Measuring the Impacts of School Principals

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# Table of Contents

1 Introduction .................................................. 3

2 Data ............................................................... 6
   2.1 Administrative Data ....................................... 7
   2.2 Climate Survey Data ....................................... 9
   2.3 Demographic Data .......................................... 11
   2.4 Principal Data ............................................. 11
   2.5 Summary Statistics ........................................ 12

3 Conceptual Framework and Methods ............................. 14
   3.1 Statistical Model .......................................... 14
   3.2 Estimating Principal Value-Added ........................ 15
   3.3 Empirical Design ......................................... 17
   3.4 Principal Transitions ...................................... 17

4 Results .................................................................. 18
   4.1 Relationship Between Principal Value-Added and School Outcomes ... 18
   4.2 Event Study I: Assignment of a High Value-Added Principal .......... 20
   4.3 Event Study 2: Exit of a High Value-Added Principal ................. 21
   4.4 Association Between Value-Added Measures .......................... 22

5 Conclusion ......................................................... 23

6 Tables and Figures ............................................... 30

7 Appendix ................................................................ 56
1 Introduction

Principals have broad responsibilities in leading and ensuring the operation of their schools. The role of principals in a school system is also complex, in a context with multiple stakeholders and dynamic legislative requirements. The range of duties often include implementing district or state-level policies, enacting school-level initiatives, and acting as liaisons between their school and district authorities. Principals manage efforts to hire, train, supervise, evaluate teachers. And, as the managers of their schools, they are also in charge of coordinating school maintenance, student safety, and effective lines of communication with staff, parents, and students.

There has been a growing emphasis on accountability in the K-12 school system. Evaluating teacher quality and performance has been a topic of particular emphasis, in large part due to a body of research demonstrating that teacher quality is the most important school-based factor influencing student performance (Aaronson et al., 2007; Rivkin et al., 2005). More recent research has connected teacher quality to future student earnings (Chetty et al., 2014b). In applying this framework to principal quality, research has found that principals impact student achievement, teacher satisfaction, and teacher retention (Johnson and Birkeland, 2003; Useem, 2003; Boyd et al., 2010; Beteille et al., 2012; Grissom et al., 2011; Dhuey et al., 2018). And, broadly, it is accepted that school leadership is a key component of improving school outcomes (Baker and Cooper, 2005; Branch et al., 2008).

However, the existing research has only considered a relatively thin slice of school outcomes that effective principals can impact. This research paper analyzes an unexplored composition of school outcomes for which principals would plausibly take responsibility. The unique data set used for analysis combines 8-years of panel data from Miami-Dade County Public Schools (MDCPS), the fourth largest public school district in the United States. The data sources include publicly available administrative data and survey data from MDCPS's Annual School Climate Survey, a 30-
question survey distributed to a random subset of staff, parents, and students at each school. Using this data, I investigate the principal-effect on six school outcomes: school grade, average student attendance, perceptions of school safety, perceptions of school maintenance, perceptions of school leadership, and perceptions of good school culture.

Using an econometric framework Chetty et al. (2014a) constructed to minimize bias in estimating teacher value-added measures, I estimate principal value-added measures for each of the six school outcomes. Given variation in school outcomes due to school-level factors beyond principals’ control, I exploit school leadership changes to evaluate how pre-change principal value-added measures relate to post-change school outcomes. To do so, analysis is restricted to the subset of principals in MDCPS who changed schools at least once between 2009 and 2017.

Regression analysis using school fixed effects, year fixed effects, and relevant demographic controls indicate a statistically significant principal impact on school outcomes for each of the six school outcomes besides average student attendance. Event studies are also used to evaluate the effect of the arrival or departure of a high value-added principal on school performance. Again, I find consistent evidence of a large principal-effect on the school outcomes considered.

The main contribution of this paper to the literature is analysis of the principal-effect on outcomes that have previously been unexplored, including school grade, average student attendance, perceptions of school safety, perceptions of school maintenance, perceptions of school leadership, and perceptions of positive school culture. These contributions were made possible through my use of a unique data set of both administrative and survey-based data from MDCPS, a large school district with a relatively diverse student composition.

A major limitation of this research project is that analysis was constrained to principals of schools that experienced at least one leadership transition between 2009
and 2017. Therefore, this analysis strategy cannot be usefully applied to identify principal quality in actual evaluation systems that must include all principals. It is also possible that the results may not generalize to the broader population of principals due to selection bias regarding which principals selected to move. Another limitation of my research is that my school-level panel data includes relatively few demographic variables and, thus, there may be omitted variable bias in the regression results. While the percentage of students identifying as minority and the percentage of students qualifying for free-and-reduced lunch were included as controls, it is possible that other controls are needed such as gender breakdown, percentage of student receiving special education services, and percentage of students with limited English proficiency. A final notable limitation is mean reversion of school performance. In the data, poor performing schools are more likely to receive a new principal than the average or high performing schools. If the influence of mean reversion was strong, estimates of the principal-effect on this subset of generally lower performing schools would be upwardly biased. While this is certainly a concern, the potential impact of a mean reversion effect is lessened because analysis in this paper was restricted to schools that experienced at least one leadership transition.

My paper has implications for policymakers and educators. First, it provides support for the existing research that suggests school leadership can play an important role in improving school outcomes. Thus, it may be worth the investment to recruit and train better principals. One of the most well-known principal training programs, the Aspiring Principals Program, was created to develop school leaders who effectively build schools where “teachers thrive and students excel” (“Aspiring Principals”). My findings that effective principals impact a broad composition of school outcomes should be encouraging to efforts, like the Aspiring Principals Program, that are directed towards increasing the effectiveness of principals. Second, my research helps clarify the school outcomes that have a large principal-effect, which
can influence the strategies that states and school districts use in recruiting, training, and evaluating principals. Third, given the precision of my estimates, my findings indicate that it might make sense for researchers to expand the list of school outcomes they consider in evaluating performance in the education sector.

The rest of the paper proceeds as follows. Section 2 presents the data and an overview of school performance measures in Miami-Dade County Public Schools (MDCPS). Section 3 demonstrates the method used to calculate principal value-added measures and describes the empirical strategy used for analysis. Section 4 reports the results of regression analysis and event studies, and Section 5 concludes.

2 Data

This paper uses school-level panel data on all schools in Miami-Dade County Public Schools (MDCPS) from 2009 - 2017. MDCPS is the fourth largest school district in the United States, comprised of 392 schools, 345,000 students and over 40,000 employees (“The 2018 Largest School Districts in America”). Miami-Dade County Public Schools is an urban school district that has a relatively diverse student composition, with 93% of students identifying as a minority and 70.7% of students eligible for free and reduced price lunch due to their socioeconomic status (“Statistical Highlights 2016-2017”). My research into the impact of principals on school outcomes uses a unique, unexplored dataset that was created by combining data from four sources: administrative data, school climate survey data, demographic data, and principal data.

