



Stepping stones: Principal career paths and school outcomes

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ABSTRACT

More than one out of every five principals leaves their school each year. In some cases, these career changes are driven by the choices of district leadership. In other cases, principals initiate the move, often demonstrating preferences to work 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. We use longitudinal data from one large urban school district to study the relationship between principal turnover and school outcomes. We find that principal turnover is, on average, detrimental to school performance. Frequent turnover of school leadership results in lower teacher retention and lower student achievement gains. Leadership changes are particularly harmful for high poverty schools, low-achieving schools, and schools with many inexperienced teachers. These schools not only suffer from high rates of principal turnover but are also unable to attract experienced successors. The negative effect of leadership changes can be mitigated when vacancies are filled by individuals with prior experience leading other schools. However, the majority of new principals in high poverty and low-performing schools lack prior leadership experience and leave when more attractive positions become available in other schools.

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1. Introduction

In 2009 the Obama administration allocated 4 billion dollars to transform some of the nation's worst schools. 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; US Department of Education, 2010).¹ Though prior research provides evidence that principals have important effects on school outcomes and, thus, suggests that leadership change can be beneficial (Hallinger and Heck, 1998; Hallinger and Heck, 1996; Leithwood et al., 2004), frequently replacing principals may create instability in schools that 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 et al., 2005; Loeb et al., 2010; Papa et al., 2002a). Many schools—particularly schools with disadvantaged student populations—face high rates of principal turnover driven, in part, by principals' desires to move to schools that they find more appealing (Loeb et al., 2010).

It is unclear *a priori* whether leadership changes are 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 depend-

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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>.

ing 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 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 most principals leave a school because they transfer to another school in the district. Few principals who leave their school are terminated by district administration. Unlike studies of turnover in other organizations which tend to find that poor performance is a precursor to managerial exits, we find that school performance bears little association with principal turnover. Principals who transfer 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. The patterns of principal movement we observe are consistent with principals' stated preferences for more advantaged and higher achieving schools.

In estimating the effects of principal turnover, we find that 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 relationship between principal turnover and student achievement is largest in schools with high concentrations of novice teachers, 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.

2. 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% each year with especially high rates of turnover in schools serving more low-income, minority and low-achieving students (Branch et al., 2008; DeAngelis and White, 2011; Fuller and Young, 2009; Gates et al., 2005; Loeb et al., 2010; Ringel et al., 2004). Principals leave their schools for a variety of reasons. The termination of an employment relationship at a school may be driven by the decision of the principal, the decision of the central office, or a mutually agreed upon separation. The effect of a principal exit on the functioning of a school is likely to depend upon the circumstances surrounding the decision that led to that exit. For example, losing a principal due to retirement is likely to have different consequences for student achievement and teacher morale than losing a principal due to a mid-year firing.

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 et al., 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 (though we are aware of no empirical evidence that supports this belief). However, there is evidence that principals' movement across schools is, at least in part, voluntary (Loeb et al., 2010).

When principals transfer, they generally move to a school with more affluent and higher achieving students relative to where they start (Loeb et al., 2010; Papa et al., 2002a). Principals usually do not receive pay increases when they change schools within a district; therefore, intra-district transfers can improve only non-pecuniary benefits. Prior research suggests that many non-salary job characteristics affect teacher and principal preferences including student characteristics, school culture, facilities, and safety (Hornig, 2009; Loeb et al., 2010; Loeb and Reininger, 2004). These working conditions vary considerably across schools. Schools with less appealing attributes 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 leading other schools and are less likely to have advanced degrees than principals in other schools (Loeb et al., 2010).

2.1. Effects of leadership turnover

Whether leadership changes are beneficial or detrimental for schools is unclear. No other study that we are aware of has examined the effects of principal turnover on school performance. Studies on the effects of leadership turnover in other types of organizations start with conflicting hypotheses and provide conflicting evidence. Some find that leadership turnover

