Stepping Stones

Principal Career Paths and School Outcomes

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Acknowledgements

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Abstract

Principals tend to prefer working in schools with higher-achieving students from more advantaged socioeconomic backgrounds. Principals often use schools with many poor or low-achieving students as stepping stones to what they view as more desirable assignments. District leadership can also exacerbate principal turnover by implementing policies aimed at improving low-performing schools such as rotating school leaders. Using longitudinal data from one large urban school district we find principal turnover is detrimental to school performance. Frequent turnover results in lower teacher retention and lower student achievement gains, which are particularly detrimental to students in high-poverty and failing schools.

Introduction

In 2009 the Obama administration allocated 4 billion dollars to transform some of the nation's worst schools. These efforts to overhaul poorly performing schools include replacing principals as the centerpiece of the reform (Dillon 2011; U.S. Department of Education 2010). Persistently low-achieving schools are eligible to receive federal grants to support intervention efforts but must make radical changes to their school in order to receive funds, including replacing their principals and in some cases large portions of their teaching staffs (Dillon 2011; Tucker 2010; U.S. Department of Education 2010).[1] Though prior research suggests that principals have important effects on school outcomes (Hallinger and Heck 1998; Hallinger and Heck 1996; Leithwood, Louis, Anderson, and Wahlstrom 2004), frequently replacing principals may create instability in schools which can potentially undermine improvement efforts (Dillon 2011).

Leadership changes in the lowest achieving schools sometimes result from involuntary termination, however, voluntary principal exits are also quite common (Gates, Ringel, Santibanez, Guarino, Ghosh-Dastidar, and Brown 2005; Loeb, Kalogrides, and Horng 2010; Papa, Lankford, and Wyckoff 2002a). Many schools—particularly schools with disadvantaged student populations—face high rates of principal turnover driven, at least in part, by principals' desires to move to schools that they find more appealing (Loeb, Kalogrides, and Horng 2010).

It is unclear a priori whether leadership change is beneficial or detrimental to schools. Studies of leadership turnover in other types of organizations suggest that turnover can have either beneficial or detrimental effects on organizations depending on the circumstances (Abelson and Baysinger 1984; Mobley 1982). Turnover can have beneficial effects if it helps generate new ideas and innovation and purges an

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[1] See the following websites for more information: http://www2.ed.gov/programs/sif/nastid2.pdf and http://www2.ed.gov/programs/sif/sigguidance11012010.pdf.

organization of ineffective leaders (Brown 1982; Denis and Denis 1995). If ineffective principals are the most likely to leave, then leadership turnover may be beneficial to schools. At the same time, too much turnover can have negative consequences if it leads to instability, loss of institutional memory, high training costs or lower employee commitment (Abelson and Baysinger 1984; Grusky 1960; Mobley 1982).

The effects of leadership changes on school performance have not been rigorously examined in prior research. Such analyses are complicated because in order to identify the effects of principal turnover, researchers need to separate the effects of principal turnover from the effects of factors that cause principals to leave their position that may also be associated with school performance. In this paper we used detailed administrative data from one urban district to describe principal turnover and examine its effects on teacher retention and student achievement. We use changes over time within schools to identify these effects, carefully assessing the time trends in teacher retention and student achievement pre and post principal turnover.

In describing principal turnover, we find that when principals leave a school it is usually due to a transfer to another school in the district rather than attrition from the principal profession via termination. Transferring principals tend to move to schools with more advantaged and higher achieving student bodies relative to where they start, suggesting that principals may use their initial school assignments as stepping stones to more desirable future positions in other schools. School performance bears little association with principal turnover.

In estimating the effects of principal turnover, we find that the substantial mobility in principals' career paths has detrimental consequences for schools. The departure of a principal is associated with higher teacher turnover rates and lower student achievement gains. The negative effects of principal turnover on student achievement are largest in schools with high concentrations of poor students and in

schools with the lowest performance in the state's accountability system. The latter group of schools is precisely the type that is the target of the recent federal reforms previously discussed. Poorly performing schools and those with high concentrations of poor students not only experience much higher principal turnover rates than other schools, but they are also unable to attract experienced new principals when vacancies arise.

Background

Many districts face very high rates of leadership turnover. Annual principal turnover rates in school districts throughout the country range from 15 to 30 percent each year with especially high rates of turnover in schools serving more low-income, minority and low-achieving students (Branch, Hanushek, and Rivkin 2008; Gates et al. 2005; Loeb, Kalogrides, and Horng 2010; Ringel, Gates, Chung, Brown, and GhoshDastidar 2004). A principal may leave his or her current school either because of involuntary departure due to firing or reassignment or voluntary departure based on a preference to work in a different school. The former is the type of turnover generated by reform efforts intended to turn around failing schools by removing the leadership. Dismissal generally accounts for only a small proportion of all principal exits. Though there are no national figures on the frequency of principal firings, data from several school districts suggest that the majority of principal turnover (as experienced by individual schools) comes from intra-district transfers and not from exits (Gates et al. 2005; Loeb, Kalogrides, and Horng 2010; Ringel et al. 2004). District leadership may also reassign principals because they believe that bringing new leadership into schools on a regular basis is beneficial for school improvement. However, there is some evidence that principals' movement across schools is, at least in part, voluntary.

When principals transfer, they generally move to a school with more affluent and higher-achieving students relative to where they start (Loeb, Kalogrides, and Horng 2010; Papa, Lankford, and Wyckoff 2002a). Given rigid salary schedules, principals do not receive pay increases when they change schools within a district. Principals can therefore only improve non-pecuniary benefits via intra-district transfers. Prior research suggests that many non-salary job characteristics affect teacher and principal preferences including student attributes, school culture, facilities, and safety (Horng 2009; Loeb, Kalogrides, and Horng 2010; Loeb and Reininger 2004). These working conditions vary considerably across schools. Changing schools may not increase pay but can still help principals maximize their utility by improving their job satisfaction and/or making their job easier. Given these preferences, hard to staff schools generally receive fewer applicants for vacant principal positions than do other schools, and therefore cannot be as selective when hiring replacements (Roza 2003). Consequently, new principals in such schools tend to have less experience and are less likely to have advanced degrees than principals in other schools (Loeb, Kalogrides, and Horng 2010). Preferences for easier to staff schools are likely to drive much of the turnover experienced by school districts throughout the country. They also contribute to the hiring of less qualified new principals in hard to staff schools given their more limited applicant pools.

