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The Impact of Four-Day School Weeks and Fifth-Day Programs on Delinquency and Problem Behaviors in Adolescents

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**THE IMPACT OF FOUR-DAY SCHOOL WEEKS AND FIFTH-DAY PROGRAMS
ON DELINQUENCY AND PROBLEM BEHAVIORS IN ADOLESCENTS**

By

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Abstract

In recent years, tightening budgets have forced school districts to find new ways to save money. One way that has become increasingly popular is to shorten the traditional five-day school week to only four-days a week. This change is budget friendly and may act through efficiency wage theory as a recruitment tool for better teachers. Despite the increasing prevalence of districts running on four-day weeks, many of the effects of the shorter week on students are still unclear. Utilizing district-level panel data from the Colorado Department of Education, Study One took a difference-in-differences approach to determine the effect of the implementation of the four-day week on various delinquency measures, including suspensions, expulsions, and juvenile arrest rates. No significant results were found with robust standard errors, but trends suggested that juvenile crime may be increasing while school related incidents may be decreasing in areas with four-day school weeks. To offset these trends, this paper also proposes a second study aimed at investigating the effects of different types of fifth-day programs on adolescent well-being, academic achievement, and problem behaviors. Schools using the four-day week that agree to participate will be randomly assigned to receive either a career-prep program, an academic program, a recreational program, a social skills/mentoring program, or no program at all. Students (N=XXX) will fill out a survey at the beginning and at the end of the program or school year, reporting their subjective well-being and recent engagement in problem behaviors. It is expected that students who participate in the social skills/mentoring program will show the highest levels of well-being and little engagement in problem behaviors. This study will help to advance the research on after school programming, particularly in rural environments.

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Introduction

In the United States, more than 550 school districts across 25 states are using a four-day schedule for the 2018-2019 school year (Fischer & Wallace, 2018). The goal of many of these districts is to use existing resources more efficiently and save money by lowering the costs of transportation, personnel, and facilities. The idea of a four-day week originated in the 1970s during the energy crisis when fuel prices were particularly volatile. It was revived by many districts after severe budget cuts that came with the Great Recession in 2008. Many districts believe that switching to the four-day school week is a good way to cut costs while keeping the same number of instructional hours through longer school days—and hopefully the same level of student achievement and well-being—but the effects of the four-day school week on both district spending and academic achievement are still unclear. The research on the actual effects of four-day school weeks and their ability to save money without compromising educational quality has been limited, and shows some mixed results. Some research has shown that the new schedule is harming student learning, while other studies have found that students at schools using the four-day schedule performed better than other students at five-day schools or even themselves before the schedule change. Only one study has looked at the effects of switching to the four-day school week on delinquency, but they found a 20% increase in juvenile crime in areas that utilized the four-day schedule (Fischer & Argyle, 2018).

The current research aims to investigate the effects that four-day school weeks have on other forms of delinquency, including truancy and school disciplinary incidents. The second study will propose research into fifth-day programs, which may be a viable method for schools and communities to take advantage of the extra-day that is given to them by the four-day school

week. This research has the ability to inform current policy discussions surrounding the four-day school week, and acts as another touchpoint for policy makers to consider when looking at the effects of the four-day school week on the lives of students.

Literature Review

History and Previous Research on the Four-Day School Week

The four-day school week was first practiced in South Dakota in the 1930s, but was not used by any significant number of schools until the 1970s energy crisis, which drove up the costs of both transportation and climate control (Donis-Keller & Silvernail, 2009). This led districts to cut out one day of school per week, following the logic that they would be able to cut their transportation and facility costs by 20%. The impact of the new school week was unclear to districts and state departments of education. As the costs of energy decreased and spending became less restricted, many of the districts returned to the five-day school week. In 2008, the Great Recession caused significant budget cuts for schools across the country. This new restriction pushed many districts towards the solution that had been experimented with nearly forty years prior.

Despite the fact that the four-day school week is rapidly spreading, research on the four-day school week is limited. The vast majority of the current available research is in the forms of evaluation reports at the state and district levels and student dissertations. These reports are often not peer reviewed, and have varying degrees of analysis of the raw quantitative or qualitative data that was collected. In 2009, Donis-Keller and Silvernail reviewed the available literature and found that the impacts of the switch were generally positive, as the districts were typically able to realize some level of savings, and there was no indication that student

achievement decreased after implementation. Additional research found that many parents and community members initially took issue with the four-day school week because of the new requirement for childcare on Fridays, but after experiencing the four-day school week, nearly all stakeholders in the school calendar preferred the shorter week (Donis-Keller & Silvernail, 2009; Plucker, Cierniak, & Chamberlin, 2012). This extra weekday allowed both parents and teachers to schedule important appointments when school was not in session, decreasing both student and teacher absence rates. In general, teachers have been found to be the most supportive of the four-day school week, while parents are supportive to a slightly lesser degree and business and community leaders have more neutral views on the schedule (Finch, Snow, & Turner, 2018).

Fiscal Impact of Four-Day Schedule

Many state and local education boards have begun to question how much money districts can actually save by making this switch, as significant savings could have policy implications for the future. While intuition says that the districts should be able to save 20% of their budget because they are operating 20% less, in reality that is not the case. Despite the fact that the week is now only four days long, teachers and administrators are now working more hours every day and are still ultimately providing the same service, thus salaries remain unchanged. The major cuts are typically made in the budgets for transportation, energy, food, and support staff. A report from the Education Commission of the States found that the maximum amount a district can save is 5.43% of their total budget (Griffith, 2011). Unfortunately, Griffith and the ECS found that those savings are often difficult to realize, and that the average experienced savings for districts that had switched to a four-day schedule were between 0.4% and 2.5%. One dissertation investigated the impact of the four-day school week on districts' yearly expenditures

in the state of Missouri, and found that there was no significant difference in spending after cutting out one class day per week (Jennewein, 2016). A report out of Oklahoma found that of the 16 districts in the state that had switched to a four-day school week before 2009, the majority did not realize any positive savings over the next five years (Oklahoma State Department of Education, 2017). That being said, depending on the size of the district, even saving only 1% of the budget still seems to be a significant enough incentive to make the switch. In Duval County, FL only 0.7% of the total budget was saved by switching to the four-day school week, but that 0.7% was equal to \$7 million, which allowed the district to retain 70 teachers they would have been forced to let go of otherwise (Griffith, 2011).