improves organizational performance (Brown, 1982; Denis and Denis, 1995; Grusky, 1963; Virany et al., 1992). This improvement happens when a manager in a struggling organization is replaced by a more effective manager. Other studies postulate or find that leadership turnover can be harmful for organizational performance (Audas et al., 2002; Azoulay et al., 2010; Grusky, 1963). In particular, frequent turnover may create instability in an organization. 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 Davis-Blake, 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. A final relevant group of studies hypothesize that leadership change plays no role in organizational performance (Brown, 1982; Eitzen and Yetman, 1972; Gamson and Scotch, 1964; Smith et al., 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. The effects of leadership turnover in schools may differ. Given the dynamics of the principal labor market described above and the voluntary nature of most principal turnover, leadership change in schools may not provide the beneficial mechanism of replacing less effective leaders with more effective leaders as often as it does in the private sector. Moreover, 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 et al., 2009). Because of its disruptive effects, leadership turnover may be particularly likely to negatively impact school performance (Brown, 1982), particularly in faltering schools with lower resource levels, more novice teachers, and consistently less effective leadership (Branch et al., 2009; Condrón and Roscigno, 2003; Lankford et al., 2002).

2.2. *Effects of principals on school performance*

Leadership turnover may impact school outcomes because leadership itself can impact school outcomes. A range of studies provide evidence that leadership effects can work through a variety of mechanisms. These studies have assessed leaders' abilities to recruit high quality teachers, to motivate teachers, to articulate school vision and goals, to allocate resources and to develop organizational structures to support instruction and learning (Eberts and Stone, 1988; Grissom and Loeb, 2011; Hallinger and Heck, 1996; Harris et al., 2010; Horng et al., 2010; Jacob and Lefgren, 2005; Leithwood et al., 2004; Loeb et al., 2012). Strong school leadership is also likely to be an essential component of school improvement efforts (Bryk et al., 2010).

Though logic suggests that principals are important for the performance of schools, it is less clear from prior research which observable attributes of principals are associated with high performance. Many prior studies that attempt to identify the effects of principal characteristics or behaviors on school performance fail to account for factors that confound that relationship (Ballou and Podgursky, 1993; Brewer, 1993; Eberts and Stone, 1988; Hallinger and Heck, 1996; Louis et al., 2010). More effective schools may attract principals with different characteristics, even if those characteristics do not improve effectiveness. Simple correlations could mistakenly attribute cause to these correlational relationships.

One recent study has carefully examined the relationship between principal experience and school performance using district panel data and methods similar to ours (Clark et al., 2009). This study finds a positive relationship between principal experience and student test scores. No studies, however, have rigorously examined the relationship between principal turnover (in comparison to principal experience) and student or school outcomes. Though principal tenure at a school is partially a function of principal turnover (i.e., schools with high turnover rates employ principals with fewer years of school-specific experience), the two measures are conceptually distinct. The effect of turnover on school performance may be negative, in part, because it leads to a reduction in principal experience at schools that experience turnover. However, turnover could have negative effects on school performance independent of the relative inexperience of new principals to a school. Constant churning of principals in and out of schools can create instability that may undermine performance. That is, the instability created by principal turnover could have negative effects on school performance even if succeeding principals are identical in their skills and knowledge to the exiting principals they replace.

In this paper we use data from one of the largest public school districts in the United States to examine the relationship between leadership changes and 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, those receiving failing grades within the state accountability system, and those with many first-year teachers. We conclude that principal preferences for easier to staff schools contributes

to high leadership turnover in schools with more disadvantaged students and, as a result, poor and low-achieving students have less exposure to stable leadership.

3. Data

The data used in this study come from administrative files on all staff, students, and schools in the Miami-Dade County Public Schools (M-DCPS) district from the 2003–2004 through the 2008–2009 school years. The school district we study, M-DCPS, 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% of students in the district are either black or Hispanic and 60% 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 M-DCPS staff database includes demographic measures, prior experience in the district, current position, and highest degree earned for all district staff from the 2003–2004 through the 2008–2009 school years. We use this information to create three measures of principal experience and turnover in each year.² The first measure tracks whether the school has a new principal in the current year. This measure captures only whether the principal is new to the school and not whether he or she has prior experience as a principal in other schools in the district. The second measure is whether the school has a first time new principal at their school. These principals have no prior principal experience as principals in the district. The third measure captures whether a school has a new principal who has previously served as principal at another school in the district. Distinguishing between these last two measures allows us to gauge whether achievement declines when schools are under the direction of a new principal because new principals have less experience.³

We also use the staff-level data to measure teacher turnover so that we can assess its response to principal turnover. The staff database 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 have test score data and basic demographic information for all students in the district which we can link to classrooms (teachers) and to schools. The demographic variables include student race, gender, free/reduced price lunch eligibility, and whether students are limited English proficient. These variables serve 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 three through ten. 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.