There is limited research on the effect of principal turnover on school performance. A few studies have examined correlations among principal turnover and student achievement and among principal turnover and teacher turnover (Louis, Leithwood, Wahlstrom, and Anderson 2010). However, principal turnover is surely endogenous—schools with higher rates of turnover are likely to have other characteristics that are associated with achievement. Prior studies have not attempted to account for this endogeneity. Studies on the effects of leadership turnover in other types of organizations suggest support for three basic hypotheses regarding the relationship between leadership change and organizational

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performance. The first is that leadership turnover improves organizational performance (Brown 1982; Denis and Denis 1995; Grusky 1963; Virany, Tushman, and Romanelli 1992). This improvement happens when a manager in a struggling organization is replaced by a more effective manager.

A second hypothesis is that leadership turnover can be harmful for organizational performance (Audas, Dobson, and Goddard 2002; Azoulay, Zivin, and Wang 2010; Grusky 1963). In particular, frequent turnover may create instability in an organization. Research on school reform suggests that organizational stability is an important component of a well running school and that frequent changes to staff undermine efforts to effectively implement a school's instructional program (Fuller and Young 2009; Hallinger and Heck 1996; Weinstein, Jacobowitz, Ely, Landon, and Schwartz 2009). While poor performance may precede managerial change, when changes are frequent, they can be disruptive and make matters worse rather than better. Faltering organizations with high levels of turnover often have difficulty attracting experienced successors, who tend to be more effective (Pfeffer and DavisBlake 1986). As a result, they become trapped in a "vicious circle" of high managerial turnover and declining performance (Grusky 1963). The "vicious circle" concept suggests that poorly performing organizations are especially vulnerable to the negative effects of leadership turnover. In the case of schools, faltering schools tend to be those with lower resource levels, more novice teachers, fewer highly qualified teachers, and less effective leadership (Branch, Hanushek, and Rivkin 2008; Condron and Roscigno 2003; Lankford, Loeb, and Wyckoff 2002). These are also the schools that lowachieving students and students from disadvantaged socioeconomic backgrounds attend.

A third hypothesis is that leadership change plays no role in organizational performance (Brown 1982; Eitzen and Yetman 1972; Gamson and Scotch 1964; Smith, Carson, and Alexander 1984). This hypothesis, originally posited by Gamson and Scotch (1964), maintains that success results from

organizational processes that are largely outside the control of middle management. Dismissing a manager

is a gesture aimed at appeasing stakeholders or of deflecting attention from shortcomings at higher levels

of management. Therefore, any relationship between management succession and performance is

spurious. Gamson and Scotch (1964) refer to this idea as the "ritual scapegoating" theory. From this

perspective, managers are either relatively unimportant or they are all of similar quality such that it makes

little difference who fills the leadership role.

These hypotheses were developed in studies of involuntary leadership turnover when managers in

struggling organizations are replaced. Given the dynamics of the principal labor market described above

and the voluntary nature of most principal turnover, it is unlikely that turnover would benefit schools

except in rare cases where schools are led by very ineffective principals. Rather, because of its disruptive

effects, turnover is likely to either have no casual impact or a negative impact on school performance

(Brown 1982).

In this paper we use data from one of the largest public school districts in the United States to

examine the consequences of leadership change on school performance. We begin by describing the

principal labor market in this district, including rates of turnover from different types of schools and the

characteristics of the schools to which principals transfer. We then examine the relationship between

principal turnover and school-level outcomes and variations in the magnitude of these relationships in

different types of schools. We find that principal turnover has negative effects on average achievement and

particularly large negative effects on the achievement of students attending high poverty schools and those

receiving failing grades within the state accountability system. We conclude that principal preferences for

easier to staff schools leads to considerable leadership turnover in schools with more disadvantaged

students. These career pathways limit poor and low-achieving students' exposure to stable leadership,

which has negative effects on their achievement.

Data

The data used in this study come from administrative files on all staff, students, and schools in the Miami-Dade County Public Schools (MDCPS) district from the 200304 through the 200809 school years. The school district we study, MDCPS, is the largest public school district in Florida and the fourth largest in the United States, trailing only New York City, Los Angeles Unified, and the City of Chicago School District. In 2008, M-DCPS enrolled almost 352,000 students, more than 200,000 of whom were Hispanic. Nearly 90 percent of students in the district are either black or Hispanic and 60 percent qualify for free or reduced priced lunches. Over our observation period there are between 360 and 400 schools in the district. This provides ample power for identifying the effects of school characteristics (i.e., leadership turnover) on student and teacher outcomes. Basic descriptive information for the principals, teachers, and students that make up our sample is shown in **Table 1**.

The MDCPS staff database includes demographic measures, prior experience in the district, current position, and highest degree earned for all district staff from the 200304 through the 200809 school years. We use this information to create the following measures of principal experience and turnover in each year: (1) a measure of whether the school has a new principal in the current year. This measure captures whether the principal is new to the school and may or may not have prior experience as a principal in other schools in the district; (2) a measure of whether the school has a first time new principal at their school (with no prior principal experience in the district); (3) a measure of whether a school has a new principal who has previously served as principal at another school in the district. Distinguishing between measures 2 and 3 helps to gauge whether achievement declines when schools are under the direction of a new principal because new principals have less experience; (4) a measure of whether the school has a new

principal who began with a temporary or interim status. Temporary/interim principals are usually appointed by the Superintendent to fill a vacancy which occurs as the result of an emergency situation — often in the middle of the school year. This type of principal succession is likely to be most disruptive to schools; (5) a measure of the principal's tenure at the current school.

We also use the staff-level data to examine the association between principal turnover and subsequent changes to teacher turnover. To examine teacher turnover following leadership transitions we use the staff database which allows us to observe teacher transfers between schools in the district as well as attrition from the district after any given year. These data also include teacher race, gender, highest degree earned, experience, and age which we use as control variables in our models.

In addition to these staff-level data, we also have test score data and basic demographic information for all students in the district which we can link to classrooms (teachers) and schools. The demographic variables include student race, gender, free/reduced price lunch eligibility, and whether students are limited English proficient. These are used as control variables in our models. The test score data include math and reading scores from the Florida Comprehensive Assessment Test (FCAT). The FCAT is given in math and reading to students in grades 310. It is also given in writing and science to a subset of grades, though we only use math and reading tests in our analyses. The FCAT includes criterion referenced tests measuring selected benchmarks from the Sunshine State Standards (SSS). We standardize students' test scores to have a mean of zero and a standard deviation of one within each grade and school year.

Methods

Our analysis includes three components: (1) descriptively examining patterns of principal turnover in the district; (2) identifying the relationship between principal turnover and (a) teacher turnover and (b) student achievement; and (3) describing variation in the relationship between principal turnover and school

outcomes by school characteristics (poverty level, performance in the state accountability system).