Given the range of responsibilities that principals plausibly hold in a school setting, six school outcomes are selected for this paper's investigation. Two of these outcomes (school grade and average student attendance) were downloaded from an administrative database that is made publicly available by Miami-Dade County Public
Schools. Four of these outcomes (perceptions of school safety, maintenance, leadership, and culture) were obtained by aggregating Miami-Dade County Public Schools’ School Climate Survey. These two data sources, along with demographic and principal data, are described in detail below.

2.1 Administrative Data

Each year, Miami-Dade County Public Schools publishes school performance data on its website, covering metrics such as average student attendance, average student mobility, high school graduation rates, and school grades (“Miami-Dade County Public Schools Performance Data”). While high school graduation rates would be an interesting school outcome upon which to consider a principal’s impact, it was not selected so that analysis of different school outcomes could consistently span all schools in the district (i.e. including elementary and middle schools). Thus, school grade and average annual attendance were selected for this paper’s investigation.

School Grade: Each year, schools in MDCPS receive a school grade ranging from A-F. For example, in 2016-2017 school year, 30% of schools received a grade of an ‘A’ and 2% of schools received a grade of an ‘F’ (“Statistical Highlights 2016-2017”). School assignment to one of the five letter grades is based on a point system defined by Florida's Department of Education, whereby receiving a percentage of total available points corresponds to a letter grade:

- A = 62% of points or greater
- B = 54% to 61% of points
- C = 41% to 53% of points
- D = 32% to 40% of points
• F = 31% of points or less

The school grade system was created by Florida's Department of Education to serve as a broad measure of school performance so that “parents and the general public...understand how well each school is serving its students.” The number of total points a school receives, which is then converted into a school letter grade, is the sum of the number of points a school receives on up to eleven components. Some of the components are only relevant to schools that serve students of particular grades and, therefore, are not included in the denominator of total available points for schools that do not serve students in those grades:

• Four Achievement Components - These components measure the percentage of enrolled students who achieve a passing score on statewide standardized assessments in English Language Arts, Mathematics, Science, and Social Studies.

• Four Learning Gains Components - These components measure general learning gains in English Language Arts and Mathematics, and learning gains for the lowest performing 25% of students in English Language Arts and Mathematics.

• Middle School Acceleration - This component measures the percentage of eligible students who passed a high school level end-of-course assessment or industry certification.

• Graduation Rate - This component considers the percent of students who graduate within four years.

• College and Career Acceleration - This component is based on the percentage of graduates from the graduation rate cohort who earned a passing score on an acceleration examination (AP, IB, or AICE), a passing grade in a course that qualifies for college credit, or an industry certification.
Evidently, the percentage of total points a school receives on the Florida School Grade Assessment provides a broad and extremely useful measure of school performance. Thus, the percentage of total points a school receives on this assessment is used as one of the six school outcomes of consideration.

Average Student Attendance: The second school outcomes derived from publicly available administrative data is average student attendance. As is the case for all of the data in this investigation, attendance data was aggregated to the school-year level and spans 2009-2017. Average student attendance is the second of six school outcomes that I consider in investigating the impact of principals on school outcomes.

2.2 Climate Survey Data

The second data set used for my paper, and the source of four additional school outcomes for analysis, is Miami Dade County’s School Climate Survey. Each year since 2001, Miami-Dade County Public Schools conducts the annual School Climate Survey, which is intended to gather information regarding how parents, students, and staff think about their school. These surveys are part of an effort to promote school improvement and educational accountability. The School Climate Survey is distributed each year to a random subset of staff, parents, and students from each school in the district. The subset of staff, parents, and students who receive the survey is quite large and the average response rate across respondent types is consistently over 50%. For example, the 2016 School Climate Survey was distributed to approximately 100,000 parents, 58,000 students, and 21,000 staff with response rates of 46%, 74% and 62%, respectively (“School Climate Surveys District Results Summary 2015-2016”).

As is intended, the 30-question survey covers a broad range of topics from school safety and violence to teacher and administrator effectiveness to the quality of main-
tenance and school lunch (see Appendix A - C for sample surveys). For each survey question, respondents can select from five options to evaluate a given statement: strongly agree, agree, undecided/unknown, disagree, and strongly disagree. Survey questions can be reasonably compared across respondent types despite slight variation in question wording. For example, in considering their sentiments towards their principal, students evaluate the statement “My principal does a good job running the school”, parents evaluate the statement “The principal does an effective job running my child's school”, and teachers evaluate the statement “My principal is an effective administrator”.

For this research paper, four school outcomes from the School Climate Survey are considered: perceptions of school safety, perceptions of school maintenance, perceptions of effective school leadership, and perceptions of good school culture. Each of these outcomes was derived by, first, calculating the percent of staff, parents, and students at a given school who either strongly agree or agree with a given statement in the School Climate Survey. For example, in 2014, 74% of student respondents at Coral Gables Senior High School either agreed or strongly agreed with the statement “I feel safe at my school”. Next, this percentage measure was averaged across respondent types (i.e. staff, parents, and students) so that equal weight is given to each respondent type. The resulting data has an average percent of respondent types who agree or strongly agree with statements related to perceptions of school safety, perceptions of school maintenance, perceptions of effective school leadership, and perceptions of good school culture. All of this data is at the school-year level.

While there are obvious limitations with using survey data (Kelley, 2003), there are a number of reasons why these data are still worth considering in my research. First, this survey-based data allows analysis to be applied to school outcomes like school culture, maintenance, and safety that are important but, often, are difficult to quantify. Second, the methods through which the survey data was collected - using
a large, random sample of different stakeholders - suggest that the data are reliable estimates of the sentiments of the general population. Third, although perceptions of various school outcomes are not perfect substitutes for measurement of the outcomes themselves, the perceptions are still worthwhile outcomes of consideration in a school context. In practice, there are even cases in which the perceptions of stakeholders can actually be more important than the outcomes themselves. Finally, a combination of administrative and survey-based data can provide a more comprehensive picture of school performance.

2.3 Demographic Data

The third data set used for my research project is data on the demographic characteristics of school's in Miami-Dade County Public Schools. Specifically, this data set contains school-level information from 2009 - 2017 on the percent of students eligible for free and reduced priced lunch and the percent of students who identify as a minority. The percent of students eligible for free and reduced priced lunch is regarded in the literature as a good indicator for the socioeconomic characteristics of a school. As was the case with the administrative data, school-level demographic data is publicly available (“Miami-Dade County Public Schools Performance Data”)

2.4 Principal Data

The fourth data set used for this project is a principal directory data set for MDCPS from 2009 to 2017. This data was obtained via Miami-Dade County Public Schools Research Services, a research arm of the school district responsible for a range of research/analysis work including that for the School Climate Survey. The principal directory data set used includes information on which principal was leading which
school for each year from 2009 to 2017 and each principal's years of administrative experience. This principal directory data makes it possible to identify cases in which a certain principal transitions from one school to another school in MDCPS between 2009 and 2017.