4. Methods

Our analysis includes three components: (1) we descriptively examine patterns of principal turnover in the district; (2) we identify the relationship between principal turnover and (a) teacher turnover and (b) student achievement; and (3) we describe variation in the relationship between principal turnover and student achievement by school characteristics (poverty level, performance in the state accountability system, concentration of first-year teachers).

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 and theoretically appropriate set of control variables in all our models as well as school and/or student fixed effects. We also run analyses to uncover the likelihood of bias. We describe these approaches and their implications below.

² We do not know why individual principals leave. The turnover we observe is likely to be a combination of voluntary, initiated by the principal, and involuntary, initiated by the school district. Some principals leave because they retire—but we do not have a way of distinguishing this type of exit from other types of attrition. Our findings therefore reflect the total effect of principal turnover, combining the effects of voluntary quits, retirements, and district initiated transfers or dismissals.

³ We also experimented with a measure of principal experience that tracks 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. We hypothesized that these unexpected mid-year vacancies would be especially disruptive to schools and that they would have the largest negative effects on performance. However, using the temporary/interim principal measure as a predictor of teacher turnover and student achievement produced results that were similar to the estimates obtained using the more general new principal indicator. We therefore omit these results from the manuscript for the sake of parsimony.

Table 1
Descriptive statistics.

	Mean	SD
<i>Principal characteristics</i>		
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	
<i>Teacher characteristics</i>		
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)	102,646	
<i>Student characteristics</i>		
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)	2,145,115	
Total student observations (with test scores)	1,246,335	
<i>Principal turnover rates</i>		
All schools – transfer rate	16%	
High poverty schools – transfer rate	21%	
Low poverty schools – transfer rate	12%	
Low achieving schools – transfer rate	22%	
High achieving schools – transfer rate	9%	
All schools – attrition rate	5%	
High poverty schools – attrition rate	5%	
Low poverty schools – attrition rate	5%	
Low achieving schools – attrition rate	6%	
High achieving schools – attrition rate	6%	

Notes: Data from administrative files from Miami-Dade County Public Schools from 2003–2004 to 2008–2009. 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. Low poverty schools are those in the bottom quartile of students receiving free lunches while high poverty schools are in the top quartile. Low achieving schools are those in the top quartile based on the percentage of their students scoring in the lowest proficiency on the state test while high achieving schools are those in the bottom quartile of this measure.

4.1. Teacher turnover

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 model is estimated with the following equation:

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

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

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.

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 in which the school has a new principal compared to years that the school does not have a new principal. Although the model with school fixed effects brings us closest to isolating the causal effect of principal turnover on teacher turnover, this model can only be identified for teachers employed in schools that experience at least one principal transition. We therefore compare the results from models with and without school fixed effects.

The models with school fixed effects control for all stable observable and unobservable school characteristics that may bias the relationship between teacher and principal turnover. Time-varying factors that may lead to both principal and teacher turnover remain unaccounted for. While we do not have a perfect solution to this endogeneity problem, we use two approaches which reduce the potential for bias. First, in all models we include controls for the percentage of students who transferred out of a school between the current and subsequent year (before reaching the highest grade offered by the school). If something disruptive happened at the school in the year before a new principal arrived, we expect that some of this will be absorbed by the student turnover rate. Second, and more directly, we include a control for the year before a new principal arrived, thus comparing the year with the new principal to other years in the same school except the year prior to the new principal. We want to exclude the prior year in the comparison group in case some factor that led to the principal's decision to leave also affected teachers' decision to leave in that year.

While high rates of teacher turnover are generally viewed in a negative light, any negative impact of teacher turnover on the performance of the school depends, in part, on which teachers leave. Some principals, for example, may seek to improve their schools by encouraging their least effective teachers to leave. In this case, teacher turnover may increase but the school may benefit from the departure of these low performing teachers. Thus, if principal turnover leads to higher teacher turnover this does not necessarily imply negative consequences for schools. We therefore examine differential turnover among more and less effective teachers following a principal transition. To do so we compute teacher value-added to student achievement⁴ and examine whether the relationship between principal turnover and teacher turnover varies by teacher value-added. If we find that turnover is higher among more effective teachers in years that their school has a new principal, this would provide additional evidence that principal turnover is related to negative outcomes for schools.