The second and third components of our analysis seek to isolate the effect of principal transitions on school outcomes, recognizing that principal turnover may be endogenous to other school characteristics. Schools with frequent principal turnover may differ from schools with more stable leadership in a variety of ways — they may have less stable teacher and student populations or other less favorable working conditions such as safety concerns, disciplinary problems, or insufficient resources. Such factors are likely to be negatively associated with school outcomes such as achievement. Though we do not have a perfect solution to this endogeneity problem, we seek to minimize the potential bias by including a rich set of control variables in all our models as well as school and/or student fixed effects where possible. We also run analyses to uncover the likelihood of bias. We describe these approaches and their implications below.

Teacher Turnover

In order to examine the relationship between principal and teacher turnover we use data on all staff in the district and estimate a logistic regression predicting whether a teacher leaves their current school at the end of the year as a function of the measures of principal turnover and experience. In our full model we include controls for teacher characteristics (race, gender, highest degree, age, experience), time-varying school characteristics (percent receiving free/reduced priced lunches, percent minority, percent low achieving, enrollment), and school fixed effects. The types of schools that have high principal turnover may also have high teacher turnover with the former not necessarily causing the latter. We therefore prefer a model with school fixed effects since it shows the relationship between principal turnover and teacher turnover within the same school. That is, we are able to examine whether teacher turnover in a given

school is higher in years that the school has a new principal compared to years that the school does not have a new principal. The model is estimated with the following equation:

$$\Pr(T_{jst} = 1) = \frac{e^f}{1+e^f}$$

$$where \ f = \beta_0 + \beta_1 \ (New \ Principal)_{ts} + X_{st}\beta_2 + S_t\beta_3 + \pi_t + \pi_s + \varepsilon_{jst}$$

The probability that teacher *j* leaves their current school *s* in year *t* is a function of whether their school has a new principal in year *t*, teacher characteristics (X_{st}), time varying attributes of schools (S_t), year fixed effects (π_t) and school fixed effects (π_s). In other models we replace the new principal variable with the other measures of principal turnover and experience discussed above.

Student Achievement

In order to examine the relationship between principal turnover and student achievement, we merge the principal database with our student data base. Given concerns about the endogeneity of principal turnover, we estimate specifications of our student achievement models that include school and/or student fixed effects. This approach allows us to discern whether students learn less in years that their schools have a new principal compared to how much students in the same school learn in other years when their school does not have a new principal.

The school fixed effect removes any stable characteristics of schools that may be associated with both the likelihood of principal turnover and lower student achievement. However, there may still be time-varying negative shocks that influence both turnover and achievement declines. We do not have a perfect solution to this endogeneity problem. We use two approaches which we think minimize the potential for bias. First, in all models we control for the percentage of teachers at a school that are new in each year. If something bad happened at a school in the year before a new principal arrived, we expect that this will be

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absorbed by the teacher turnover rate. Second, as checks of the robustness of our estimates we include a control for the year before a new principal arrived in addition to the school fixed effect which takes out the average for the school across all years. If schools that experience a decrease in achievement in a given year are more likely to see their principal leave, then controlling for the year before the new principal arrives should account for this. Our estimates are generally unaffected by the inclusion of this measure or by the inclusion/exclusion of the teacher turnover rate.

Our estimates for the effect of principal turnover on student achievement are identified from students attending schools that experience at least one principal transition over the years in which they are tested. The following equation describes the model:

$$A_{ist} = \beta_1 A_{is(t-1)} + X_{it}\beta_2 + C_t\beta_3 + S_t\beta_4 +$$

$$\beta_5(NewPrincipal_{ts}) + \pi_i + \pi_s + \pi_g + \pi_t + \varepsilon_{ist}$$

where the achievement of student i in school s in year t is a function of their prior achievement $(A_{is(t-1)})$, time-varying attributes of students (X_{it}), their classes (C_t) and their schools (S_t), whether the student's school has a new principal $(NewPrincipal_{ts})$, and student, school, grade and year fixed effects. The parameter of interest is β_5 which shows the difference in the average achievement of students in years when their school has a new principal compared to years in which they do not. In other models we replace the new principal variable with the other measures of principal turnover and experience discussed above.

Interaction Models

In the analyses described previously, we examine the average effect of principal turnover on school outcomes. However, we expect that the magnitude of this effect might depend on characteristics of school. Certain types of schools may have higher rates of principal turnover and more difficulty attracting effective and experienced principals as successors. For example, if schools with high concentrations of poor or low achieving students attract less effective or experienced principals, then turnover might have larger negative effects in such schools. To examine variation in the relationship between principal turnover and student achievement, we include interactions between school characteristics and whether the school has a new principal. We examine whether the effect of turnover is different for high poverty schools relative to lower poverty schools and whether the effect is different for failing schools (i.e., schools that receive an F grade from the Florida accountability system) relative to higher-performing schools.[2]

Results

We begin by describing principal turnover rates in MDCPS as well as in several other school districts and professions for comparison purposes. **Table 2** lists principal turnover rates as well as turnover rates for other managerial professions. In MDCPS, 22 percent of principals leave their current school each year and most of those who leave transfer to another school in the district. The rates are similar in other districts: Milwaukee and North Carolina schools have annual turnover rates of around 20 percent, San Francisco has a turnover rate of 26 percent, New York City has a turnover rate of 24 percent, and Texas has a turnover

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[2]School grades are determined by a formula used by the district that weighs the percentage of students meeting high standards across various subjects tested, the percentage of students making learning gains, whether adequate progress is made among the lowest 25 percent of students, and the percentage of eligible students who are tested. For more information, see: http://schoolgrades.fldoe.org/pdf/0708/2008SchoolGradesTAP.pdf

rate of 30 percent. As **Table 2** shows, in general, managerial turnover is fairly high in other professions as well — ranging anywhere from 10 percent to 35 percent depending on the industry (Denis and Denis 1995; DiPrete and Krecker 1991; Fee and Hadlock 2004; Larsen 1993).

Next, in **Table 3** we show the principal turnover rate in MDCPS for schools serving different student populations. The first column lists the total percentage of principals who left their current school at the end of the year, while the second and third columns separate exits via transfer to another school in the district from exits via attrition from the district. Principal turnover rates are highest in schools serving high concentrations of poor, minority and low achieving students. In MDCPS, 28 percent of principals in schools in the top quartile of students receiving free/reduced priced lunches (high poverty) leave each year compared to 18 percent of principals in schools in the bottom quartile (low poverty). Nearly 30 percent of principals in schools with high concentrations of low achieving students leave each year compared to only 16 percent of principals in schools with low concentrations of low achieving students. We find similar results in Milwaukee and San Francisco from which we also have data (not shown) as do Gates et al. (2004) in their study of North Carolina and Ringel et al. (2004) in their study of Illinois.

Are Principals More Likely to Leave Following a Year of Poor Performance?