2.5 Summary Statistics

The panel data set that combines data from the four data sets described has one row per school per year. Although the MDCPS system includes adult education schools and night schools, these school types were excluded from analysis so that a total of 344 schools were represented in the data set. In addition, a total of 522 principals were identified in the data set, with only one principal being assigned per school per year. The number of principals in the data set exceeds the number of schools because, although there are cases in the data in which the same principal leads a certain school from 2009-2017, there are also cases in that time period in which existing principals leave or enter the school system. For instance, principals leave the school system because they retire, are fired, or move to a school out of the school district and, therefore, require the addition of a new MDCPS principal.

Summary statistics are included in the Table 1. These results display, for instance, that average annual attendance across schools from 2009-2017 is relatively high (94.89%) and that the median school grade attained by schools from 2009-2017 is an ‘A’ (since the median percent of school grade points is 62% and scores of 62 or above are considered an ‘A’ grade). On average, 16.88% (~54 principals) move schools each year and the average years of administrative experience of principals in the MDCPS system from 2009-2017 is 3.65 years. Table 2 displays the average of the four survey-based school outcomes in the data by respondent type. It is interesting to note the variability in survey responses by participant type and, in particular, that students had the lowest percent of agreement for each measure summarized. The
variability in average responses by respondent type suggests that averaging across respondent types, which was done, could reduce bias in estimating school performance for different school outcomes like safety, maintenance, leadership, and culture using survey responses.

Table 3 compares statistics for schools that experienced at least one leadership transition from 2009 to 2017 (i.e. ‘Mover Schools’) and those that did not (i.e. ‘Non-Mover Schools’). During the time period, Mover Schools had worse performance on all six school outcomes that we consider in this analysis relative to Non-Mover Schools. One theory for why this is the case - which was anecdotally described as being the norm in interviews I conducted with MDCPS principals - is that low-performing schools are more likely to receive a new principal as a sort of intervention to improve school performance. Table 3 also shows that Mover Schools, on average, have a higher percentage of minority students and a higher percentage of students eligible for free and reduced price lunch.

For econometric reasons that will be explained in the following section, analysis of the principal effect on school outcomes will be constrained to Mover Schools (i.e. schools that experienced at least one leadership transition from 2009-2017). Trends in variables from 2009-2017 for Mover Schools are displayed in Figure 1 and show, for instance, that average student attendance and the student minority percentage have remained high and relatively constant over the time period. The percent of students eligible for free and reduced price lunch has increased from approximately 73% in 2009 to 83.75% in 2017. These trends suggest that it may be appropriate to control for year effects in analysis.
3 Conceptual Framework and Methods

An important econometric question for analysis in this paper is how to best isolate principal effects from non-principal effects on school outcomes. To do so, principal value-added measures are calculated using the econometric method Chetty et al. (2014a) applied to estimate teacher value-added measures. This strategy is one of the most well-regarded strategies to calculate value-added measures and I use it in this paper to calculate principal value-added measures for each of the six school outcomes in consideration.

To investigate the relationship between these principal value-added measures and school outcomes, I exploit leadership transitions, whereby one principal replaces another at a school. I define principals that changed schools at least once between 2009 and 2017 as ‘Mover Principals’. The data described in the previous section is at the school-year level, whereby there is only principal leading each school for each year (i.e. only one principal per row).

The framework of calculating principal value-added measures is detailed below, followed by the empirical design used to analyze the relationship between principal value-added measures and school outcomes. These steps all contribute to the central aim of this paper of estimating principal effect on various school outcomes.

3.1 Statistical Model

Let \( j = j(i, t) \) denote school \( i \)'s principal in year \( t \) and \( \mu_{jyt} \) represent the principal \( j \)'s value-added on school outcome \( y \) in year \( t \). In other words, \( \mu_{jyt} \) represents principal \( j \)'s impact on school outcome \( y \) in year \( t \). I standardize the principal value-added for each of the six outcomes so that each has a mean of zero and standard deviation of 1.
Let school $i$’s outcome measure $y$ in year $t$, $A_{iyt}$, be given by:

$$A_{iyt}^* = \beta X_{iyt} + \epsilon_{iyt}$$

where $\epsilon_{iyt} = \mu_{jyt} + \theta_i + \tilde{\epsilon}_{iyt}$

Here, $X_{iyt}$ denotes observable determinants of school outcome $y$, such as lagged scores for school outcome $y$ and the demographic characteristics of school $i$, and $\epsilon_{iyt}$ denotes the error term. Using the framework of Chetty, et al. (2014a), this error term, $\epsilon_{iyt}$, can be decomposed into three components: principal value-added $\mu_{jyt}$, exogenous school shocks $\theta_i$, and idiosyncratic school-level variation $\tilde{\epsilon}_{iyt}$. Let $\epsilon_{iyt} = \theta_i + \tilde{\epsilon}_{iyt}$ denote the unobserved error in school outcome $y$ unrelated to principal quality. In this model, I allow for cases in which school characteristics $X_{iyt}$ and $\epsilon_{iyt}$ are correlated with $\mu_{jyt}$.

### 3.2 Estimating Principal Value-Added

In this section, I develop an estimator for principal value-added on school outcome $y$ in year $t$, $\mu_{jyt}$, based on mean school outcome measures in principal $j$’s prior school.

The estimator is created in three steps:

1. I regress school outcome measures $A_{iyt}^*$ on $X_{iyt}$ to construct residuals of school outcome controlling for observables. It is important to note that observables also include school outcome $y$ in the prior years.

2. I estimate the best linear predictor of school outcome residuals in year $t$ based on school outcome residuals in prior years. To do this, an OLS regression is
used with school-level outcome $y$ in year $t$ on school-level outcome $y$'s residuals in year $t - 3$ to $t - 1$.

3. I use the coefficients of the best linear predictor to predict each principal’s value-added in year $t + 1$. In other words, I use estimated coefficient in predicting principal value-added in year $t + 1$ based on the school outcome $y$ residual in year $t - 2$ to $t$ for each principal. Conceptually, we can think of using coefficients of the best linear predictor as a way to adjust the weighting of past years in our prediction model. We expect more recent principal-value-added measures to be better predictors of future principal value-added measures than less recent principal value-added measures. An extreme example of this is that we likely would not want to give a principal's value-added measure from 10 years ago as much weight as his/her value-added measure last year to create a good predictor for the principal's value-added measure next year.