4.2. Student achievement

In order to examine the relationship between principal turnover and student achievement, we merge the principal database with our student data base. We focus our presentation on math achievement but find similar results when using reading achievement. Given concerns about the endogeneity of principal turnover, we estimate specifications of our student achievement models that include school and/or student fixed effects. These approaches allow us to discern whether students learn less in years that their schools have a new principal compared to how much the same students (student fixed effects) in the same school (school fixed effects) learn in other years when their school does not have a new principal.

As discussed above, 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 use a similar approach to reduce bias in the student achievement analysis as we did in the teacher turnover analysis discussed above. First, we control for the student mobility rate. Second, we include an indicator variable set to one in the last year a principal works at a school, as discussed above. In addition, we control for the teacher turnover rate and the years of experience of each student's classroom teachers. If something disruptive happened at a school in the year before a new principal arrived, we expect that this will be absorbed by the teacher turnover rate. Our estimates are generally unaffected by the inclusion of these measures. While our test for the effects of principal turnover on student outcomes are not experimental, we use the rich longitudinal data in an attempt to eliminate alternative explanations for the relationships we observe, providing strong, if not definitive, evidence of the relationship between principal turnover and the outcomes of interest.

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.⁵ The following equation describes the model:

$$A_{ist} = \beta_1 A_{ist-1} + X_{it}\beta_2 + C_t\beta_3 + S_t\beta_4 + \beta_5(\text{New Principal}_{ts}) + \pi_i + \pi_s + \pi_t + \varepsilon_{ist} \quad (2)$$

⁴ Briefly, we compute teacher value-added by predicting a student achievement gain as a function of time-varying student characteristics, school characteristics, a student fixed effect, and a teacher by year fixed effect. The teacher by year fixed effect, which we shrink to account for measurement error using the Empirical Bayes method, is our measure of value-added. We present a complete description of the value-added estimation in Appendix A.

⁵ About 43% of students experience at least one principal transition over the years in which they are tested. Students who experience at least one principal transition have slightly lower test scores than students who experience 0 principal transitions and they are also more likely to be poor.

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 (New Principal $_{ts}$), and student, school, 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.

We also hypothesize that the relationship between having a new principal and student achievement may be particularly negative for students with novice teachers. There are a number of reasons to expect a differential effect. For example, new principals may not be as skilled in hiring new teachers as more experienced principals. Therefore, new teachers in schools with new principals may be particularly ineffective. New principals also may be less able to provide the type of mentoring or professional development that benefit new teachers thereby hurting their effectiveness in the classroom relative to other years. To investigate this hypothesis we add a dichotomous variable indicating whether the student has a novice teacher (first or second year) in a given year and interact this measure with the new principal indicator.

4.3. Interactions with school characteristics

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 schools. Certain schools, for example, may have 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.⁶ We also expect that leadership turnover might be more consequential for schools that employ more novice teachers, as strong school leadership may be especially important for novice teachers who may benefit most from mentoring and support from their principal. Schools with a more stable senior teaching force may be better equipped to handle the departure of a principal since teachers in such schools are more familiar with their jobs and are likely to work more autonomously with less oversight from the school leadership. To examine whether the effects of principal turnover is different for schools with many novice teachers we include an interaction between whether the school has a new principal and a measure of whether the school is in the top quartile in terms of the percentage of their teachers who are in their first year.

5. Results

We begin by describing principal turnover rates in M-DCPS 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 M-DCPS, 22% 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%, San Francisco has a turnover rate of 26%, New York City has a turnover rate of 24%, and Texas has a turnover rate of 30%. As Table 2 shows, in general, managerial turnover is fairly high in other professions as well—ranging anywhere from 10% to 35% depending on the industry (Denis and Denis, 1995; DiPrete and Krecker, 1991; Fee and Hadlock, 2004; Larsen, 1993).