Prior studies of leadership turnover in other professions have found that leaders are more likely to leave following a period of poor performance (Allen, Panian, and Lotz 1979; Brown 1982; Denis and Denis 1995). We examine whether principal exits are associated with the performance of their school by predicting student test score gains in a given year as a function of whether a school's principal leaves at the end of that year. We also separate principal exists via transfer and via attrition. The results are shown in **Table 4.** The coefficients are all essentially zero and not statistically significant. This suggests that poor school

performance is not, on average, a precursor to principal turnover. This analysis also suggests that schools that experience principal exits are not necessarily experiencing a downward achievement trajectory which could confound our estimates of the effect of turnover on student achievement.

Since the majority of principal turnover results from principals transferring schools within the district, we next turn to an analysis of principals' transfer patterns. In **Table 5** we compare the characteristics of principals' initial schools to the characteristics of the schools to which they transfer. There is one observation for each principal-school combination and we predict a school characteristic as a function of whether the school is the principals' first, second, third, or fourth or more. The models also include a principal fixed effect. Principals' first school is the omitted category, thus the coefficients show the difference in school characteristics between a principal's first school and each subsequent school. The models are only identified from principals who serve at more than one school. The results from these analyses show that principals who transfer tend to move to schools with higher achieving students, fewer poor students, fewer minority students, and fewer students with attendance problems. For example, principals' second and third schools have about 9 percent fewer low achieving students than their first schools, 4 percent more high achieving students than their first schools, 89 percent fewer poor and minority students than their first school and 36 percent fewer students who are chronically absent. Few principals serve at four or more schools during our observation period so those coefficients are less precisely estimated. Taken together, the results from Table 4 and 5 suggest that principals are not leaving when their school is performing poorly but, rather, they tend to leave when vacancies arise at easier to staff schools.

Principal Turnover and School Outcomes

Next, we turn to an examination of the relationship between principal turnover and both teacher turnover (**Table 6**) and student achievement (**Tables 7 and 8**). We run three models for each analysis. The first model excludes controls and simply asks whether the outcome is different in those schools and years in which a new principal takes over. The second model includes a detailed set of control variables and shows whether the outcome differs in schools and years when there is a new principal in comparison to similar schools and years.[3] The third model includes school fixed effects asking whether within a school the outcome differs in years where there is a new principal compared to years when there is not a new principal. While the last specification is the cleanest causally, it identifies the effect only from the small variation within schools across years. Tables 7 and 8 include one additional model that adds a student fixed effect to the model with school fixed effects and the controls.

In **Table 6** we find that turnover among teachers is higher when a new principal takes over at a school. The first row of the Table shows that the odds that a teacher leaves his or her current school are about 17 percent higher in years and schools that have a new principal. The direction of the results remains in the next two models which aim to identify the causal effect of principal turnover on teacher turnover. Within schools, the odds of teacher turnover are approximately 8.7 percentage points higher in the years in which there is a new principal. These results are marginally significant and not substantially different from the model with controls instead of fixed effects (11.3 percentage points) which is strongly statistically

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[3] The control variables used in our teacher turnover models include: race, gender, age, highest degree earned, experience (entered as dummies and top coded at 21 or more years), percentage of students receiving free/reduced priced lunches at the school, percent minority at the school, logged school enrollment, average math achievement at the school and year fixed effects. The control variables used in our student achievement models include: prior achievement, race, gender, whether the student is limited English proficient, free/reduced priced lunch receipt, whether the student was retained in the prior year, school and class percentage free/reduced priced lunches, limited English proficient and average prior achievement as well as year and grade fixed effects.

significant.

Teacher turnover might be higher in years when schools have a new principal because of the relative inexperience of new principals. More experienced principals might be more skilled in developing effective policies to retain their teachers or supporting a collegial environment that curbs turnover. In addition, a new principal might be more likely than a more experienced principal to bring a new approach to the school that is in conflict with teachers' preferences; thus causing teachers to seek other positions. In the second panel of **Table 6** we add a control for the number of prior years of experience that the principal has (in any school). Controlling for this measure reduces the magnitude of the new principal effect on turnover somewhat but there is still a significant positive relationship between principal and teacher turnover in the model with control variables (**model 2**). This suggests that the lack of experience of a new principal to a school explains some but not all of the positive relationship between principal and teacher turnover. The final model that includes school fixed effects does not show a significant relationship but most of the difference between **models 2 and 3** comes from an increase in the standard error, likely due to the substantially reduced variation when we include school fixed effects.

Another way of gauging the importance of experience in explaining the relationship between principal and teacher turnover is to distinguish between cases where the new principal is a first time new principal and cases where the new principal has prior experience as a principal in another school. This analysis is shown in the third panel of **Table 6**. The relationship appears somewhat stronger for new principals with prior experience than for new principals without prior experience, though the differences are not statistically significant in any of the specifications. The similarity in the magnitude of the effects of having a new first time principal and a new principal with prior experience at another school suggests that whether the new principal is experienced or not is not an important influence on teacher turnover. Rather,

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teacher turnover is similarly higher in years when schools have a new principal with and without prior experience in other schools. Taken together these results suggest that leadership instability tends to generate greater instability among the teaching force that goes beyond the turnover associated with having a less experienced principal.

The final two panels of **Table 6** give estimates of the effects of having a temporary or interim principal and of principal experience on teacher attrition. We see that on average teachers turn over more under temporary or interim principals but that this relationship is small (3.6 percent in the model with controls and 1.6 percent in the school fixed effects model) and not statistically different from zero. The final panel shows that teachers are less likely to leave under principals with longer tenure at their school. An extra year of experience at a school is associated with a 4 percentage point reduction in the odds of turnover in the school fixed effects model, but these estimates are not statistically significant.

In **Table 7** (math) and Table 8 (reading) we examine the relationship between principal turnover and student achievement. **Model 1** is a baseline model that only includes a measure of lagged achievement, the percentage of new teachers at the school and the principal experience measures. In model 2 we add student, school, and classroom control variables as well as grade and year fixed effects. Model 3 adds a school fixed effect and model 4 adds a student fixed effect. We focus our discussion on model 4 since it brings us closest to identifying a causal effect of principal turnover on achievement. In this model we use variation in the presence of new leaders within schools (across time) to examine whether students learn less in years when their school has a new principal compared to years when their school does not have a new principal.

The effects are relatively small but consistent across measures. In **Table 7** we find that students make lower achievement gains in math when their school has a new principal (first panel), when their

school has a new first time principal (without prior experience in another school) (third panel), and when their school has a temporary or interim principal (fourth panel). Students also have higher learning gains in math when their principal has longer tenure at their school (fifth panel). Interestingly, there is no negative effect on math achievement when a school has a new principal who previously served as a principal at another school in the district (third panel). This suggests that the skills and experience that principals bring to their new schools are important and that lack of prior experience explains much of the negative effect of turnover on math achievement.