The econometric method described above to estimate principal value-added measures is used for each of the six school outcomes: school grade, average student attendance, perceptions of school safety, perceptions of school maintenance, perceptions of effective school leadership, and perceptions of positive school culture. An important analytical challenge in applying the strategy of Chetty et al. (2014a) to principals is disentangling principals’ true contributions to school outcomes and other school-level factors beyond principals’ control. This is primarily a problem because outcomes are at the school-year level.

As was alluded to earlier, a valid way to do this, which has been used by authors of previous studies, is to use school leadership changes as a way to identify a principal’s effectiveness relative to other principals who have served at the same school. To investigate the impact of principals on school outcomes, I constrain analysis to Mover Principals. Conceptually, this means that principal $j$ who moves schools at year $t$ has six value-added measures derived from his/her prior estimated contributions to
the six school outcomes. In the next section, I describe the empirical design use to analyze the relationship between principal value-added measures and school outcomes.

3.3 Empirical Design

For each of the six school outcomes of consideration, I use three different methods to evaluate the principal-effect on the school outcome: (1) regression of principal value-added score on school outcome with controls and fixed effects; (2) an event study analysis for when a school is treated with a high value-added principal; (3) an event study analysis for when a school loses a high value-added principal. It is important to note that each of these empirical methods of analysis are constrained to principals that move schools at least once from 2009 to 2017 and that each value-added measure is unique to the school outcome in consideration (ex. I analyze the impact of principals’ school grade value-added scores on their new schools’ school grade scores).

3.4 Principal Transitions

There is some concern for exogeneity around whether a principal is a Mover Principal or not. It is plausible that there is selection bias in regards to (1) which schools experience a leadership transition and (2) which principals are chosen to move schools. The difference between schools that experienced at least one leadership transition between 2009 and 2017 and those that did not was described earlier with reference to Table 3. Specifically, it was shown that Mover Schools (i.e. those that experienced at least one leadership transition) have worse school performance on average compared to Non-Mover Schools. In the interviews with current MDCPS principals, there was a general consensus that, typically, non-retirement principal movement occurs in the form of higher performing principals being moved to lower performing schools. Thus,
there is evidence suggesting that, on average, schools that received new principals are
different from those that do not receive new principals and, on average, principals who
are chosen to move are different from principals not chosen to move. Importantly,
this does not invalidate the methods or results of this research project and, instead,
indicates that my findings might not generalize well to the broader population of
schools and principals.

4 Results

In the following sections, I describe the results of the three methods of analysis.
Tables and Figures for each of these methods can be found starting on page 33.

4.1 Relationship Between Principal Value-Added and School
Outcomes

A baseline question that should be explored is whether principal value-added (PVA)
measures derived from a principal’s past performance is correlated with performance
of his/her new school. As an initial investigation into the relationship between principal-
value-added measures and school outcomes, I plot principal value-added measures
for each of the six school outcomes at time $t$ (the year the principal entered the new
school) versus school outcomes at time $t + 1$ (the year after the principal entered
the new school). These plots are displayed in Figures 2-7. While there is variation
in the strength of the relationship between principal value-added measures in time $t$
and school outcome measures in time $t + 1$ across school outcomes, the relationship
for all six of the school outcomes is positive. The outcomes school grade, percep-
tions of school maintenance, perceptions of school safety, and perceptions of school
culture demonstrate a particularly strong positive relationships between principal
value-added in time $t$ and school performance in time $t + 1$.

For a more rigorous analysis, regressions are run with a control for the share of minority students, a control on the share of students eligible for free and reduced priced lunch, school fixed effects, and year fixed effects. School fixed effects is used as a method to reduce assignment bias in which principal's moving from a higher performing school are more likely to be assigned to better or worse performing schools compared to principals moving from a lower performing school. Regression results are displayed in Tables 4-6.

In regressions with a control on the share of minority students, a control on the share of students eligible for free and reduced priced lunch, school fixed effects, and year fixed effects, principal value-added scores are positive and statistically significant at the 1% level of significance for all school outcomes besides average attendance rate (which is positive but far from statistically significant). For instance, a one-point increase in the principal value-added measure for the school grade outcome is associated with 0.8 increase in the school grade outcome. For perceptions of school safety, maintenance, and school culture, a one-point increase in the principal value-added measure for each outcome is associated with an even larger increase in the school performance on that outcome.

The size and statistical significance of estimates is relatively constant when year fixed effects are added to a model with only school fixed effects. Outcome-by-outcome interpretations of the results are made in Table 4-6 but, broadly, the regression results provide supporting evidence that - for the school outcomes school grade, perceptions of school safety, perceptions of school maintenance, perceptions of effective school leadership, and perceptions of positive school culture - there is a measurable principal effect. There is inconclusive evidence regarding the principal effect on average student attendance.
4.2 Event Study I: Assignment of a High Value-Added Principal

While my entire analysis focuses on principals who moved schools, it is worthwhile to investigate how a subset of transitions impacts school outcomes. In particular, in this section I look at how school outcomes change when a school is ‘treated’ with a principal with high value-added measures compared to the average principal. Let year $t = 0$ denote the school year when a principal transitions to a new school and define all other school years relative to that year (e.g. if the principal enters in year 2013, year 2010 is -3 and year 2017 is +4). To obtain a balanced sample, I analyze events for which we have data on average school outcomes for at least three years before and after the event. I define a top 25% Mover Principal as one who has an estimated value-added measure in his/her year of entry in the top 25 percent of the distribution of all entrants. Similarly, I define a top 50% Mover Principal as one who has an estimated value-added measure in his/her year of entry in the top 50 percent of the distribution of all entrants.

The results, displayed in Figures 8-13, generally support the regression results that there is a substantial, positive impact of high value-added principals on school outcomes. In each graph, there is a downward trend of school outcomes prior to the move at time $t = 0$, followed by a noticeable divergence in school outcomes between schools that received high value-added principals and the average school outcome score. One potential theory for the local minimum of the school outcome at $t = 0$ is that there is friction associated with transitioning principals and, thus, school outcomes decline during the year of the transition. Another theory, which is not mutually exclusive to the first theory, is that a new principal tends to be brought in when the current school performance is low. Thus, it is unsurprising that school performance tends to be at a local minimum during the year of the transition.
There are two obvious concerns of this event study. Although parallel trends is roughly maintained in many of the graphs, there are some cases in which the pre-move school outcomes of a high value-added principal are much better than that of the average. We already know that Mover Principals tend to go to a lower quality school compared to Non-Mover Principals. In addition, amongst Mover Principals, it appears that higher value-added principals are assigned to schools with higher pre-transition performance. Still, the divergence of school outcomes post-treatment for schools that did receive a high value-added principal versus those that did not is both noticeable and substantial. A second concern is mean reversion, whereby new principals are assigned to a new schools because the schools they are assigned to are performing very poorly. Then, following the move, the schools do much better but a degree of that improvement is explained by reversion to the district-wide average of that particular school outcome. This would especially be a concern if I was confident that higher value-added principals tended to be assigned to lower performing schools.