Effects of Four-Day School Week on Student Achievement

Several studies have looked into the effects of the four-day school week on student achievement to varying degrees of success. A report published by the Colorado Department of Education (Lefly & Penn, 2011) compared the percentage of students in each district who scored proficient or advanced on the state test and average growth according to the Colorado Growth Model between four-day and five-day school districts. Although no significance tests were run, the results appeared to show little difference between the two schedules (Lefly & Penn, 2011). Alternately, Tharp, Matt, and O'Reilly (2016) used a similar method to compare the scores of students at four-day and five-day schools in Montana, but determined that students on the four-day schedule did progressively worse over time on achievement tests compared to their peers on the traditional five-day schedule.

Other researchers have also compared the state test scores of the school districts in Colorado. Hewitt and Denny (2011) used matched pairs t-tests to determine if any differences in

performance between students on the different schedules were significant. Matching districts based on the percentage of students who received a free or reduced lunch and levels of enrollment, they determined that in general there was no significant difference in scores between the four and five-day districts, however the data did trend in favor of those running on the five-day school week. Both of these papers compared student achievement on the district level, using cross-sectional data to create a snapshot of student performance on the four-day and five-day schedules. Hewitt and Denny (2011) also took an approximator of poverty levels (percent of students on free and reduced lunch) into account when matching districts, but no other educationally relevant district characteristics, such as student demographics, were taken into consideration.

In 2014, Hedtke wrote his education dissertation comparing the effects of the four-day and five-day schedules in South Dakota. Unlike those before him, Hedtke investigated this question not only by matching districts with five-day districts similar in community size and median income level, but also by comparing each school to itself before the switch was made. Although the results are limited due to a limited sample size, Hedtke's results were similar to those of previous studies; the results were mixed overall, but leaned in favor of the five-day school week, particularly as time on the four-day school week increased. Hedtke's data suggested that in the first year after the switch to the new schedule there did not seem to be any impact, but over time the four-day week had a slightly negative effect on student learning. Interviews with principals of these schools also suggested that the four-day week may impact students of different abilities differently, as some said that they used the extra fifth-day as

required tutoring for those who were struggling, in which case the difference between the four-day week and the five-day week becomes somewhat unclear (Hedtke, 2014).

Several other education dissertations have investigated the effects of the four-day school week on standardized state test scores and ACT (American College Testing) scores. In South Dakota, no significant differences in student achievement were found between the four- and five-day schedules, although the scores trended to favor the five-day schedule (Dolezal, 2018). In Georgia, however, pre-post tests using one school district found that if anything, the students performed better on the four-day schedule (Hegwood, 2016). One dissertation did find that in Missouri, attendance rates significantly increased after the district switched to a four-day school week, however this improvement did not carry over to the schools' average ACT scores (Gower, 2017).

One notable study directly investigated the impact of the four-day school week on student performance in Colorado (Anderson & Walker, 2015). They did this by using panel data from all of the elementary schools in the state from 2001-2010 to compare state test scores in fourth-grade reading and fifth-grade math between four-day and five-day schedules. Using a differences in differences approach and holding school fixed effects equal, Anderson and Walker found that switching to a four-day schedule tended to have a positive impact on a school's state test scores, but that this effect decreased over time. While the positive differences in the percentage of students who scored proficient or advanced were significant in the first couple of years after the switch, the impact faded as time went on; four-day schools showed the same achievement levels as equivalent five-day schools once they settled into the new routine. Anderson and Walker also noted in particular that in their model, the percent of students who

qualified for free or reduced lunches was positively correlated to an increase in test scores, which suggests that something about the four-day week may be especially beneficial for low income students (Anderson & Walker, 2015).

One study in Oregon expanded on the work done by Anderson and Walker (Thompson, 2018). Thompson was able to access student and teacher level data from the state of Oregon for a six year period, from 2008 to 2014. This expanse of data allowed him to use a differences in differences model to determine the impact of the switch to a four-day schedule on the overall student body, but also on more specific demographic groups, such as low-income students, special education students, English-language learners, and minority students. He was also able to control for fixed effects at the district, school, and student level. Thompson found that in the first year after a school district switched to the four-day calendar student test scores dropped dramatically, but within four years of the switch, test scores became roughly equivalent to those of students from comparable five-day week schools. This finding is directly opposes the findings of Anderson and Walker (2015), however in both studies the schools scores on average revert back to the state average within a few years of the switch. In investigating the effects of the four-day week on different subsets of students, Thompson found that minority and low-income students were likely to be more negatively affected by the schedule change than their peers. The switch also appears to have a greater negative impact on special education students. English-language learners were not significantly more or less affected by the switch than their peers, perhaps because there are many places outside of school that are still positive learning environments for students trying to learn English (Thompson, 2018).

Overall, the research on the effects of four-day school weeks on student academic achievement is mixed. Some studies have found that students tended to do better on the four-day schedule, while other found that the new schedule had negative effects on student achievement. Much of the research seems to suggest that just the change in schedule may actually have little to no effect on academic achievement at all.

Effects of the Rural Environment on Well-being

Many of the schools which have begun to utilize the four-day week have done so because their transportation costs are seen as particularly significant, and they need to find ways to cut spending. This is most often the case in rural communities, where buses may travel hundreds of miles in a single day (Donis-Keller & Silvernail, 2009). Previous research on children who grow up in rural areas has found that those students tend to experience greater loneliness due to the long distances between homes (Woodward & Frank, 1988), and are more likely to abuse tobacco, alcohol, and other drugs than their peers in urban environments (Spoth, Goldberg, Nepl, Trudeau, & Ramisetty-Miler, 2001).

