2.08	44.0	98.0
2015	72.34	2.03	41.0	93.0
2016	69.47	1.65	44.0	87.0
Switch to Four-Day Week – 2014 (11)				
2012	73.62	5.30	46.4	100.0
2013	80.09	4.62	54.0	104.0
2014	78.64	3.69	64.0	102.0
2015	76.09	4.65	53.0	102.0
2016	70.09	4.52	50.0	97.0
Switch to Four-Day Week – 2015 (14)				
2012	69.70	3.05	46.4	90.0
2013	80.79	3.54	59.0	103.0
2014	77.57	2.52	68.0	96.0
2015	73.64	3.27	48.0	95.0
2016	74.07	2.13	58.0	87.0
Switch to Four-Day Week – 2016 (30)				
2012	74.64	2.27	46.4	100.0
2013	76.20	2.43	54.0	99.0
2014	73.37	2.12	54.0	99.0
2015	71.93	2.33	42.0	99.0
2016	70.63	2.26	49.0	103.0

Source: Oklahoma State Department of Education (OSDE) Report Card data, 2012-2016.  
N=1,336

Table 5 represents the descriptive statistics for all of the schools in our sample by the year of schedule change. The schools that maintain a five-day school week (1,243) saw an initial increase in scores from 79.09 in 2012 to 79.41 in 2013. After this initial increase of test scores, the non-changers experienced a drop in scores, earning a

score of 77.79 in 2014, 77.1 in 2015, and 76.38 in 2016. These scores range from a low of 28 in 2014 to a high of 108 in 2015.

The schools that made the schedule change to a four-day week in 2013 (38) had mean school scores starting at 72.66 in 2012 and increasing to 75.61 in 2013. These scores then began declining with the group earning a score of 73 in 2014, 72.34 in 2015, and 69.47 in 2016. These scores range from a low of 41 in 2015 to a high of 101 in 2013.

The schools that made the schedule change to a four-day week in 2014 (11) had mean school scores starting at 73.62 in 2013 and increasing to 80.09 in 2013. These scores then began declining, following the pattern of the other school groups. This group earned a 78.64 in 2014, a 76.09 in 2015, and a 70.09 in 2016. These scores ranged from a low of 46.4 in 2012 to a high of 104 in 2013.

There were 14 schools that made the schedule change to a four-day week in 2015. These school also saw an initial increase in school scores from 69.7 in 2012 to 80.79 in 2013. Those scores then began declining, with the group earning a score of 77.57 in 2014, 73.64 in 2015, and 74.07 in 2016. The scores range from a low of 46.4 in 2012 to a high of 103 in 2013.

Finally, 30 schools changed to a four-day schedule in 2016. After seeing an initial increase in scores from 74.64 in 2012 to 76.2 in 2013, this group also saw a decline in scores. The group earned a score of 73.37 in 2014, 71.93 in 2015, and 70.63 in 2016. These scores range from a low of 42 in 2015 to 103 in 2016.