One concern with these models is that schools that are on a downward achievement trajectory might also be more likely to experience principal turnover, which could potentially bias our estimates. We account for this possibility in the second panel by controlling for the year prior to the new principal (similar to the analysis shown in **Table 4**). Our estimates of the effect of having a new principal on math achievement remain relatively unchanged with the inclusion of this control. The results for reading achievement in Table 8 are fairly similar to those discussed for math thus far.

In the sixth panel of **Tables 7 and 8** we add interactions between years of prior principal experience and the new principal indicator. This principal experience measure reflects years of experience in any school in the district and is distinct from the measure of experience used in panel five of **Tables 7 and 8**, which only captures years of experience at the current school. For math (**Table 7**) the main effect on new principal in **model 4** suggests that student achievement is about .013 standard deviations lower when schools have a new principal without any prior principal experience (i.e., when prior years of experience is equal to zero). However, the interaction between new principal and prior principal experience is positive and statistically significant. This suggests that the negative effect of having a new principal is smaller when new principals to a school have more prior experience serving as a principal in other schools. The results for

reading achievement in **Table 8** are a bit different. These results suggest that overall years of principal

experience is positively related to reading achievement and the magnitude of that relationship is similar or

slightly smaller in schools with a new principal. Though the negative interaction term in **models 1 and 2**

suggests that principal experience is less important in schools with a new principal, the interactions are still

smaller than the main effect on principal experience suggesting that principal experience is still related to

reading achievement in schools with new principals. These results suggest that principal experience is

important in schools with new principals and that the negative effect of leadership turnover on student

achievement can be mitigated through the recruitment of experienced succeeding principals.

In sum, we find that principal turnover is positively associated with teacher turnover and negatively

associated with student achievement. These results provide fairly consistent evidence that greater

instability among leadership is detrimental to school outcomes and that new principals without any prior

experience seem to be less effective than their more experienced counterparts.

Interaction Models

In our final set of analyses we examine whether the association between leadership changes and student

achievement is different in low performing schools and in high poverty schools. In **Table 9** we predict

student achievement as a function of our full set of student, school, and classroom controls as well as the

relevant fixed effects. In model 12 we include a variable indicating whether the school received a failing

accountability grade (i.e., an "F" grade) in the prior year as well as an interaction between whether the

school had a new principal in the current year and earned a failing grade in the prior year. We are

interested in the interaction term since it shows whether the relationship between principal turnover and

student achievement is different in failing schools. In model 34 we include a variable indicating whether the

school was in the top quartile of students receiving subsidized lunches (high poverty) and an interaction

between this variable and new principal. The interaction shows whether the relationship between principal turnover and student achievement is different in high poverty schools. We estimate these models using our measure of whether a school has a new principal, temporary/interim principal, and principal experience at a school.

The negative relationship between principal turnover and student achievement is stronger in failing schools and in high poverty schools. Here we focus our discussion of the models with student fixed effects (**models 2 and 4**) though most of these results are similar in models that exclude them (**models 1 and 3**). While there is little or no relationship between having a new principal and achievement in non-poor schools and higher performing schools (shown by the main effects), students in failing schools have reading and math achievement that is about .04 to .06 standard deviations lower in years when they have a new principal while students in high poverty schools have reading and math achievement that is .02 to .03 standard deviations lower in years when they have a new principal. Similarly, principal tenure at a school bears a stronger relationship to achievement gains in high poverty and failing schools than in non-poor and higher- performing schools. Instability among school leadership is therefore more consequential for high poverty and failing schools, schools which also tend to have more frequent turnover.

The effect of turnover may be different for high poverty and failing schools if such schools differ in their ability to attract experienced successors. We examine this descriptively in **Table 10**, which shows the characteristics of new principals in different types of schools. We list the proportion of new principals with prior experience, years of prior principal experience in the district, and the proportion of principals with master's degrees. As expected, new principals in high poverty schools have less prior experience as a principal and are less likely to have a master's degree or higher compared to new principals in schools with fewer low-income students. About 65 percent of new principals in low poverty schools have previously

served as principal at another school in the district compared to only 30 percent of new principals in high poverty schools. Similarly, new principals in high poverty schools have about half as many prior years of experience as principals in low poverty schools (roughly 4 versus 2 years). New principals in high poverty schools are also less likely to have a master's degree (65 percent in low poverty schools compared to 56 percent in high poverty schools). Therefore, the effect of having a new principal may be more negative for high poverty schools because such schools are unable to attract the most experienced and credentialed successors.

Discussion and Conclusion

Many school districts throughout the country—including the district studied in this paper—face very high rates of principal turnover (Branch, Hanushek, and Rivkin 2008; Gates, Ringel, Santibanez, Ross, and Chung 2003; Papa, Lankford, and Wyckoff 2002b). While they average around 20 percent in the district we study as a whole, they are about a third higher in schools with high concentrations of poor, minority and low achieving students. Though we do not have data on why principals choose to leave their schools, we find evidence that suggests that one likely reason is a desire to move to easier to staff schools. Principals who switch schools within this district tend to move to schools with fewer students in poverty and fewer low achieving students compared to where they start. In other work we also found that principals express a desire to work in easier to staff schools (i.e., high achieving, low poverty, safe, good facilities, etc.) and many also express an aversion to work in schools with many poor students (Loeb, Kalogrides, and Horng 2010). Schools may not be the only type of organizations that experience voluntary turnover—for example, managers may also move among similar firms in the for-profit sector. However, schools are much more constrained than private firms in the resources they can deploy to keep effective employees. Given the rigidities of the salary schedule for teachers and school administrators there are little, if any, opportunities

to increase one's earnings outside of acquiring more experience or further credentials. School personnel may therefore seek to maximize other non-pecuniary benefits such as positive working conditions (Hanushek, Kain, and Rivkin 2004; Lankford, Loeb, and Wyckoff 2002; Loeb, Kalogrides, and Horng 2010).

Since much of the turnover we document is likely to be voluntary and driven by a preference to move to easier to serve schools, it is not surprising that there is no association between school performance and the likelihood that a principal leaves their school. While some principals whose schools are performing poorly may leave either via termination or by their own accord, some principals whose schools are performing well may also leave. A proven track record in improving the performance of a school is likely to make someone a viable candidate for vacancies in other schools. Prior research on the effects of leadership turnover on organizational performance suggests that turnover can be beneficial in instances where ineffective leaders are replaced (Grusky 1963; Virany, Tushman, and Romanelli 1992). But the dynamics of the principal labor market we document suggest that the majority of turnover is not driven by an attempt to replace ineffective leaders.