Other studies have focused on other potential effects of the four-day school week such as student use of new additional “free” time and potential food insecurity. One study explored the impact of the extended weekend on student well-being and on the surrounding community at large, by interviewing teachers, parents, coaches, staff, and administrators (Amys, 2016). The researcher was not able to get permission to interview any students directly, but he was able to get some student input thanks to an anonymous texting service. In this case study, Amys found that many of the stakeholders believed that the students were making positive choices on the weekend, despite the increase in free time. They largely attributed these choices to the protective

factors of the community, and some of the students' texts seemed to support the idea that community activities, through the school or the local religious organization, were able to give them additional support on the weekends. Due to this study's focus on one school which happened to be rated the top school in Montana for several years in a row, it is hard to know how reliable and generalizable the information can be. While the adult's perspective can inform researchers about some of the effects, this case study appears to represent a best case scenario of a four-day week school, in which the vast majority of students and community members are involved in extracurricular activities. This was further demonstrated by the interviews in which all of the parents demonstrated a strong emotional relationship with their children which, according to Kerr and Stattin (2000), keeps adolescents from doing things that would be seen as embarrassing to the family, and allows for an open flow of communication. The methodology that was used left students who were not involved in extracurricular activities out. While those students are those who would most likely benefit the most from the continued use of the fifth-day for extra contact with adults outside of the family unit or a reliable meal, they were also the students who were not heard from (Amys, 2016).

Fischer and Argyle (2018) recently published a study that suggests that these results are indeed not the norm. Using Colorado crime data and information about schools on four-day school weeks, they were able to identify the effects of switching to the four-day school week on various crime rates in the area. It was found that overall, juvenile crime rates increased by nearly 20% in areas where the school schedule was shifted to only operate four-days per week. In particular, the number of property crimes increased by more than 25%. Fischer and Argyle also broke down the data by day, and determined whether crimes were happening at or not at school.

Juvenile crimes in general increased 30% on Thursdays, the new beginning of the weekend, and compared to areas with students in school five days a week, these crimes were 60% more likely to occur off-campus. For Monday through Thursday, areas with four-day schools were significantly more likely to see juvenile crime on campus than those with traditional five-day weeks, but the opposite was true Friday and Sunday. This suggests that the increase in unsupervised time that comes with one more weekend day may in fact increase youth crime rates. Fischer and Argyle found that crime rates were increasing, but they did not investigate the impact of the four-day school week on other measures of adolescent delinquency, such as truancy or suspension rates, nor did they account for temporal or locational fixed effects.

Impact of Afterschool Programs on Delinquency and Student Well-being

After School Programs (ASPs) have been thought for many years to be one potential way to reduce delinquency in adolescents (Gottfredson, Gerstenblith, Soulé, Womer, & Lu, 2004). Gottfredson et al. analyzed the effects of 14 federally funded ASPs aimed at reducing delinquency by decreasing unsupervised hours and negative peer influences and increasing academic achievement and social skills. They found that the programs were moderately successful in reducing delinquency, when they were able to reduce the students' favorable attitudes towards illegal substances, and increase positive peer associations. This reduction was most prominent for middle school aged students, and for students in programs that put a higher emphasis on social skills and character development instruction and practice (Gottfredson et al., 2004). A meta-analysis of the data from this and 13 other studies which focused on the impact of ASPs on delinquency found a small, non significant effect (Taheri & Welsh, 2016). One limitation of this analysis, however, was its inability to measure the differences in effect between

the identified different types of ASPs: academic programs, recreational programs, and mentoring programs. As Gottfredson et al. (2004) identified that mentoring and skill building programs were the most promising in reducing current and future problem behaviors, it is possible that this type of program has more of an effect than the other types of programs.

Another analysis of ASPs that aimed to promote personal and social skills in students found that when a program could be identified as SAFE (sequenced, active, focused, and explicit), the students involved were more likely to have more positive self-perceptions and prosocial behaviors, higher levels of academic achievement, and significantly fewer problem behaviors when compared to the beginning of the year and to students not involved in SAFE programs (Durlak, Weissberg, & Pachan, 2010). SAFE programs used sequenced step-by-step training approaches, active learning for students to practice new skills, focused specific time and attention on skill training, and explicitly defined the goals of the program. Other studies looking to understand why some ASPs are more effective than others found that one key determinant of program effectiveness was staff-student interaction, such that the students are actively involved in the program and the staff acted as positive models for social interaction (Granger, 2010; Hirsch, Mekinda, & Stawicki, 2010).

One explanation for these findings can be found in problem-behavior theory, which suggests that the behavior of adolescents is an outcome of the interaction between the person and the environment (Jessor & Jessor, 1977). Both factors have the potential to drive the individual either toward or away from problem behaviors, which include delinquency, marijuana and other illicit drug use, tobacco and alcohol consumption, violence, school dropout, risky driving, early and unprotected sex, and cyberbullying. In 1992, Jessor suggested that both risk factors and

protective factors can exist in each sphere of adolescent life, and impact an adolescent's future behaviors and choices accordingly. Jessor and Turbin (2014) subdivided both risk factors and protective factors into four major types of each; protective factors: models protection, controls protection, support protection, and behavior protection, and risk factors: models risk, behavior risk, vulnerability risk, and opportunity risk. ASPs and other student engagement programs can act as protective factors for students, helping to model positive behaviors, controlling student free time, offering another touchpoint for adult support of students, and frequently inherently functioning as positive behaviors for the students, particularly when they are actively engaged in the program. They also have the potential to reduce the effects of potential risk factors, by reducing students' free time and thus their opportunity to engage in the use of illicit substances or other problem behaviors.