The turnover rate of principals varies across schools. The bottom of Table 1 shows the principal turnover rate in M-DCPS for schools serving different student populations. The table lists the percentage of principals who transfer to another school each year and the percentage that leave their school but do not transfer. Principal turnover rates are highest in schools serving high concentrations of poor and low achieving students. In M-DCPS, 26% of principals in schools in the top quartile of students receiving subsidized lunches (high poverty) leave each year compared to 17% of principals in schools in the bottom quartile (low poverty). Nearly 30% of principals in schools with high concentrations of low achieving students leave each year compared to only 15% of principals in schools with low concentrations of low achieving students. The attrition rates across school types are fairly similar while the transfer rates vary considerably. We find similar results in Milwaukee and San Francisco from which we also have data (not shown), as do Gates et al. (2005) in their study of North Carolina and Ringel et al. (2004) in their study of Illinois.

5.1. 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 et al., 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

⁶ 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.fl DOE.org/pdf/0708/2008SchoolGradesTAP.pdf>.

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
<i>Principals</i>				
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 et al. (2002a,b)	First time principals	New York State	1992	36% (Total)
Gates et al. (2005)	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)
DeAngelis and White (2011)	Principals	Illinois State	2001–2008	20% (Total)
Branch et al. (2009)	Principals	Texas State	1995–2001	30% (Total)
Steinberg (2000)	Principals	Washington State	1999	15% (Attrit)
<i>Other leadership professions</i>				
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 et al. (1979)	Major League Baseball Coaches	–	1920–1973	36%
Denis and Denis (1995)	CEOs	–	1985–1988	22%
Larsen (1993)	Nurse Managers	–	1993	35%

Table 3

Relationship between math achievement and principal turnover.

	Model 1	Model 2
<i>Model 1</i>		
Year prior to principal exit	–0.001 (0.006)	–0.002 (0.004)
<i>Model 2</i>		
Year prior to principal exit (via attrition)	–0.005 (0.007)	–0.001 (0.006)
Year prior to principal exit (via transfer)	0.002 (0.007)	–0.002 (0.005)
School fixed effect	–	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. All models include controls for time-varying student measures, time-varying school measures, and time-varying classroom measures as well as a control for the prior year test score. They also include grade and year fixed effects. Time-varying student-level controls include limited English proficiency, free or reduced priced lunch eligibility, and retention status. Class and school-level characteristics include all student-level measures aggregated to the school/class level. The standard errors are clustered at the school-by-year level.

whether a school's principal leaves at the end of that year. We also separate principal exits via transfer and via attrition. The results are shown in Table 3. The coefficients are all essentially zero and not statistically significant. These results suggest 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' school preferences and transfer patterns. In Table 4 we compare the characteristics of principals' current schools with the characteristics of the schools they report they would most like to work in. The self-report data come from a survey of principals in Miami that we administered in 2010.⁷ We asked principals if they could work in any school in

⁷ We administered an online survey to all principals in M-DCPS in May of 2010 with a response rate of 55%.

Table 4

Comparison of school characteristics – principals' current school and other schools they would like to work in.

	Current School (A)	First choice School (B)	Difference (A–B)	P-value
Percent F/R lunch	0.73	0.68	0.05	0.052
Percent black	0.30	0.24	0.06	0.100
Percent lowest achievement level in math	0.19	0.11	0.08	0.000
Percent highest achievement level in math	0.09	0.12	–0.03	0.024
Percent lowest achievement level in reading	0.25	0.18	0.07	0.003
Percent highest achievement level in reading	0.07	0.09	–0.02	0.011
Standardized math score	–0.14	0.09	–0.23	0.000
Standardized reading score	–0.12	0.09	–0.21	0.000
Percent students suspended this year	0.08	0.05	0.03	0.056
Percent students chronically absent this year	0.10	0.06	0.04	0.048

Notes: Figures are from a 2010 survey of principals in Miami-Dade. Principals were asked if they could work at any school in the district other than the one they are currently in, what would be their first choice. The *p*-value listed in the final column value is from a *t*-test that the difference between A and B is equal to 0.

the district (other than their current school) which would be their first choice. We compare the characteristics of the student bodies in their current school with their first choice school. The results show that principals' first choice schools have fewer poor, black and low achieving students than their current school as well as fewer students who are suspended or chronically absent. Most of these differences are statistically significant at the .05, particularly the achievement differences.