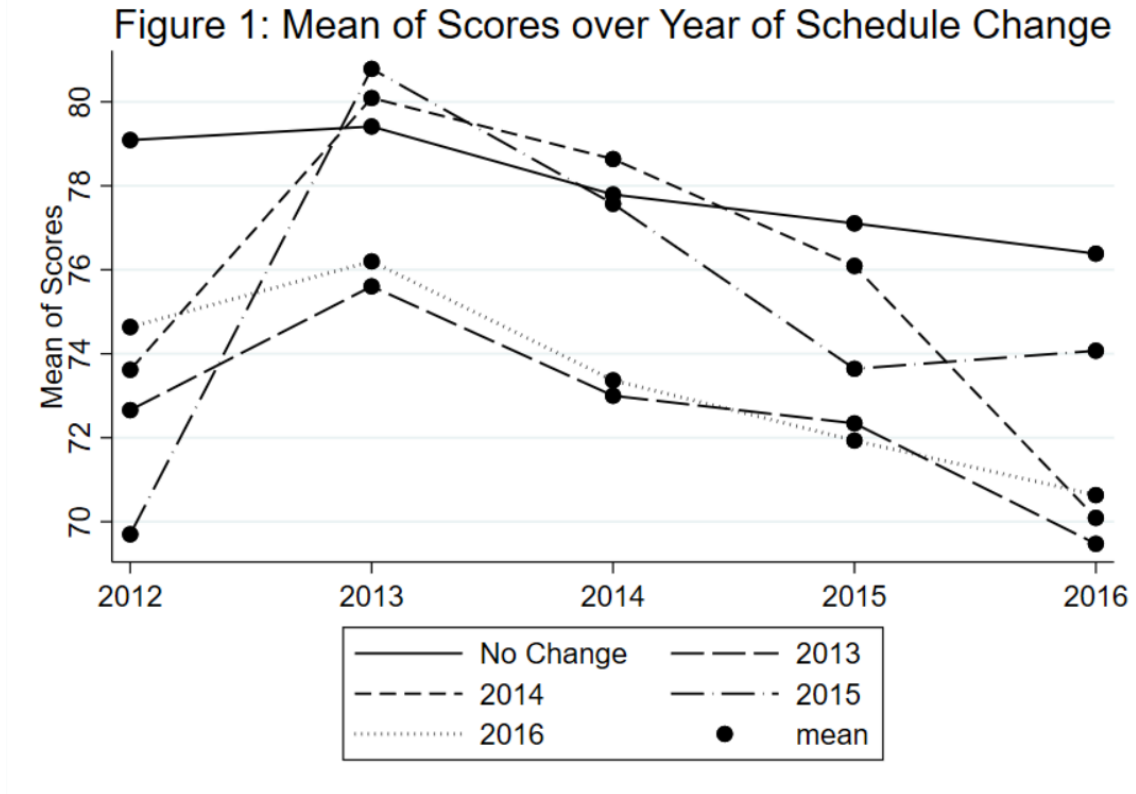


Figure 1 represents a visual interpretation of the school test score means presented in Table 5. When examining this figure, we see the initial jump in scores for all schools, followed by a decline. However, the scores for the schools that maintained a five-day schedule not only begin the study period with higher scores, but they also finish with the highest scores in the last two years. In addition, we can see that all of the schools that made the schedule change started out with noticeably lower scores than the non-changers.

*Plan of Analysis*

To investigate these differences in means, we began by completing a T-Test. For more robust results comparing the schools that were never on a four-day schedule compared to those that switched to a four-day schedule, we then ran a clustered linear

regression. The schools in our sample appear multiple times in the data. Clustering adjusts the standard error to account for the multiple appearances, thus avoiding bias.

### *Results*

Figure 2: T-Test of the Difference in Mean Report Card Scores

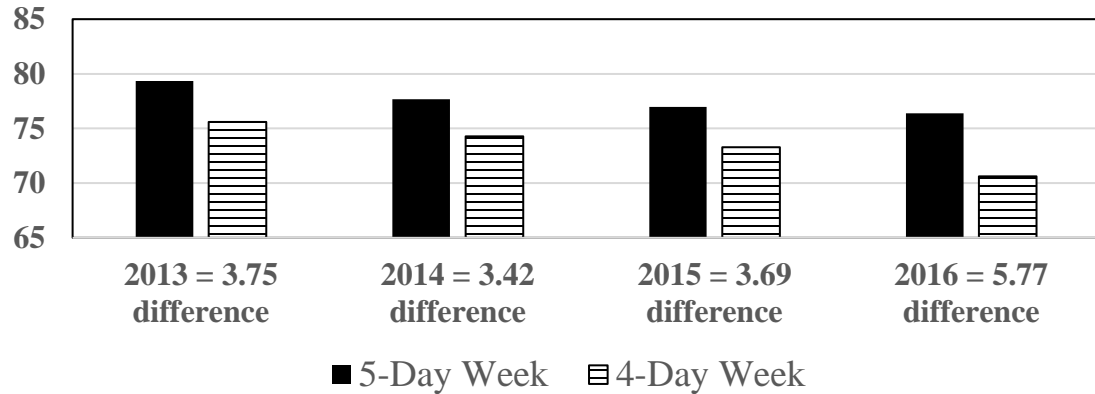


Figure 2 represents the difference in means for the overall sample. We have excluded 2012 from this test because no schools made the schedule change in that year. The magnitude of difference between 4-day and 5-day schools in all four years represented in the figure is statistically significant at the .05 level. The magnitude of difference in 2013 is 3.75. In 2014, the magnitude of difference is 3.42. In 2015, it is 3.69. Finally, in 2016 the magnitude of difference is 5.77.

Table 6: Linear Regression Assessing the Four-Day School Schedule on School Report Card Scores (n=6,680)

	Model 1	Model 2	Model 3
Four-Day Week Schedule Ref = Five-Day School	-5.01*** (1.16)	-4.37*** (1.18)	-0.55 (2.86)
Week			
Time		-0.71*** (0.08)	-0.69*** (0.08)
Four-Day Week x Time			-0.99 (0.61)
Intercept	77.84*** (0.27)	79.95*** (0.38)	79.88*** (0.38)

Source: Oklahoma State Department of Education (OSDE) Report Card data, 2012-2016.