However, Figures 8-13, if anything, show that higher value-added principals tend to be assigned to better performing schools. Thus, a strong effect of mean reversion would be a downward bias on estimates of principal effect. More broadly, I think mean reversion is much less of a concern than it might otherwise be because I am only comparing the subset of schools that received a new principal. Mean reversion would be a much larger concern if I was comparing schools that were assigned a new principal because of low school performance (and improved due to mean reversion with little effect actually attributed to the new principal) versus higher performing schools that kept the same principals.

4.3 Event Study 2: Exit of a High Value-Added Principal

The second event study I used applies the same framework for when a school is treated with a high value-added principal to cases in which a school is treated with the exit
of a high value-added principal. Figures 14 - 19 display the six school outcomes of concern before and after the exit where, again, $t = 0$ denotes the school year when a principal transition occurs. In this case, there is a noticeable and dramatic convergence of school outcomes post-exit for almost all of the six school outcomes. These results further supports this paper’s findings of a principal-effect on defined school outcomes.

For this event study, like the previous event study, there is a concern that mean reversion is biasing the results. In particular, there is a concern that a school with a high value-added principal pre-treatment performed well above the district-level mean on a particular outcome and then, post-treatment, declined but a degree of that decline was due to a reversion to the district-level average of that particular outcome. In this case, a post-treatment change might be wrongly attributed to a high value-added principal leaving when, instead, it was also the result of a school performing well above the district average and regressing towards the district mean. The concern of mean reversion is more reasonable in this event study compared to the previous event study. However, even if we accepted some degree of mean reversion, it is unlikely that it could fully explain the sudden and substantial convergence of school outcomes immediately post-treatment.

4.4 Association Between Value-Added Measures

For the analysis thus far, principal value-added measures for each school outcome and the school outcomes themselves were considered independently. For example, in looking at the school outcome average student attendance, I investigated the impact of a principal's value-added score for student attendance on the attendance of his/her new school. In doing so, I have shown that, for all of the school outcomes besides average student attendance, prior principal contributions to these school outcomes is predictive of future school outcomes for principals who move schools, which suggests
a principal effect on school outcomes.

However, it is also interesting to consider how different principal value-added measures are associated. In particular, it is worthwhile to consider whether principal effectiveness in regards to certain school outcomes is associated with high levels of effectiveness in regards to other school outcomes. Table 7 displays the correlation between the different value-added measures in my investigation, and shows that principals who are effective at improving perceptions of safety also tend to be effective at improving perceptions of a positive school culture. There is a similarly strong positive association between principal value-added measures for perceptions of school safety and perceptions of good school maintenance, along with a strong positive correlation between principal value-added measures for perceptions of a positive school culture and perceptions of good school maintenance. The associations of school outcomes are positive for all pairs of school outcomes in consideration, but some pairs - for example average student attendance and school maintenance - are only weakly positive.

5 Conclusion

The main contribution of this paper is an investigation into principals’ impacts on school outcomes that have previously been unexplored, including school grade, average student attendance, perceptions of school safety, perceptions of school maintenance, perceptions of school leadership, and perceptions of positive school culture. The use of a unique data set from Miami-Dade County Public Schools (MDCPS), which combined administrative and survey-based data, allowed for analysis of school outcomes that are important yet rarely researched. My paper's empirical design also represents a meaningful contribution to the literature given the difficult analytical challenge of disentangling principal and other school-level impacts on school outcomes. By calculating principal value-added measures using a rigorous method
presented by Chetty et al. (2014a), exploiting leadership transitions in MDCPS from 2009 - 2017, and using a combination of regression analysis and event studies, I identify a substantial and statistically significant principal effect for the school outcomes school grade, perceptions of school safety, perceptions of school maintenance, perceptions of school leadership, and perceptions of positive school culture.

The primary limitation of my research paper is that, given my paper's empirical design, analysis was constrained to schools in MDCPS that experienced at least one leadership transition from 2009 to 2017 (approximately 39% of schools). This is a particular concern because baseline analysis I presented in this paper show that schools that experienced at least one leadership transition from 2009 to 2017, on average, have worse performance compared to schools that did not experience at least one leadership transition. Thus, my findings may not generalize to all of the schools in the district. In addition, there is some concern of selection bias in regards to which principals are chosen to move schools and which are not, which limits the potential generalizability of results to all principals in the district.

A natural extension of this research involves investigating principals’ impacts on school outcomes besides those I considered. Even in the context of MDCPS, I included only a subset of potential school outcomes worth considering from the administrative and survey-based sources. Another promising extension involves investigating the characteristics of principals with higher principal value-added measures. For example, one could collect the demographic and professional characteristics of principals and explore how they are linked to different value-added measures. Teachers with graduate degrees have been found to have an insubstantial increased impact on student achievement compared to non-graduate degree peers (Clotfelter et al., 2007). This sort of analysis could be extended to principals. Ballou et al. (1995) made progress in this direction, finding that neither work experience outside of education nor administrative experience raise performance ratings of K-12 principals. However,
much more can be done to, for example, analyze how education-level, participation in a principal training program, principal certification through an online or weekend course, years of in-classroom experience as a teacher, whether a principal has the autonomy to hire/fire teachers, the pay of the principal, and other characteristics are associated with higher principal value-added measures. Importantly, this analysis can be applied to various value-added measures calculated for different school outcomes, like those I focused on in this paper.

In addition to considering demographic and professional characteristics of principals, an extension of my research could look at how personality and skill-based qualities of principals relates to their value-added measures for improving different school outcomes. Work by Grissom and Loeb (2009) found that principals’ organization management skills predict measures of student achievement growth. Grissom and Loeb’s method could be applied to a vast range of school outcomes besides student achievement growth, including those I explore in this paper. Each of the three extensions I describe above could be used to both contribute to the existing literature and, importantly, better inform policies around recruiting and training our schools’ leaders.