Fifth-Day Programs

Some schools have already begun to take advantage of the 'extra' day of the four-day school week by creating fifth-day programs, which aim to keep students engaged in positive behaviors by focusing on student interests and activities that are relevant to their current and potential future lives. The Donnell-Kay Foundation, in partnership with the J.A. and Kathryn Albertson Family Foundation, have given grants to more than ten school districts across Colorado and Idaho to help them institute various fifth-day programs prioritizing different types of student learning and achievement. In Colorado Springs for example, the Widefield School District was able to hire a professional carpenter to take advantage of what had been an abandoned woodshop. The district was then able to draw attention to its work from major construction companies, and received more than \$800,000 of equipment for the workspace,

which is now known as The Manufacturing Industry Learning Lab, or The MILL, and services students from multiple districts in the area. These programs are relatively new, and no research has been done on their effectiveness thus far.

Current Research

The majority of the research on four-day school weeks thus far has focused on the effects of the new schedule on student achievement and public perceptions of the week. One study broadly investigated what students who only go to school four days a week do on the weekend, and another investigated what effects the four-day school week has had on juvenile crime, but no research thus far has further investigated other, legal types of delinquency. There has also been no research at all on fifth-day programs, which is an approach some school districts are taking to help fill in the new long weekend.

The present research will aim to further investigate the impact of four-day school weeks on student delinquency and problem behaviors. The purpose of study 1 is to determine these effects by looking at changes in truancy rates, expulsions, and other school disciplinary measures in Colorado schools on the four-day and five-day schedules, to see if the increase in juvenile crime found by Fischer and Argyle (2018) carries over to any other types of delinquent or problem behaviors in school. The purpose of study 2 is to propose an experiment to investigate the impact of fifth-day programs on students' problem behaviors, level of academic achievement, and general subjective well-being.

Study One

The first study in this paper investigated the impact of four-day school weeks by analyzing changes in the levels of reported problem behaviors and other delinquent activities in

response to a different schedule. This was done by comparing districts that use the four-day school week to themselves when they still used the five-day schedule, and to other five-day districts, controlling for demographics and other school and community characteristics.

Data

The data used in this study for outcome variables at the district-level come from the Colorado Department of Education in raw counts of the number of times each outcome occurred. These include all school related disciplinary actions, including suspensions, expulsions, and incidents at school during which local law enforcement agencies were called. Juvenile arrest counts by traditional calendar year are provided by the Colorado Bureau of Investigation at the county-level. The total count of arrests is subdivided into three types: drug related crimes, property crimes, and violent crimes. The list of schools that utilize a four-day school week along with the year that they first implemented the policy is also created from various reports on the four-day week out of the Colorado Department of Education. This data is supported by district-level demographic information which is obtained from the Common Core of Data, which is maintained by the National Center for Education Statistics (NCES). This includes a host of district-level information, including the total enrollment counts, and the counts of students who are English language learners (ELL), who are considered special needs and have an Individualized Education Plan (IEP), and who qualify for free or reduced lunches (FRL). The NCES Common Core of Data also provides the racial and gender proportions of the districts. Race is collected using five categories: American Indian/Alaska Native, Asian or Asian/Pacific

Islander, Hispanic, Black, and White. The student-teacher ratio of each district was obtained from the NCES Common Core of Data.

The final data set consists of district-level panel data, spanning from the 2004-2005 school year to the 2015-2016 school year, the most recent year in which all school data is publicly available. Juvenile arrests have been included such that the year of arrest is the same as the second half of the school year, ie. arrest rates for the 2007 calendar year are connected with the 2006-2007 school year. This method was chosen to ensure that in the case of a policy change during the paneled period, the arrests during the first semester of implementation would not be included, thus allowing the policy time to create an effect.

In the final analysis, 178 school districts were included. Of those, 34 started using the four-day week before the 2004-2005 school year, and 45 began using the schedule between 2004 and 2016. More than 20 additional districts have already implemented or are preparing to implement the four-day week since the 2015-2016 school year. In total, there are 600 observations of districts actively using the four-day school week, and 1,533 observations over the 12 year panel for schools that used the traditional five-day week.

Table 1 (see Appendix) contains the summary statistics of the district demographics. Given that the majority of schools that institute the four-day school weeks tend to be in rural areas, it is not surprising that there are some clear differences in the average demographics of four-day and five-day districts. Four-day districts have on average lower enrollment rates (1436 students to 5922 students), a higher percentage of students who qualify for free and reduced lunch (44.3 percent to 38.1 percent), and a higher proportion of white students (74.8 percent to 67.1 percent). The summary statistics of the outcome variables are reported in Table 2. The

counts across all variables are notably higher for the five-day districts; this is in line with the higher enrollment counts in five-day districts.

Empirical Model

In this study, a difference in differences method is used to assess the impact of the four-day school week on delinquent behaviors by accounting for district and year fixed effects.

The following regression equation is estimated:

$$Del_{dt} = \beta_0 + \beta_1 Four\text{-}Day\ Week_{dt} + \beta_2 X_{dt} + \theta_t + i_{dt} \quad (1)$$

where Del_{dt} is district d 's reported delinquency count of interest during school year t . The $Four\text{-}Day\ Week_{dt}$ variable is a dummy variable that is equal to one if the school district was operating on a four-day school week during school year t , and zero if not. The X_{dt} vector contains district-level characteristics including the total enrollment, ethnic and gender breakdowns of the district, and the percentage of students who qualify as ELL, are FRL eligible, and have an IEP. The θ_t vector includes school year fixed effects, and ε_{dt} is an idiosyncratic error term.