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Table 6 represents the results of a clustered linear regression. Model 1 measures only the differences by the school schedule. When compared to the schools that maintained a five-day school week, schools that switched to a four-day week scored five points lower on school scores. When accounting for time in model two, the gap between school scores for five-day schools and four-day schools decreases, but we still see the four-day schools achieving scores that were 4.27 points lower.

Finally, when interacting the four-day week and time, we learn that we can expect school scores for the four-day week schools to drop nearly a point compared to the five-day schools in that same year. This is not a statistically significant result, but it is compelling, as Figure 3 represents.



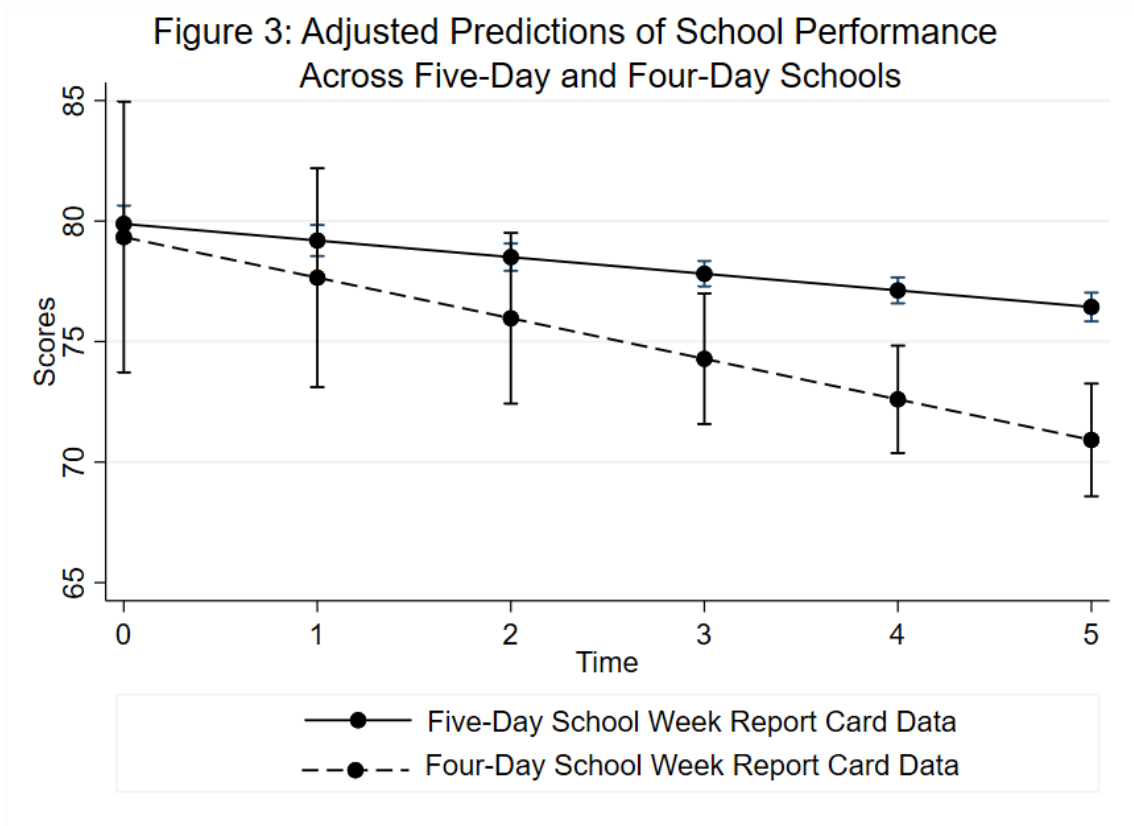


Figure 3 provides an illustration of the suggested gap in school scores resulting from the change to a four-day week. This relationship needs further study as more data become available, but these initial results are concerning, and suggest cumulative inequality for those children on four-day school week schedules. The statistical significance is likely to improve as more schools in Oklahoma make the switch to a four-day week.

## **Chapter 3**

### **Discussion**

Our analysis supports the hypothesis that the switch to a four-day school week negatively affects achievement scores in Oklahoma. In fact, we can expect the gap to grow each year with the schools following a four-day week dropping a point for each year they follow the schedule compared to schools following a five-day week. This finding contradicts existing studies focusing on other states, but it represents the importance of considering the unique attributes of each state when making these budgeting decisions.