The consequences of the turnover we document are clearly negative, on average. Turnover is likely to be disruptive for schools and other organizations for a variety of reasons—it can undermine reform efforts and reduce employee buyin, fracture professional networks developed among employees and leadership, create unclear goals and expectations, and make for a less stable and desirable working environment (Abelson and Baysinger 1984; Fuller and Young 2009; Hallinger and Heck 1996; Steinberg 2000). These disruptive effects of turnover for schools are cause for concern, particularly in high poverty and failing schools where turnover rates are quite high and the negative effects of turnover are large. Practices that bring in experienced administrators can mitigate some of the problems created by turnover. Turnover's negative effects are smaller when vacancies are filled with principals who have prior experience

leading other schools in the district. At the same time, the types of schools that hire less experienced new principals (i.e., high poverty schools) tend to suffer more harm from leadership instability.

Turnover might have less detrimental effects on more advantaged schools because they have less frequent turnover and because they attract more experienced replacements. It is also possible that principals matter less in these schools – these are the types of schools that have more advantaged and higher achieving students and have an easier time attracting the best teachers. Turnover in these schools might also occur more often from retirement rather than a desire to move to an easier to serve school. In instances where the principal's exit is anticipated (i.e., due to retirement) there might be more mechanisms in place to ensure a smoother transition. Overall, our results suggest that principals' desire to work in schools with more affluent and high achieving students reduces disadvantaged students' exposure to experienced and stable school personnel (both teachers and principals) which has negative consequences for their learning.

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Tables

Table 1. Descriptive Statistics

	Mean	SD
Principal Characteristics		
Total Years of Experience in District	22.37	8.14
Years Experience as Principal	3.88	3.61
White	0.26	
Black	0.36	
Hispanic	0.38	
Female	0.67	
Masters Degree or Higher	0.70	
Total Principal Observations	2041	
Percentage of Principals who Serve Two or More Schools	0.35	
Percentage of Principals who Serve Three or More Schools	0.10	
Teacher Characteristics		
Total Years of Experience in District	9.55	9.29
White	0.28	
Black	0.27	
Hispanic	0.43	
Female	0.76	
Age	42.23	11.72
Master's Degree or Higher	0.40	
Total Teacher Observations (all teachers)	102646	
Student Characteristics		
Black	0.27	
Hispanic	0.60	
Female	0.49	
Limited English Proficient	0.16	
Retained in Year Prior	0.04	
Eligible for Subsidized Lunch	0.61	
Total Student Observations (all students)	2145115	
Total Student Observations (with test scores)	1246335	

Notes: Data from administrative files from Miami-Dade County Public Schools from 2003-04 to 2008-09.

Table 2. Principal Turnover Rates in Various School Districts and Comparisons with Turnover Rates in Other Leadership Professions

Source	Profession	School District(s)	Time Period	Annual Turnover Rate
PRINCIPALS				
Authors' calculations from data provided by district	Principals	Miami-Dade County Public Schools	2003-2009	22% (Total); 16% (Transfer); 6% (Attrit)
Authors' calculations from data provided by district	Principals	Milwaukee Public Schools	2000-2008	19% (Total); 11% (Transfer); 8% (Attrit)
Authors' calculations from data provided by district	Principals	San Francisco Unified School District	2003-2009	26% (Total); 18% (Transfer); 8% (Attrit)
Authors' calculations from data provided by district	Principals	New York City	1999-2008	24% (Total)
Papa, Lankford, Wyckoff (2002)	First Time Principals	New York State	1992	36% (Total)
Gates et al. (2004)	Principals	North Carolina State	1987-2001	18% (Total); 9% (Transfer); 9% (Attrit)
Ringel et al. (2004)	Principals	Illinois State	1987-2001	14% (Total); 7% (Transfer); 7% (Attrit)
Branch, Hanushek, and Rivkin (2009)	Principals	Texas State	1995-2001	30% (Total)
Steinberg (2000)	Principals	Washington State	1999	15% (Attrit)
OTHER LEADERSHIP PROFESSIONS				
DiPrete and Krecker (1991)	Professional and Managerial Workers	---	1980s	10%
Sorensen (2000)	TV Station Supervisors	---	1953-1988	15%
Audas et al. (1999)	English Soccer Coaches	---	1972-1999	36%
Pfeffer and Davis-Blake (1986)	National Basketball Association Coaches	---	1977-1981	25%
Fee and Hadlock (2000)	Newspaper Managers	---	1950-1993	15-16%
Allen, Panian, and Lotz (1979)	Major League Baseball Coaches	---	1920-1973	36%
Denis and Denis (1995)	CEOs	---	1985-1988	22%
Larsen (1993)	Nurse Managers	---	1993	35%

Table 3. Average Annual Principal Turnover Rate by School Type in Miami-Dade County Public Schools

	Total % Left	% Transfer	% Attrit
All Schools	22%	16%	5%
Percent Free Lunch			
Quartile 1	18%	12%	5%
Quartile 4	28%	21%	6%
Percent Minority			
Quartile 1	20%	14%	5%
Quartile 4	28%	23%	4%
Percent Low Achieving(Math)			
Quartile 1	16%	9%	6%
Quartile 4	29%	22%	6%
Percent Being Suspended			
Quartile 1	19%	12%	7%
Quartile 4	27%	22%	5%
Percent Absent 21 or More Days			
Quartile 1	17%	10%	6%
Quartile 4	27%	22%	5%
School Accountability Grade			
A	19%	13%	6%
B	20%	14%	5%
C	26%	20%	6%
D	25%	19%	6%
F	48%	43%	5%
School Level			
Elementary	21%	16%	5%
Middle	23%	18%	4%
High	25%	20%	4%

Notes: Transfer refers to the percentage of principals who transfer to another school in the district at the end of an academic year. Attrition refers to the percentage of principals who are no longer observed as a principal in the district following the end of an academic year.