This model assumes that the districts which switched to the four-day week did not switch because they were seeing a change in delinquent behaviors. In 2018, Fischer and Argyle investigated whether the crime trends in areas surrounding schools that switched to the four-day school week were different than those that have not switched and found no difference between the two groups (Fischer & Argyle, 2018). Many anecdotal reports also suggest that the main rationale behind most districts choice to change the weekly schedule is to save money (Anderson & Walker, 2015; Donis-Keller & Silvernail, 2009; Plucker, Cierniak, & Chamberlin, 2012). The other reason some districts are deciding to change their schedule is to use the shortened week as

a recruiting device for quality teachers (Hendricks, 2018). Following with the efficiency wage theory, giving teachers an extra weekend day while keeping their salaries the same can increase faculty's incentives to work hard without increasing the monetary benefits of the job. This is especially important for rural districts, which often do not have the financial ability to recruit high quality teachers, and are typically seen as less favorable working environments compared to suburbs or urban areas. One dissertation found that teacher and staff morale was reported to have increased due to the four-day week (Jennewein, 2018). The extended weekend gives students and teachers an extra day to spend with family, and many teachers report feeling more rejuvenated after the three-day weekend. Once lesson plans are revamped to fit within the new schedule, teachers also report being able to do better activities that would not have fit into the traditionally shorter school days. These positive consequences of the policy implementation can be felt in a variety of ways around schools. The additional non-monetary benefits increase the quality of teachers who are already at the school, and attract better teachers for the same salary level to fill open positions. Alternately, if teachers, and students alike, are not able to take advantage of the longer weekend break and the extended class time, the quality of class time could decrease, lowering average productivity.

Results

The results of this regression with standard errors adjusted for heteroskedasticity are reported in Tables 3, 4, 5, and 6 (see Appendix). Table 3 presents these results for truancy and attendance rates. No significant differences ($\alpha=0.05$) were found in attendance or truancy rates between four- and five-day districts. Table 4 shows the effects of the four-day school week on

juvenile crime in the counties associated with each school district, and although none of the results are significant, they all trend towards the four-day week increasing crime rates, which matches Fischer and Argyle's (2018) findings of increased crime in areas where schools adopted a four-day school week.

Table 5 presents the results of the analysis of four-day school weeks' impact on class removals and suspensions. Interestingly, class removals appeared to increase after a school switched to the four-day week, but the number of suspensions seemed to decrease, although none of these results were statistically significant with robust standard errors. While these numbers are not significant beyond a statistically significant level ($\alpha \leq 0.05$), they do show a trend that suggests that schools that switch to the four-day school week may choose to resort to different disciplinary measures because of the schedule.

The results presented in Table 6 demonstrate the effects of the four-day week on more extreme disciplinary actions, including expulsions and referrals to law enforcement. These results, though also insignificant, additionally indicate that there may be a reduction in general school incidents in four day schools. This trend has been corroborated by many teachers who report that after their district switched to the four-day school week, they observed fewer problem behaviors and were giving students referrals less frequently.

Conclusions

Since the Great Recession, education funding has been limited. To reduce the tightness of their budgets, some rural school districts have been choosing to run their schools only four-days a week. That being said, the effects of this new schedule have not been thoroughly

investigated. Specifically, it has been unclear whether student delinquent behaviors will increase due to increasing unsupervised free time, or if it will decrease due to increased quality class time.

This paper used data from the Colorado Department of Education and the Colorado Department of Justice to determine the impact of the four-day school week on these problem behaviors. Panel data from 2004-2016 allowed the use of a difference-in-differences approach to test if change in disciplinary incidents is significant. No significant changes in any of the reported disciplinary actions were found, although a trend appeared such that four-day schools may be associated with fewer problem behaviors. This trend could be due to the fact that the students are spending more time unsupervised on the weekends and have less time during school to get in trouble. Additionally, no changes in truancy or attendance rates were found.

While this study provides a good overview of the impact of the four-day school week, one major limitation is that demographic controls do not go beyond the district-level. For delinquency measures in particular, investigating the effects of the four-day school week at the school-level, specifically in high schools, may reveal a stronger effect, due to the increases in delinquent behaviors as individuals move through adolescence. Additionally, juvenile crime rates could only be obtained at the county level, while some of the counties contain multiple school districts, which might not all be utilizing the four-day week. Some of the districts also serve students from multiple counties, making it unclear which county's crime rate each district should be associated with. More local reports, like those obtained by Fischer and Argyle (2018) are likely to be better representations of the effect of the four-day school week on crime specifically. Lastly, these results could be specific to Colorado; more research should be done in other parts of the country to determine if this is a consistent or isolated effect.

This paper investigated the effects of the policy on negative behaviors, but future research could focus on the impact of this change on students' ability to engage in positive behaviors in and outside of school, such as clubs, athletics, part-time jobs, and other extracurricular activities. Dropout and graduation rates were also not included in this analysis, but are another important educational outcome, particularly for economic growth, that may be affected by the implementation of the four-day school week. Additionally, the quality of teaching and class time should be investigated in conjunction with the four-day school week to determine the relationships between the three and their combined impacts on student achievement and delinquency behaviors. Lastly, the effects of the four-day week have been shown to interact with various student demographics differently, and it would be important to see if the frequency of problem behaviors within different demographic groups was affected unequally by the implementation of the four-day school week.

Study Two

The purpose of Study 2 is to propose a study designed to investigate a potential treatment for problem behaviors and increases in crime in the four-day school week setting. This study will manipulate the presence of various fifth-day programs to determine their effectiveness in reducing problem behaviors, and in increasing student achievement and overall well-being.

Method

Participants. The participants in this study will be adolescent students ages 10-18 who are enrolled in Colorado schools utilizing a four-day school week. A power analysis was run

assuming a medium effect size to determine that at least 35 students will be needed in each condition, for a total of at least 190 students. To ensure that this number will be reached despite the likelihood of a high attrition rate, schools will be recruited to attain at least 350 total students at the beginning of the study.

The demographics of the participants are expected to generally match the average demographics of the schools using the four-day school week, assuming that these demographic factors do not significantly impact the likelihood that a student will participate in the study. The sample will likely be 0.7% American Indian, 0.4% Asian, 24.9% Hispanic, 1.2% black, 70.7% white, and 2.1% multiracial. The average percentage of students who qualify for free or reduced lunch plans is 52.8%; 0.7% of the students will have Individualized Education Plans (IEPs), and on average 3.8% of the participants will be English language learners.