Our data are limited since relatively few schools included in Oklahoma had made the schedule change at the time of the available data, but those numbers are growing. In fact, the number of schools making the switch to a four-day week doubled in 2017. That data has not yet been released, however. It is essential to study these effects as they happen before any negative effects are irreversible as well as to capitalize on any positive effects resulting from the change.

If the goal of a schedule switch is to improve student performance, these findings do not support that move. In fact, the switch to a four-day week appears to have an adverse effect on performance. The switch is being made in schools that are already performing poorly, and it is resulting in even worse performance. Furthermore, there is a lack of resources available to counteract the effect on the children and families in the rural communities supported by the schools making this switch.

If the goal of a schedule switch is to save the districts money, that also appears to be unsuccessful. In fact, in a memorandum from March of 2017, Joy Hofmeister, the

state superintendent of public instruction for the state of Oklahoma, reported the findings of a study examining the potential savings experienced by districts making this schedule change. In the memorandum addressed to Mary Fallin, governor of the state of Oklahoma, Hofmeister reported that, on average, school districts were spending \$8,380 more per year than they spent before the schedule change (see Appendix A).

Future research should be completed to examine the effects of a four-day school week on individual families. A qualitative study would offer a potentially valuable understanding of the complexities of this schedule change beyond the impact on finances and achievement scores. The knowledge gleaned from the current study as well as a qualitative study would be beneficial when shaping policy about future educational budgets in the state of Oklahoma.

## **Chapter 4**

### **Conclusion**

We found a negative relationship between the schedule change to a four-day week and the school report card scores for those schools when compared to schools that maintain a five-day school week. Specifically, those schools that switch to a four-day school week have lower report card scores on average after the switch, compared to before the switch. This finding supports our hypothesis, that through cumulative disadvantage and in concordance with bandwidth theory, children on a four-day school week suffer academically. In addition to the poverty these children face, these children on the four-day school week now have the added obstacle of a widening achievement gap that may be impossible for them to bridge. It is, therefore, key to consider these shifts in policies that move students from a five-day school week to a four-day school week on a state-by-state basis, considering the unique attributes each state embodies, when attempting to educate the future leaders of our society.

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# Appendix A

## Hofmeister Memorandum



JOY HOFMEISTER  
STATE SUPERINTENDENT of PUBLIC INSTRUCTION  
OKLAHOMA STATE DEPARTMENT of EDUCATION

### MEMORANDUM

**TO:** The Honorable Mary Fallin  
**FROM:** Superintendent Joy Hofmeister  
**DATE:** March 1, 2017  
**SUBJECT:** Analysis of Expenditures of Districts on a Four-Day School Week

I am writing today in response to your January request for an analysis of expenditures for Oklahoma school districts that have adopted four-day school weeks. A study across several school years results in the most thorough analysis. Therefore, I am providing analysis of expenditures from fiscal year 2008-2009 through fiscal year 2015-2016 for the following districts: Fort Towson, Midway, Wilson (Okmulgee County), Swink, Lone Wolf, Battiest, Valiant, Avant, Barnsdall, Prue, Asher, Moyers, Rattan, Straight, Liberty (Tulsa County) and Sharon-Mutual. These districts switched to a four-day week beginning in fiscal year 2011-2012.

With this analysis, we sought to determine whether district average expenditures decreased after the move to a four-day week. To do so, we used expenditure data from three years prior to the change in the weekly schedule and from the time of the change to the present. We included four types of expenditures where savings might be predicted in a move to a reduced school week: utilities, food, transportation and support staff.

Of the 16 districts, we discovered that nine spent more money, on average, after the switch to a four-day week. Eight of these nine districts also saw an increase in Weighted Average Daily Membership (WADM). It is possible that the increase in expenditures for those eight districts may have been attributed to the increase in student numbers.

The remaining seven districts spent less money, on average, after switching to the four-day school week. Four of the seven saw a decrease in WADM, which may be attributed to the decrease in student number. Three districts spent less money while their WADM increased. Further study is needed to determine the cause of these savings. This report does not clearly indicate that the savings were necessarily caused by the switch to a four-day week.

When we combined expenditures of all 16 districts, we found that, on average, school districts spent \$4,523 more on utilities, \$2,714 less on food, \$1,971 less on transportation, and \$8,542 more on support staff after switching to a four-day week than they spent before the change in school schedule.

In conclusion, after analyzing each district's expenditures, we can find no conclusive evidence to support the theory that four-day school weeks save districts money.

Attached documentation:

- Graphs depicting patterns in each district's expenditures
- Spreadsheet documenting each district's expenditures since 2008