Principals' stated preferences mirror their actual transfer patterns. We compare the characteristics of principals' initial schools to the characteristics of the schools to which they transfer in Table 5. 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 school. 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% fewer low achieving students than their first schools, 4% more high achieving students than their first schools, 8–9% fewer poor and minority students than their first school and 3–6% 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. These results are consistent with principals' reports of their school preferences.

Taken together, the results presented thus far 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 given that they find such schools more appealing.

5.2. Principal turnover and school outcomes

Next, we turn to an examination of the relationship between principal turnover and teacher turnover in Table 6. We present the results in three models. The first model does not include control measures, just showing the bivariate relationship between principal and teacher turnover. 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.⁸ 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.

As shown 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 18% higher in years and schools that have a new principal. The results are similar 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 10% points higher in the years in which there is a new principal.

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

⁸ The control variables used in our teacher turnover models include: race, gender, age, age², 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, year fixed effects, the annual student mobility rate, and the variable flagging the final year of a principal spell.

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 ^{***} (2.449)	−0.093 ^{***} (0.014)	0.037 ^{***} (0.006)	−0.081 ^{**} (0.025)	−0.091 ^{**} (0.031)	−0.027 [*] (0.012)
Third school served as principal	19.768 ^{***} (4.650)	−0.093 ^{***} (0.026)	0.036 ^{**} (0.012)	−0.088 [*] (0.046)	−0.093 (0.058)	−0.057 ^{**} (0.022)
Fourth or fifth school served as principal	24.930 [*] (9.880)	−0.156 ^{**} (0.056)	0.035 (0.026)	−0.005 (0.100)	−0.081 (0.126)	−0.040 (0.050)
Constant	304.685 ^{***} (0.996)	0.250 ^{***} (0.006)	0.060 ^{**} (0.003)	0.727 ^{***} (0.010)	0.400 ^{**} (0.013)	0.107 ^{***} (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: The first school at which the principal served is the omitted category.

^{*} $p < .10$.^{*} $p < .05$.^{**} $p < .01$.^{***} $p < .001$.**Table 6**Logistic regression of teacher turnover by principal experience (odds ratios/ t -statistics).

	1	2	3
<i>1. New principal at school</i>			
New principal	1.177 ^{***} (4.628)	1.125 ^{***} (4.109)	1.100 ^{**} (3.037)
<i>2. New principals with and without prior experience</i>			
First time new principal this year	1.150 ^{**} (3.170)	1.090 [*] (2.559)	1.086 [*] (2.002)
New principal to school, but with prior experience at another school in district	1.216 ^{***} (3.756)	1.176 ^{***} (3.684)	1.120 [*] (1.818)
<i>3. New principal with value-added interactions</i>			
New principal	1.236 ^{**} (3.182)	1.127 [*] (1.866)	1.186 (0.819)
Teacher value-added in math	0.837 ^{***} (−5.666)	0.846 ^{***} (−5.339)	0.828 ^{**} (−3.053)
New principal*teacher value-added in math	1.110 [*] (1.759)	1.106 [*] (1.740)	1.134 [*] (2.190)
Teacher-level controls	–	X	X
School-level controls	–	X	X
School fixed effect	–	–	X
Year fixed effect	–	X	X
Clustered SE (school by year)	X	X	X

Notes: 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. The teacher-level controls include teacher race, gender, highest degree earned, age, and years of experienced (entered as dummy variables). The school-level controls include the percentage of students receiving free lunches, the percent minority, the log of enrollment, the average student math score, the student mobility rate, and a dichotomous variable indicating whether the observation reflects the final year of a principal's tenure at a school. Panels 1–2 include 99,842 teacher by year observations while panel 3 includes 13,000 teacher by year observations.

^{*} $p < .10$.^{*} $p < .05$.^{**} $p < .01$.^{***} $p < .001$.

seek other positions. In the second panel of Table 6 we distinguish between cases when the new principal is a first time new principal and cases when the new principal has prior experience as a principal in another school. The relationships for new principals with and without prior experience differ slightly in magnitude but are not statistically different. 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. Taken together these results suggest that leadership instability tends to generate instability among the teaching force that goes beyond the turnover associated with having a less experienced principal.

Table 7
Regression of standardized math achievement test scores on principal experience.