This line of research has implications beyond education due to its methods and findings. My strategy to estimate value-added measures for outcomes, given that there is only one principal per school per year, has obvious applications to business and government where there is also only one leader per organizational unit per year. In addition, my findings that there are measurable principal effects on previously unexplored outcomes are encouraging to efforts made to broaden the metrics-of-success organizational units use. I am currently investigating these sorts of cross-sector applications of value-added measures.
References


6 Tables and Figures

Table 1: Summary Statistics for Sample Used to Estimate Principal Value-Added Measures

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
<th>Median</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>School data</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Points for School Grade (%)</td>
<td>61.74</td>
<td>12.00</td>
<td>62.00</td>
<td>2804</td>
</tr>
<tr>
<td>Attendance (%)</td>
<td>94.89</td>
<td>3.68</td>
<td>95.36</td>
<td>2808</td>
</tr>
<tr>
<td>Agreement that the school is safe across teachers, students, parents (%)</td>
<td>85.19</td>
<td>12.07</td>
<td>88.00</td>
<td>2809</td>
</tr>
<tr>
<td>Agreement that the school is well maintained across teachers, students, parents (%)</td>
<td>72.70</td>
<td>16.64</td>
<td>74.17</td>
<td>2809</td>
</tr>
<tr>
<td>Agreement that the school has a good culture across teachers, students, parents (%)</td>
<td>79.74</td>
<td>14.41</td>
<td>83.00</td>
<td>2809</td>
</tr>
<tr>
<td>Agreement that the principal is effective across teachers, students, parents (%)</td>
<td>81.62</td>
<td>13.54</td>
<td>85.00</td>
<td>2809</td>
</tr>
<tr>
<td>Minority (%)</td>
<td>93.14</td>
<td>9.44</td>
<td>97.00</td>
<td>2810</td>
</tr>
<tr>
<td>Free lunch eligible (%)</td>
<td>78.60</td>
<td>19.87</td>
<td>85.91</td>
<td>2810</td>
</tr>
<tr>
<td><strong>Principal characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mover Principals (%)</td>
<td>16.88</td>
<td>0.37</td>
<td>0.00</td>
<td>2880</td>
</tr>
<tr>
<td>Number of mover principals per year</td>
<td>53.97</td>
<td>9.94</td>
<td>49.00</td>
<td>2880</td>
</tr>
<tr>
<td>Years of administrative experience</td>
<td>3.65</td>
<td>2.07</td>
<td>3.66</td>
<td>2880</td>
</tr>
</tbody>
</table>

These summary statistics are calculated using all school-year data from 2009-2017 and include only Mover Schools (i.e. those that experienced at least one leadership transition during the time period). On average, 16.88% of principals change schools each year. This is an important statistic, since analysis will be constrained to this subset of principals.
Table 2: Survey Responses By Participant Type

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>Staff</th>
<th>Parents</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agreement that the school is safe (%)</td>
<td>87.1 (13.7)</td>
<td>85.4 (12.8)</td>
<td>79.3 (15.1)</td>
</tr>
<tr>
<td>Agreement that the school is well maintained (%)</td>
<td>76 (19.5)</td>
<td>82.2 (15.5)</td>
<td>53.1 (20.9)</td>
</tr>
<tr>
<td>Agreement that the school has a good culture (%)</td>
<td>82.4 (16.5)</td>
<td>85.4 (13.9)</td>
<td>66.6 (17.9)</td>
</tr>
<tr>
<td>Agreement that the principal is effective (%)</td>
<td>82.81 (15.4)</td>
<td>83.12 (13.1)</td>
<td>77.72 (17.5)</td>
</tr>
</tbody>
</table>

These summary statistics represent the percent of respondents that agree or strongly agree to a statement corresponding to the school outcome of consideration. These summary statistics indicate variability in responses across staff, parents, and students. For each outcome, students had the lowest percent agreement with the given statement. Example surveys are included in Appendix A-C.
Table 3: Summary Statistics By Mover Status of a School

<table>
<thead>
<tr>
<th>Variable</th>
<th>Non-Mover</th>
<th>Mover</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Points for School Grade (%)</td>
<td>62.35</td>
<td>58.85</td>
<td>61.76</td>
</tr>
<tr>
<td></td>
<td>(12.17)</td>
<td>(11.44)</td>
<td>(12.12)</td>
</tr>
<tr>
<td>Attendance (%)</td>
<td>94.95</td>
<td>94.52</td>
<td>94.88</td>
</tr>
<tr>
<td></td>
<td>(4.25)</td>
<td>(2.06)</td>
<td>(3.96)</td>
</tr>
<tr>
<td>Agreement that the school is safe across teachers, students, parents (%)</td>
<td>85.85</td>
<td>81.43</td>
<td>85.1</td>
</tr>
<tr>
<td></td>
<td>(12.34)</td>
<td>(13.63)</td>
<td>(12.67)</td>
</tr>
<tr>
<td>Agreement that the school is well maintained across teachers, students, parents (%)</td>
<td>73.31</td>
<td>68.91</td>
<td>72.57</td>
</tr>
<tr>
<td></td>
<td>(16.88)</td>
<td>(17.58)</td>
<td>(17.08)</td>
</tr>
<tr>
<td>Agreement that the school has a good culture across teachers, students, parents (%)</td>
<td>80.66</td>
<td>74.66</td>
<td>79.65</td>
</tr>
<tr>
<td></td>
<td>(14.39)</td>
<td>(16.13)</td>
<td>(14.87)</td>
</tr>
<tr>
<td>Agreement that the principal is effective across teachers, students, parents (%)</td>
<td>82.31</td>
<td>78.21</td>
<td>81.62</td>
</tr>
<tr>
<td></td>
<td>(13.16)</td>
<td>(14.83)</td>
<td>(13.54)</td>
</tr>
<tr>
<td>Minority (%)</td>
<td>92.88</td>
<td>94.66</td>
<td>93.18</td>
</tr>
<tr>
<td></td>
<td>(9.59)</td>
<td>(8.15)</td>
<td>(9.39)</td>
</tr>
<tr>
<td>Free lunch eligible (%)</td>
<td>77.86</td>
<td>82.43</td>
<td>78.63</td>
</tr>
<tr>
<td></td>
<td>(20.29)</td>
<td>(17.27)</td>
<td>(19.89)</td>
</tr>
<tr>
<td>Years of administrative experience</td>
<td>4.09</td>
<td>1.49</td>
<td>3.65</td>
</tr>
<tr>
<td></td>
<td>(1.9)</td>
<td>(1.34)</td>
<td>(2.07)</td>
</tr>
</tbody>
</table>

These summary statistics display mean measures segmented by whether a school is a Mover School or not. While only Mover Schools will be considered in future analysis, Table 3 is important to investigate whether the characteristics of Mover Schools are, on average, different from Non-Mover Schools. These results show Mover Schools had worse performance on all six school outcomes that we consider in this analysis relative to Non-Mover Schools.
The plot shows the average variable trends for schools that received at least one new principal from 2009 to 2017. A majority of the variables plotted are relatively flat during the time period. However, variables like total points for school grade, percentage of students eligible for free and reduced lunch, and percent agreement that the school is well-maintained have changed. The percentage of students eligible for free and reduced price lunch increased from 73% in 2009 to 83.75% in 2017. These trends suggest that analysis should control for year effects.
Figure 2: Total points for school grade