To recruit participants, I will first talk to school districts, principals, and parents to get their permission and support to potentially run a fifth-day program for their students. I will explain that if their school is assigned to the no program condition and one of the programs is shown to have positive effects, then they will also receive the program the following year. Participants will not be directly compensated. The benefit for the communities is that the first year of whatever program the school is assigned will be completely free to the community. In the case of the five-day schedule school, I would hope that the scientific and educational merit would be enough for the principals and parents to allow me to use their students as one of the control groups.

Measures.

Problem Behaviors. The Problem Behaviors Measure was created using the Delinquency Scale from the National Longitudinal Study of Adolescent Health (Add Health) (Chen & Vazsonyi, 2011). Problem behaviors were measured using 14 items covering a range of delinquent behaviors, including minor offences such as shoplifting, and more serious acts such as engaging in physical violence or selling drugs. Students reported how many times in the past 12 months they had participated in each activity using a 0 to 3 scale, from never to five or more times. The items were then averaged to create a composite Problem Behavior score. This measure has been shown to be highly reliable (Cronbach's $\alpha = .82$). No formal measure of validity was conducted, but based on Jessor and Jessor's (1977) definition of problem behaviors this measure is highly face valid.

Adolescent Well-being. The Scales of General Well-Being (SGWB) will be used to measure adolescent well-being (Longo, Coyne, & Joseph, 2017). The scale consists of 65 total items representing 14 sub constructs of general well-being. Examples of the prompts include "I feel active," "In my activities, I feel fully engaged," and "I'm in touch with how I feel inside." Participants express how much they agree with each item using a five-point scale, which ranges from 1 (not at all true) to 5 (very true). Extensive research showed that this set of scales is highly reliable and valid. Six academics who had done significant research on well-being of various varieties evaluated the first round of potential items to ensure that the scale had high construct and content validity. An additional study found that the reliability of each of the subscales was fairly high, with ω h coefficients ranging from 0.82 to 0.92, and an overall coefficient of ω h = 0.86.

Academic Achievement. Academic achievement will be measured using student grades and state standardized test scores received from the district after the school year.

Stimulus Programs. The academic, recreational, and social skills/mentoring based programs will all be created using resources from the National AfterSchool Association and the Afterschool Alliance. Each program will have its own goals, matching generally with those of programs previously included in their corresponding category.

The career based program will mirror some of the fifth-day programs that have been implemented in some communities with the help of statewide charitable foundations (J.A. and Kathryn Albertson Family Foundation, 2018). These programs can vary significantly in different communities. The career program used for this research will be based on The MILL, a woodworking program that has been adopted in the Colorado Springs area.

Procedure. This study will be conducted at approximately 12-16 schools throughout the state of Colorado. After getting permission from the districts and principals of the schools involved, and receiving some level of community buy in, each of the four-day schools participating will be randomly assigned to one of five conditions: no program, a career-based program, an academic based program, a social skills/mentoring program, or a recreational program. Local staff will receive training on their assigned program throughout the summer preceding the school year to familiarize them with the program. Once the school year begins, consent will be received from parents or students who are legal adults. Within the first two Friday's of the program, or the first month of school for those assigned to not participate in a program, all students participating will fill out the pre-test survey, containing the Problem Behaviors Measure and the Scales of General Well-being. At this time, the teachers and staff

will fill out their surveys based on their observations of the students from the first month of school. Over the remainder of the school year, the programs will be run, with monthly check-ins between the program staff and the research team to help make sure that the programs run as smoothly as possible. Attendance will be taken each week to ensure that students assigned to be in the program are actually being exposed to the program. During the last month of school, post-surveys will be given to the students and teachers. After the surveys are completed, the students and the rest of the community will be given a full debriefing.

Ethics. The potential benefits of this study, to both participants and the scientific community overall, are numerous. The families of each school that participates will have a place for their kids to go on Fridays. Each of the programs implemented will be designed using the latest after school program (ASP) research, and will be likely to have additional benefits to those who attend. This research will add to the body of literature on ASPs and other school related programs by beginning to examine the different effects from each type of programs. While preliminary research has shown that academic, recreational, and skills based programs are those most typically used in the ASP format, there is very little research differentiating their impact on students, and looking more specifically at their mitigating potential for problem behaviors.

This study has minimal risks for participants. The participants will be attending an afterschool like program each Friday for one school year, and nothing that the students are asked to do during the course of the program will be notably different from they would do during a typical day at school, thus, the level of risk is not above that of the participants daily life. This minimal risk is significantly outweighed by the potential benefits for both participants and society at large.

This study does involve the use of minors, specifically adolescents in grades 6-12. It is necessary to use this population as participants because these programs are developed intentionally to target adolescents and people in other stages of development are unlikely to be affected by the programs in the same way. To ensure their protection, extensive informed consent forms will be sent home with students to explain to parents or guardians what the program in their area will entail; no deception will be involved at any point in the study. A meeting will also be held by the researchers at the beginning of the year as an opportunity for parents and students to receive additional information and ask any questions that they may have. It will be made clear to students and parents that if they do choose to participate, the students will not be required to attend every session, as participation in the study will be completely voluntary and they will be allowed to stop attending the program at any time throughout the year.

The students will be asked to provide some sensitive information, specifically, they will be asked about their experiences with illicit substances. To protect their anonymity, instead of their name, all students will be asked to write a randomly assigned five digit number on their surveys at the beginning and end of the study. The key, containing the numbers assigned to each student will be kept on the lead researcher's computer, and relevant sections of the list will be sent to program staff so that each student knows which number to write down. After all of the data has been collected, the researcher will use the key once more to match academic measures (grade and standardized test scores) to each student's set of surveys. Once the complete data set has been compiled, students' names and any other clearly identifying information will be removed from the data, and it will be considered completely anonymous.

Predicted Results

It is predicted that significant support for all of the hypotheses will be found. A MANOVA will be run to test the effects of each of the program options, the four-day week control, and the five-day week control, on all of the dependent variables.