Table 4. Relationship between Student Achievement and Principal Turnover

	Math	Reading
Model 1		
Year Prior to Principal Exit	-0.001	0.000
	(0.004)	(0.003)
Model 2		
Year Prior to Principal Exit (via Attrition)	0.001	0.001
	(0.006)	(0.005)
Year Prior to Principal Exit (via Transfer)	-0.003	0.000
	(0.005)	(0.004)
Control for Lag of Outcome	X	X
Time-Varying Student Controls	X	X
Time-Varying School Controls	X	X
Time-Varying Classroom Controls	X	X
School Fixed Effect	X	X
Grade Fixed Effect	X	X
Year Fixed Effect	X	X
Clustered Standard Errors (by School-Year)	X	X

Notes: +p<.10*p<.05, **p<.01, ***p<.001

Table 5. Change in School Characteristics among Principals who Transfer

	Mean Math Score		Percent Low Proficiency in Math		Percent High Proficiency in Math		Percent F/R Lunch		Percent Black		Percent Chronically Absent	
Second School Served as Principal	17.944	***	-0.093	***	0.037	***	-0.081	**	-0.091	**	-0.027	*
	(2.449)		(0.014)		(0.006)		(0.025)		(0.031)		(0.012)	
Third School Served as Principal	19.768	***	-0.093	***	0.036	**	-0.088	+	-0.093		-0.057	**
	(4.650)		(0.026)		(0.012)		(0.046)		(0.058)		(0.022)	
Fourth or Fifth School Served as Principal	24.930	*	-0.156	**	0.035		-0.005		-0.081		-0.040	
	(9.880)		(0.056)		(0.026)		(0.100)		(0.126)		(0.050)	
Constant	304.685	***	0.250	***	0.060	***	0.727	***	0.400	***	0.107	***
	(0.996)		(0.006)		(0.003)		(0.010)		(0.013)		(0.005)	
Principal Fixed Effect	X		X		X		X		X		X	
N (Principals)	516		518		518		522		522		522	
N (Observations)	690		696		696		704		704		704	

Notes: +p<.10 *p<.05, **p<.01, ***p<.001 The first school at which the principal served is the omitted category.

Table 6. Logistic Regression of Teacher Turnover by Principal Experience (Odds Ratios/t-Statistics)

	1		2		3	
1. New Principal at School						
New Principal	1.168	***	1.112	***	1.087	*
	(4.464)		(3.405)		(2.352)	
2. New Principal at School with Control for Prior Experience						
New Principal	1.114	**	1.086	*	1.074	
	(2.801)		(2.439)		(0.794)	
Prior Years of Principal Experience (in Any School)	0.983	***	0.991	*	0.995	
	(-3.370)		(-1.976)		(-0.168)	
3. First-Time New Principal at School						
First Time New Principal This Year	1.141	**	1.086	*	1.075	
	(2.989)		(2.172)		(1.072)	
New Principal to School, but with Prior Experience at another School in District	1.207	***	1.149	**	1.102	
	(3.743)		(2.883)		(1.549)	
4. Temporary/Interim Principal						
Temporary/Interim Principal	1.101	*	1.036		1.016	
	(2.225)		(0.915)		(0.086)	
5. Principal Experience						
Years at Current School	0.950	**	0.972		0.960	
	(-2.698)		(-1.584)		(-0.336)	
Time-Varying Teacher Controls	---		X		X	
Time-Varying School Controls	---		X		X	
School Fixed Effect	---		---		X	
Year Fixed Effect	---		X		X	
Clustered SE (School by Year)	X		X		X	

Notes: +p<.10*, p<.05, **p<.01, ***p<.001 The outcome is whether the teacher left their school at the end of the year. The models are restricted to teachers under the age of 62 (to omit those who leave due to retirement). Each numbered panel represents a different model.

Table 7. OLS Regression of Standardized Math Achievement Test Scores on Principal Experience

	1		2		3		4	
1. New Principal at School								
New Principal This Year	-0.019	***	-0.005	**	-0.004	*	-0.005	**
	(0.002)		(0.002)		(0.002)		(0.002)	
Proportion of New Teachers at School	-0.020	***	0.000		-0.019	+	-0.080	***
	(0.006)		(0.006)		(0.011)		(0.015)	
2. New Principal, Control for Year before New Principal								
Year Before New Principal	-0.024	***	-0.002		-0.004	*	-0.001	
	(0.002)		(0.002)		(0.002)		(0.002)	
New Principal This Year	-0.021	***	-0.005	**	-0.005	**	-0.006	***
	(0.002)		(0.002)		(0.002)		(0.002)	
Proportion of New Teachers at School	-0.015	*	0.002		-0.023	*	-0.082	***
	(0.006)		(0.006)		(0.011)		(0.016)	
3. First-Time New Principal at School								
First Time New Principal This Year	-0.038	***	-0.012	***	-0.011	***	-0.010	***
	(0.002)		(0.002)		(0.002)		(0.002)	
New Principal to School, but with Prior Experience	-0.000		0.002		0.003		-0.000	
at another School in District	(0.002)		(0.002)		(0.002)		(0.002)	
Proportion of New Teachers at School	-0.031	***	-0.005		-0.024	*	-0.088	***
	(0.006)		(0.006)		(0.011)		(0.015)	
4. Temporary/Interim Principal								
Temporary/Interim Principal	-0.025	***	-0.004	+	-0.004	*	-0.011	***
	(0.002)		(0.002)		(0.002)		(0.002)	
Proportion of New Teachers at School	-0.027	***	-0.007		-0.018	*	-0.064	***
	(0.005)		(0.005)		(0.008)		(0.011)	
5. Principal Experience (Continuous)								
Years at Current School	0.008	***	0.001		0.004	**	0.003	**
	(0.001)		(0.001)		(0.001)		(0.001)	
Proportion of New Teachers at School	-0.012	*	0.003		-0.018	+	-0.081	***
	(0.006)		(0.006)		(0.011)		(0.015)	
6. New Principal with Interactions								
New Principal This Year	-0.006	*	-0.002		-0.013	***		
	(0.003)		(0.003)		(0.003)			
Prior Years of Principal Experience (Any School)	0.005	***	0.002	***	0.000			
	(0.000)		(0.000)		(0.001)			
New Principal*Prior Years Principal Experience	-0.001		0.001		0.004	***		
	(0.001)		(0.001)		(0.001)			
Control for Lag of Outcome	X		X		X		X	
Time-Varying Student Controls	---		X		X		X	
Time-Varying School Controls	---		X		X		X	
Time-Varying Classroom Controls	---		X		X		X	
School Fixed Effect	---		---		X		X	
Student Fixed Effect	---		---		---		X	
Grade Fixed Effect	---		X		X		X	
Year Fixed Effect	---		X		X		X	

Notes: +p<.10, *p<.05, **p<.01, ***p<.001 Test scores are standardized to have a mean of 0 and a standard deviation of 1 within each year and grade. Each numbered panel represents a separate model. Time-varying student-level controls include limited English proficiency, free or reduced priced lunch eligibility, and retention status. Class characteristics include percent black, percent female, percent eligible for free or reduced priced lunches, percent limited English proficient and average prior achievement. School-level controls include percent minority and percent eligible for free or reduced priced lunches.