This graph only includes Mover Principals. The graph plots the principals’ value-added scores the year of the transition to a new school versus the score of their new school a year after the move. The value-added measure and school score are both in regards to the school outcome total percent for school grade. There is a strong, positive relationship between principal value-added measures during the year of the transition and school outcomes a year after the transition.
This graph plots the student attendance value-added scores for Mover Principals the year of the leadership transition versus the student attendance score of the Mover Principal’s new school a year after the move. There is some bunching of the data and a few obvious outliers, but the linear best fit model does a relatively good job at fitting the strongly positive relationship between principal value-added at year $t$ (the year of the move) and the school outcome at year $t+1$ (the year after the move).
The graph above includes Mover Principals and compares their value-added score prior to the move, with the score of their new school the year after the move. Both measures are in regards to perceptions of school safety. While the relationship between principal value-added and the school outcome is clearly positive, the relationship is less strong than that for school grade and student attendance.
The plot above compares principal value-added scores prior to a leadership transition, with the score these principals’ new school a year after the move. There is clearly a strong and positive association between a principal value-added scores the year of the move to a new school and the performance of the school the year after the move for perceptions of school maintenance. However, the relatively large spread in the data is worth noting (i.e. large standard errors).
Figure 6: Agreement that the school has a good culture

This graph only includes Mover Principals and compares their value-added score the year they move to a new school with the score of their new school a year after the move. The school outcome being considered is perceptions of positive school culture. The association between principal value-added measures in time $t$ and school performance in time $t + 1$ is positive and the slope of the linear fit model is relatively steep.
This graph only includes Mover Principals and compares their value-added score when they move to a new school with the score of their new school a year after the move. Although there is a positive relationship between principal value-added and school performance, the relationship is relatively weak and, thus, the linear fit model is fairly flat slope. The school outcome being considered for both principal value-added and school performance is perceptions of effective school leadership.
These regression results display regressions of various school outcomes after a leadership transition on principal value-added scores for those particular school outcomes, with relevant controls. School fixed effects and year fixed effects are used. Total points for school grade represents the score a school received on a broad, district-generated measure for school performance, with score ranges for the letter grade of the school. This measure is mostly determined by student test scores.

| | | | | | Observations |
|---|---|---|---|---|
| 12.3 | 12.3 | 0.0 | 0.0 | R-squared |
| 0.286 | 0.283 | 0.087 | 0.9493 |
| X | X | | | Year fixed effects |
| X | X | X | X | School fixed effects |
| (0.029) | (0.024) | (0.0179) | (0.026) |
| 0.020 | 0.020 | 0.020 | 0.020 |
| (0.015) | (0.010) | (0.0097) | (0.010) |
| *0.258 | *0.27 | *0.179 | *0.167 |
| (0.049) | (0.039) | (0.0179) | (0.023) |
| 0.048 | 0.048 | 0.048 | 0.048 |
| Attendance | Attendance | Grade (%) | Grade (%) |
| % | % | Total Points for School | Total Points for School |
| Attendance | Attendance | Grade (%) | Grade (%) |
| % | % | Total Points for School | Total Points for School |
These regressions are a continuation of those in Table 4 for additional school outcomes.

<table>
<thead>
<tr>
<th>Variable</th>
<th>123</th>
<th>123</th>
<th>123</th>
<th>123</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-squared</td>
<td>0.0359</td>
<td>0.3569</td>
<td>0.377</td>
<td>0.2870</td>
</tr>
<tr>
<td>Year fixed effects</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>School fixed effects</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Minority (%)</td>
<td>0.127 (0.072)</td>
<td>0.147 (0.063)</td>
<td>0.127 (0.079)</td>
<td>0.149 (0.062)</td>
</tr>
<tr>
<td>Free lunch eligible</td>
<td>0.049 (0.092)</td>
<td>0.089 (0.114)</td>
<td>0.088 (0.097)</td>
<td>0.092 (0.110)</td>
</tr>
<tr>
<td>Principal value-added</td>
<td>1.186*** (0.153)</td>
<td>1.186*** (0.155)</td>
<td>1.335*** (0.223)</td>
<td>1.324*** (0.205)</td>
</tr>
<tr>
<td>Agreement that the school is well financed</td>
<td>(%)</td>
<td>(%)</td>
<td>(%)</td>
<td>(%)</td>
</tr>
<tr>
<td>Agreement that the school is well staffed</td>
<td>(%)</td>
<td>(%)</td>
<td>(%)</td>
<td>(%)</td>
</tr>
<tr>
<td>Agreement that the school is safe</td>
<td>(%)</td>
<td>(%)</td>
<td>(%)</td>
<td>(%)</td>
</tr>
<tr>
<td>Agreement that the school is clean</td>
<td>(%)</td>
<td>(%)</td>
<td>(%)</td>
<td>(%)</td>
</tr>
</tbody>
</table>

**Table 5: Regression Results for Survey Data**
These regressions are a continuation of those in Table 4 for additional school outcomes.

<table>
<thead>
<tr>
<th></th>
<th>123</th>
<th>123</th>
<th>123</th>
<th>123</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-squared</td>
<td>0.149</td>
<td></td>
<td>0.454</td>
<td>0.2640</td>
</tr>
<tr>
<td>Year fixed effects</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>School fixed effects</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minority (%)</td>
<td>0.211</td>
<td>0.27</td>
<td>0.156</td>
<td>0.137</td>
</tr>
<tr>
<td>Free lunch (%)</td>
<td>0.827</td>
<td>0.807</td>
<td>0.77</td>
<td>0.71</td>
</tr>
<tr>
<td>Add. measure (%)</td>
<td>0.212</td>
<td>0.219</td>
<td>0.163</td>
<td>0.169</td>
</tr>
<tr>
<td>Has a good culture (%)</td>
<td>0.05</td>
<td>0.03</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>Has a good culture (%)</td>
<td>0.05</td>
<td>0.03</td>
<td>0.05</td>
<td>0.05</td>
</tr>
</tbody>
</table>

Table 6: Regression Results for Survey Data
Figure 8: Total points for school grade

The plot displays the average school score (total points which are converted into a letter grade) for schools that receive principals with different value-added measures on school score at the time of the move (i.e. $t = 0$). Considering that pre-treatment scores of schools that received a higher value-added principal are higher than the average, it seems that higher value-added principals tend to be assigned to better performing schools. Still, there is a large and noticeable divergence in school outcomes following the move, with outcomes in those schools that receive higher value-added principals increasing dramatically up to four year after the move and average outcomes across all schools that experienced a leadership transition being roughly flat post-move.
The plot displays the average annual student attendance for schools that receive principals with different student attendance value-added measures at the time of the move (i.e. $t = 0$). The pre-treatment school scores of principals with different value-added measures at the time of the move are only slightly higher for schools that received a high value-added principal and follow the same trend pre-treatment. However, post-treatment, there is a large divergence with schools that received a high value-added principal increasing while the average increased one-year after the move, remain roughly flat for three years, and then decline.
Figure 10: Agreement that the school is safe