Changes in academic achievement and student well-being are expected to be significantly greater in the program groups on average compared to the control groups. Reported engagement in delinquent behaviors is expected to drop significantly more in the program groups than in the control groups. While not all of the programs are expected to impact these variables to the same degree, when compounded together, previous research has shown that after school programs have the ability to increase student achievement and well-being and decrease delinquent behaviors. Research has shown that this effect is strongest when these outcomes are targeted for in the programs. Thus, it is expected that the largest improvement in academic achievement will be found in students in the academically focused program. Students in the social skills/mentoring program are expected to report higher levels of subjective well-being, and significantly fewer problem behaviors than those in all other conditions. Students in the career oriented program are expected to report an increase in well-being, second only to those in the mentoring program. Those participating in the recreational program are expected to report increased overall well-being, but the effect size is expected to be the smallest of all the recreational programs.

A series of regressions will also be used to determine if delinquent behaviors mediate the effects of the programs on student achievement. Specifically, correlations will be run to determine that a given program is shown to significantly increase academic achievement and

decrease problem behaviors, and then that the increases in academic achievement are tied to the decreases in problem behaviors. It is expected that the relationships will be significant, such that students who have higher test scores and GPAs will report fewer delinquent behaviors. While some of the programs may have the ability to improve academic achievement directly, students who engage in fewer delinquent behaviors will by proxy be spending more time in school, and will have greater opportunities to get help when they need it, increasing the students' achievement.

Conclusions

The four-day school week is a policy that is rapidly spreading as many school districts continue to look for ways to cut their spending that don't include cutting programs. As more and more students are affected by this new model, it is important to research exactly how this change is affecting them, if at all. Study 1 of this paper showed no significant changes in local juvenile crime rates or other school disciplinary measures as a result of changing to the four-day school week, although there were trends identified such that crime rates increased and school disciplinary actions decreased.

This proposed study will aim to observe the effectiveness of several different types of fifth-day programs in reducing problem behaviors and increasing academic achievement and student well-being. Some programs are expected to be more effective than others in achieving certain goals based on their expectations for the students. The career training program and the social skills/mentoring program are expected to have the largest impact on students, increasing

their subjective well-being, decreasing their delinquent and problem behaviors, and increasing their academic achievement.

This will further ASP research and will begin the conversation on the value fifth-day programs for schools with four-day weeks. The results of this research will mostly be applicable to rural students and communities, and while this research will give a window into the varying levels of effectiveness of the different programs, future research should use a similar procedure to allow for directly comparable results between the different types of programs in more urban environments.

One major limitation of this study is that due to the rural nature of the four-day school week, students cannot realistically be individually randomly assigned to each program. This causes potential issues with differences in the communities that could impact the results. In the future, if the four-day school week begins to spread to more densely populated areas, then this study could be run again, truly randomizing each student to a different condition. This study also has limited experimental control, and while schools are being randomly assigned to different programs to mitigate these effects, it is likely that events outside of the experimental programs will impact the students' well-being, academic achievement, and problem behaviors in ways that cannot be explicitly accounted for.

Discussion

The four-day school week is being used more and more by districts across the country every year, and thus it is important to analyze its effects on the students and communities it serves using several perspectives. In this paper, data from several Colorado government services were used to determine the impact of the four-day school week on the frequency of various

disciplinary actions, taken by both the school district and local law enforcement. A further study was proposed to randomly assign schools to various fifth-day programs in the hopes of determining which, if any, are effective in reducing problem behaviors and increasing well-being in students. These studies both have important implications for policy makers when deciding whether or not to allow schools to switch to this schedule as well. At this point in time, some states are just beginning to allow districts to use the four-day week, while others are forcing districts to go back to the traditional five-day week if they do not meet predetermined goals. So far, the majority of the research has been mixed, but much of the research shows that the new schedule does not have a significant effect on students' lives. This research seems to add to that body of literature, finding no significant differences between students in four- and five-day schools. Given that many districts have been able to realize some level of savings at what seems to be no cost to the students, the four-day school week, coupled with a supportive fifth-day program, may be a good alternative to the traditional more costly five-day school week.

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Appendix**Table 1: Summary Statistics of District Demographics**

	<u>All Districts</u>	<u>Four-Day Only</u>	<u>Five-Day Only</u>
Total Enrollment	4667.035 (12057.46)	1436.287 (7674.047)	5921.695 (13168.13)
Student Teacher Ratio	13.904 (5.379)	11.622 (4.929)	14.790 (5.286)
Fraction of ELL Students	0.062 (0.085)	0.029 (0.053)	0.075 (0.0921)
Fraction of IEP Students	0.057 (0.389)	0.015 (0.039)	0.073 (0.457)
Fraction of FRL Students	0.399 (0.216)	0.443 (0.222)	0.381 (0.211)
Fraction of Female Students	0.484 (0.030)	0.485 (0.037)	0.484 (0.027)
Fraction of American Indian Students	0.012 (0.032)	0.009 (0.013)	0.013 (0.037)
Fraction of Asian Students	0.011 (0.014)	0.007 (0.009)	0.013 (0.015)
Fraction of Hispanic Students	0.256 (0.211)	0.215 (0.217)	0.272 (0.207)
Fraction of Black Students	0.016 (0.032)	0.009 (0.014)	0.019 (0.037)
Fraction of White Students	0.697 (0.219)	0.748 (0.217)	0.671 (0.216)
Fraction of Multiracial Students*	0.010 (0.016)	0.011 (0.016)	0.009 (0.016)
Fraction of Hawaiian Students*	0.001 (0.002)	0.001 (0.003)	0.001 (0.002)
Observations	2,133	600	1,533

*Data only recorded starting in 2011-2012 school year.

Note: Full sample includes all district observations; Four-day Only sample includes data from school years in which a district operated on a four-day school week; Five-day Only sample includes data from school years in which districts operated on a traditional five-day school week. Standard Deviations are given in parentheses.