Table 8. OLS Regression of Standardized Reading Achievement Test Scores on Principal Experience

	1		2		3		4	
1. New Principal at School								
New Principal This Year	-0.027	***	-0.011	***	-0.005	*	-0.004	*
	(0.002)		(0.002)		(0.002)		(0.002)	
Proportion of New Teachers at School	-0.036	***	-0.007		-0.022	+	-0.022	
	(0.006)		(0.006)		(0.011)		(0.017)	
2. New Principal, Control for Year before New Principal								
Year Before New Principal	-0.035	***	-0.010	***	-0.002		-0.003	
	(0.002)		(0.002)		(0.002)		(0.002)	
New Principal This Year	-0.029	***	-0.012	***	-0.005	*	-0.005	*
	(0.002)		(0.002)		(0.002)		(0.002)	
Proportion of New Teachers at School	-0.032	***	-0.007		-0.023	*	-0.022	
	(0.006)		(0.006)		(0.011)		(0.017)	
3. First-Time New Principal at School								
First Time New Principal This Year	-0.051	***	-0.016	***	-0.005	*	-0.004	
	(0.002)		(0.002)		(0.003)		(0.002)	
New Principal to School, but with Prior Experience at another School in District	-0.004		-0.007	**	-0.004	+	-0.005	*
	(0.002)		(0.002)		(0.003)		(0.002)	
Proportion of New Teachers at School	-0.049	***	-0.010		-0.022	*	-0.021	
	(0.006)		(0.006)		(0.011)		(0.017)	
4. Temporary/Interim Principal								
Temporary/Interim Principal	-0.036	***	-0.007	**	0.000		-0.002	
	(0.002)		(0.002)		(0.002)		(0.002)	
Proportion of New Teachers at School	-0.052	***	-0.019	***	-0.017	*	-0.022	+
	(0.005)		(0.005)		(0.008)		(0.012)	
5. Principal Experience (Continuous)								
Years at Current School	0.017	***	0.006	***	0.004	***	0.004	**
	(0.001)		(0.001)		(0.001)		(0.001)	
Proportion of New Teachers at School	-0.025	***	-0.001		-0.020	+	-0.020	
	(0.006)		(0.006)		(0.011)		(0.017)	
6. New Principal with Interactions								
New Principal This Year	-0.007	*	0.002		-0.001			
	(0.003)		(0.003)		(0.003)			
Prior Years of Principal Experience (Any School)	0.006	***	0.003	***	0.002	***		
	(0.000)		(0.000)		(0.001)			
New Principal*Prior Years Principal Experience	-0.002	*	-0.002	**	-0.000			
	(0.001)		(0.001)		(0.001)			
Control for Lag of Outcome	X		X		X		X	
Time-Varying Student Controls	---		X		X		X	
Time-Varying School Controls	---		X		X		X	
Time-Varying Classroom Controls	---		X		X		X	
School Fixed Effect	---		---		X		X	
Student Fixed Effect	---		---		---		X	
Grade Fixed Effect	---		X		X		X	
Year Fixed Effect	---		X		X		X	

Table 9. Principal Turnover and Student Achievement with Interactions by Failing and High Poverty School

	Reading				Math			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
1. New Principal at School								
New Principal	-0.001	-0.003	-0.003	-0.000	-0.005 *	-0.004 *	0.000	0.000
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
New Principal*F Grade Last Year	-0.047 **	-0.038 *			-0.020	-0.062 ***		
	(0.016)	(0.016)			(0.016)	(0.015)		
New Principal*High Poverty School			-0.006	-0.020 ***			-0.016 **	-0.032 ***
			(0.006)	(0.005)			(0.005)	(0.005)
2. Temporary/Interim Principal								
Temporary/Interim Principal	-0.001	-0.002	0.003	0.001	-0.010 ***	-0.012 ***	-0.005 *	-0.009 ***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)	(0.002)
Temp Principal*F Grade Last Year	-0.033 *	-0.020			0.014	-0.033 *		
	(0.016)	(0.016)			(0.015)	(0.014)		
Temp Principal*High Poverty School			-0.013 *	-0.013 *			0.002	-0.013 *
			(0.006)	(0.005)			(0.006)	(0.005)
3. Principal Experience at a School								
Principal Experience	0.003 *	0.002	0.003 *	0.002	0.005 ***	0.003 +	0.002 +	0.001
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Principal Experience*F Grade Last Year	-0.008	0.120 +			-0.261 ***	-0.018		
	(0.067)	(0.070)			(0.063)	(0.065)		
Principal Experience*High Poverty School			0.007 +	0.013 **			0.009 **	0.018 ***
			(0.004)	(0.004)			(0.004)	(0.004)
Control for Percent New Teachers to School	X	X	X	X	X	X	X	X
Control for Lag of Outcome	X	X	X	X	X	X	X	X
Time-Varying Student Controls	X	X	X	X	X	X	X	X
Time-Varying School Controls	X	X	X	X	X	X	X	X
Time-Varying Classroom Controls	X	X	X	X	X	X	X	X
School Fixed Effect	X	X	X	X	X	X	X	X
Student Fixed Effect	---	X	---	X	---	X	---	X
Grade Fixed Effect	X	X	X	X	X	X	X	X
Year Fixed Effect	X	X	X	X	X	X	X	X

Notes: +p<.10, *p<.05, **p<.01, ***p<.001 Test scores are standardized to have a mean of 0 and a standard deviation of 1 within each grade and year. High poverty schools are those in the top quartile of students receiving free or reduced priced lunches. Poverty status and accountability grades vary within schools across years so all models also include a main effect for these measures that are not shown in the table. Each numbered panel represents a separate model.

Table 10. Characteristics of Principals by School Type

	New Principals to a School			All Principals at a School			
	% with Prior Prin Exp	Yrs Prin Experience	Master's Degree	Yrs Prin Experience	Yrs Prin at School	Master's Degree	First Yr Principal
Free Lunch Quartiles							
Quartile 1 (Low Poverty)	0.65	3.94	0.65	4.75	3.07	0.70	0.11
Quartile 4 (High Poverty)	0.30	2.21	0.56	3.43	2.48	0.62	0.20
Math Low Ach Quartiles							
Quartile 1 (Few Low Ach)	0.66	3.34	0.55	5.50	3.77	0.72	0.07
Quartile 4 (Many Low Ach)	0.38	2.40	0.61	2.99	2.37	0.65	0.21
Reading Low Ach Quartiles							
Quartile 1 (Few Low Ach)	0.61	3.63	0.61	5.47	3.63	0.73	0.09
Quartile 4 (Many Low Ach)	0.47	2.79	0.64	2.84	2.22	0.64	0.23
School Accountability Grades							
A	0.46	2.92	0.57	5.08	3.43	0.69	0.13
F	0.50	3.10	0.30	2.47	1.97	0.67	0.26