The plot above shows perceptions of school safety for schools that receive a new principal at time $t = 0$. There are three linear trends representing average perceptions of school safety for all schools that receive a new principal, average perceptions of school safety for schools that receive a new principal who has a top-50% value-added measure on perceptions of school safety at time $t = 0$, and average perceptions of school safety for schools that receive a new principal who has a top-25% value-added measure on perceptions of school safety at time $t = 0$. The data shows that higher value-added principals that move tend to be assigned to better performing schools but, even so, there is a noticeable post-treatment divergence in perceptions of school safety for schools that received high value-added principals compared to the average.
Figure 11: Agreement that the school is well maintained

The plot displays the average annual perceptions of school maintenance for schools that receive principals with different value-added measures on school score at the time of the move (i.e. $t = 0$). The pre-treatment school scores of principals with different value-added measures at the time of the move are the same for approximately 6 years before the treatment but then, closer to the treatment, the pre-treatment school scores are higher for those schools that receive a high value-added principal. This suggests that higher value-added principals are, on average, assigned to better performing schools. There is a large divergence in perceptions of school maintenance for schools that receive and do not receive high value-added principals three years after the transition.
This plot displays the average annual perceptions of positive school culture for schools that receive principals with different school culture value-added measures at the time of the move. The pre-treatment school scores of principals with different value-added measures at the time of the move are only slightly higher for schools that received a high value-added principal and follow the same trend pre-treatment. However, post-treatment, there is a large divergence, especially immediately after treatment and after $t = 3$, with schools that received a high value-added principal increasing while the average remains roughly flat.
Figure 13: Agreement that the principal is effective

This plot shows the average annual perceptions of principal effectiveness for schools that receive principals with different value-added measures at the time of the move. The pre-treatment school scores of principals with different value-added measures at the time of the move are slightly higher for schools that received a high value-added principal pre-treatment and follow the same downward trend pre-treatment. Post-treatment, there is a large divergence in average annual perceptions of principal effectiveness for schools that receive principals with different value-added measures.
Figure 14: Total points for school grade

The plot above displays the average school score (total points which are converted into a letter grade) for schools that experienced an exit of principals with different value-added measures on school score at the time of the move (i.e. \( t = 0 \)).

Pre-treatment, schools with a high value-added principal, on average, have better average school scores than the average school. However, by year \( t = 5 \) post-treatment, the schools that lost a high value-added principal had the same school outcomes as the average. The rate of this convergence was relatively constant post-treatment.
This plot shows the average annual student attendance for schools that experienced a principal transition with the principal exiting at $t = 0$ having different student attendance value-added measures. The pre-treatment school performance for schools with a high value-added principal, on average, are better than that of the average school. However, after the treatment, there is a noticeable convergence with schools that lost principals with higher value-added measures having the same average student attendance measure as the average school by time $t = 6$. 
This plots perceptions of school safety for schools that receive a new principal at time $t = 0$ and have a principal of different value-added measures at $t = 0$ leaving (due to movement to another school, retirement, etc.). Pre-treatment perceptions of school safety are on average higher for schools that lost a high school safety value-added principal at time $t = 0$. This persists to a lesser extent post-treatment until 5 years after the treatment, when the average perceptions converge across schools.
This plot displays perceptions of school maintenance for schools that receive a new principal at time $t = 0$ and have a principal of different value-added measures exiting at $t = 0$. Pre-treatment, schools with high value-added principals, on average, have better average perceptions of school maintenance than the average school. However, post-treatment, there is a relatively constant convergence such that, by year $t = 5$ post-treatment, the schools that lost a high value-added principal have the same perceptions of school maintenance as the average school.
This plot shows perceptions of positive school culture for schools that experienced a principal transition with the principal exiting at $t = 0$ having different school culture value-added measures. The pre-treatment school performance for schools with a high value-added principal, on average, are better than that of the average school (although this difference lessens closer to the time of treatment). After the treatment, there is a noticeable convergence such that schools that lost a high value-added principal have the same school outcomes as the average school by time $t = 6$. 
The plot above displays the average perceptions of principal effectiveness for schools that experienced an exit of principals with different value-added measures at the time of the move (i.e. $t = 0$). Pre-treatment, schools with a high value-added principal, on average, have better average perceptions of effective school leadership than the average school. However, there is a noticeable and dramatic convergence of average perceptions of principal effectiveness after the exit of a high value-added principal such that, by $t = 6$, the schools that lost a high value-added principal have the same average perceptions of principal effectiveness as the average. This convergence was relatively constant post-treatment.
Table 7: Correlation between different principal value-added measures

<table>
<thead>
<tr>
<th>Principal Value Added Measure</th>
<th>Percent of Points</th>
<th>Safe School Score</th>
<th>School Condition Score</th>
<th>School Culture Score</th>
<th>Percent Attendance Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent of Points</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safe School Score</td>
<td>0.579</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>School Condition Score</td>
<td>0.322</td>
<td>0.676</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>School Culture Score</td>
<td>0.519</td>
<td>0.852</td>
<td>0.671</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Percent Attendance Score</td>
<td>0.444</td>
<td>0.445</td>
<td>0.279</td>
<td>0.460</td>
<td>1</td>
</tr>
</tbody>
</table>

This table shows the correlation between principal value-added measures for six different school outcomes. The association is positive for all outcomes, but the strength of the association varies.
Appendix A: Sample Climate Survey (Parents)

This is a list of survey questions sent to a random subset of parents and their average responses.
Appendix B: Sample Climate Survey (Students)

This is a list of survey questions sent to a random subset of students and their average responses.

<table>
<thead>
<tr>
<th>Question</th>
<th>Average Grade</th>
<th>Average Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Do you feel the school provides an equal opportunity for all students?</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>2. Do you feel the school offers a variety of academic programs?</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>3. Do you feel the school's extracurricular activities are diverse and engaging?</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4. Do you feel the school's teacher-student ratio is appropriate?</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5. Do you feel the school's facilities are well-maintained?</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>6. Do you feel the school's safety measures are adequate?</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>7. Do you feel the school's policies are fair and consistent?</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>8. Do you feel the school's counseling and support services are effective?</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>9. Do you feel the school's communication with parents is open and honest?</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>10. Do you feel the school's administration and staff are approachable?</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

---

Feedback from Students (Semester 1)

Report for the 2019-20 Administration School Climate Survey

No specific survey questions are listed, but feedback is gathered from students.

- Increased security measures in the school
- Improved teacher-student interactions
- More diverse extracurricular activities
- Enhanced feedback mechanisms for students
Appendix C: Sample Climate Survey (Staff)

This is a list of survey questions sent to a random subset of school staff members and their average responses.