Table 2: Summary Statistics of Delinquent Outcomes

	<u>All Districts</u>	<u>Four-Day Only</u>	<u>Five-Day Only</u>
Truancy Rate	0.014 (0.020)	0.013 (0.018)	0.014 (0.021)
Attendance Rate	0.924 (0.116)	0.934 (0.076)	0.920 (0.128)
In School Suspension	209.083 (648.152)	76.636 (333.490)	260.084 (727.897)
Total Out of School Suspensions	365.611 (1120.263)	110.050 (572.875)	463.632 (1255.483)
Total Suspensions	572.490 (1738.575)	186.686 (898.379)	721.053 (1948.706)
Expulsions	11.252 (32.091)	2.389 (11.819)	14.650 (36.468)
Referrals to Law Enforcement	47.110 (192.457)	9.870 (83.960)	61.393 (218.674)
Other Actions	39.013 (360.924)	11.792 (45.644)	49.454 (423.168)
Unduplicated Count of Students Disciplined	362.634 (994.972)	116.376 (530.513)	457.087 (1109.003)
Duplicated Count of Students Disciplined	715.916 (2061.076)	227.715 (1040.151)	903.166 (2310.237)
Students with One Out of School Suspension	151.997 (385.393)	91.848 (401.203)	195.915 (368.322)
Students with Multiple Out of School Suspensions	73.263 (191.640)	45.058 (180.038)	93.85714 (197.620)
Total Juvenile Arrests	345.727 (576.008)	184.597 (435.050)	406.610 (610.137)
Total Drug Related Juvenile Arrests	93.600 (155.588)	48.093 (106.211)	110.795 (167.402)
Total Property Crime Juvenile Arrests	224.602 (383.999)	119.569 (290.646)	264.289 (406.910)
Total Violent Juvenile Arrests	27.525 (50.050)	16.934 (44.716)	31.526 (51.372)

Note: Full sample includes all district observations; Four-day Only sample includes data from school years in which a district operated on a four-day school week; Five-day Only sample includes data from school years in which districts operated on a traditional five-day school week. Standard Deviations are given in parentheses.

Table 3: Effects of Four-Day Week Adoption on Attendance Rates

	<i>Truancy Rate</i>		<i>Attendance Rate</i>	
<i>Four-Day week</i>	-0.001 (.001)	0.001 (0.002)	-0.002 (.006)	-0.005 (0.007)
<i>Fixed Effects</i>		X		X
<i>Observations</i>	2,133	2,133	2,133	2,133
<i>R</i> ²	0.019	0.028	0.011	.027

Notes: Each column represents a separate regression. The first column for each dependent variable only includes time fixed effects while the second also includes district fixed effects including, the total enrollment, ethnic and gender breakdowns of the district, and the percentage of students who qualify as ELL, are FRL eligible, and have an IEP. Robust standard errors are reported in parentheses. * $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$

Table 4: Effects of Four-Day Week Adoption on Juvenile Arrests

	<i>Total Arrests</i>		<i>Total Arrests: Drug Crimes</i>		<i>Total Arrests: Property Crimes</i>		<i>Total Arrests: Violent Crimes</i>	
<i>Four-Day week</i>	35.528 (26.517)	20.173 (24.475)	2.984 (5.571)	1.278 (5.298)	27.574 (19.243)	16.838 (17.869)	3.709 (2.727)	2.057 (2.648)
<i>Fixed Effects</i>		X		X		X		X
<i>Observations</i>	2,099	2,099	2,099	2,099	2,099	2,099	2,099	2,099
<i>R</i> ²	0.007	0.027	0.003	0.092	0.010	0.022	0.022	0.063

Notes: Each column represents a separate regression. The first column for each dependent variable only includes time fixed effects while the second also includes district fixed effects including, the total enrollment, ethnic and gender breakdowns of the district, and the percentage of students who qualify as ELL, are FRL eligible, and have an IEP. Robust standard errors are reported in parentheses. * $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$

Table 5: Effects of Four-Day Week Adoption on Suspensions

	<i>Class Removals</i>		<i>In-School Suspensions</i>		<i>Total Out-of-School Suspensions</i>		<i>Total Suspensions</i>	
<i>Four-Day week</i>	1.534 (5.229)	19.863 (13.230)	-20.275 (25.455)	-29.519 (24.210)	-32.674 (37.129)	-48.950 (41.512)	-50.204 (56.943)	-79.759 (59.625)
<i>Fixed Effects</i>		X		X		X		X
<i>Observations</i>	2,097	2,097	2,097	2,097	2,103	2,103	2,097	2,097
<i>R</i> ²	0.001	0.046	0.005	0.652	0.006	0.767	0.006	0.749

Notes: Each column represents a separate regression. The first column for each dependent variable only includes time fixed effects while the second also includes district fixed effects including, the total enrollment, ethnic and gender breakdowns of the

district, and the percentage of students who qualify as ELL, are FRL eligible, and have an IEP. Robust standard errors are reported in parentheses. * $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$

Table 6: Effects of Four-Day Week Adoption on Extreme Disciplinary Measures

	<i>Expulsions</i>		<i>Referrals to Law Enforcement</i>		<i>Other Actions Taken</i>	
<i>Four-Day week</i>	-3.995 (3.758)	-4.642 (4.042)	-16.655 (19.394)	-19.752 (20.231)	-27.259** (10.829)	0.494 (10.853)
<i>Fixed Effects</i>		X		X		X
<i>Observations</i>	2,103	2,103	2,103	2,103	2,103	2,103
R^2	0.023	0.632	0.011	0.600	0.007	0.018

Notes: Each column represents a separate regression. The first column for each dependent variable only includes time fixed effects while the second also includes district fixed effects including, the total enrollment, ethnic and gender breakdowns of the district, and the percentage of students who qualify as ELL, are FRL eligible, and have an IEP. Robust standard errors are reported in parentheses. * $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$