	1	2	3
<i>1. New principal at school</i>			
New principal this year	–0.007*** (0.002)	–0.008*** (0.002)	–0.007*** (0.002)
<i>2. New principals with and without prior experience</i>			
First time new principal this year	–0.015*** (0.002)	–0.016*** (0.003)	–0.011*** (0.002)
New principal to school, but with prior experience at another school in district	–0.001 (0.002)	–0.000 (0.003)	–0.002 (0.002)
<i>3. New principal with novice teacher interactions</i>			
New principal this year	–0.003* (0.002)	–0.005* (0.002)	–0.005* (0.002)
Student has new teacher (0–1 Yrs experience)	–0.027*** (0.002)	–0.029*** (0.002)	–0.022*** (0.002)
New principal*new teacher	–0.021*** (0.004)	–0.015*** (0.004)	–0.007* (0.004)
School fixed effect	–	X	X
Student fixed effect	–	–	X

Notes: ** $p < .01$. 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. All models include controls for time-varying student measures, time-varying school measures, and time-varying classroom measures as well as a control for the prior year test score. They also include grade and year fixed effects. Time-varying student-level controls include limited English proficiency, free or reduced priced lunch eligibility, and retention status. Class and school-level characteristics include all student-level measures aggregated to the school/class level. The models also control for the student mobility rate at the school, the experience of the student's classroom teacher, the school-level teacher turnover rate the prior year, and a dummy variable flagging the final year of a principal spell.

* $p < .10$.
* $p < .05$.
*** $p < .001$.

The results thus far suggest that teacher turnover increases when a new principal takes over at a school. Whether teacher turnover is detrimental to schools, however, may depend in part on what types of teachers leave. We next examine whether there is a differential effect of principal turnover on teacher turnover among high and low value-added teachers. We predict teacher turnover as a function of whether the school has a new principal this year, teachers' value-added to math achievement and an interaction between the two. Teacher value-added is standardized to have a mean of 0 and a standard deviation of 1 in each year. Note that the sample of teachers for which we are able to compute value-added is relatively small compared to the population of teachers. Teachers are missing value-added estimates for a variety of reasons, such as not teaching students tested in math, not teaching students in tested grades, or teaching small classes. While the models estimated in panels 1–2 of Table 6 include about 100,000 teacher-by-year observations, the models in panel 3 include about 13,000 observations.

Turning to the results in panel 3, we find a positive relationship between principal turnover and teacher turnover among teachers at the mean of value-added (shown by the main effect on new principal). The estimate is not significant in the model with school fixed effects but this is due to an increase in the standard error rather than due to a decrease in the magnitude of the estimate. The main effect on value-added shows that higher value-added teachers are less likely to leave their school than lower value-added teachers in schools without first year principals. This result is consistent with other research that finds that more effective teachers tend to have lower turnover rates (Boyd et al., 2008; Goldhaber et al., 2007; Hanushek et al., 2005). The result is true across the population of teachers and within schools. The interaction between the new principal measure and teacher value-added is positive and marginally significant across models. At the mean of value-added the odds that a teacher leaves their school at the end of the year are about 19% higher in schools with a new principal (Model 3). For a teacher one standard deviation above the mean of value-added the odds are about 32% higher. This suggests that the turnover of higher value-added teachers increases more when schools have a new principal than the turnover of lower value-added teachers. When we disaggregate the new principal measure into new principals with and without prior experience in other schools we find similar results for both types of new principals (not shown).

In Table 7 we examine the relationship between principal turnover and student math achievement.⁹ Model 1 includes a measure of lagged achievement, student, school, and classroom control variables as well as grade and year fixed effects.¹⁰ Model 2 adds a school fixed effect and Model 3 adds a student fixed effect. We focus our discussion on Models 2 and 3 since they bring us closest to identifying a causal effect of principal turnover on achievement. These models use variation in the presence of new

⁹ The results for reading achievement are similar and available from the authors upon request.

¹⁰ 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, the student mobility rate, the experience of students' classroom teachers, and a dichotomous variable flagging the final year of a principal's tenure at a school.

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 models. We find that students make lower achievement gains in math when their school has a new principal (first panel). The second panel shows that the negative effect of new principals on student achievement is especially large when schools have a first time new principal without prior experience at other schools. We do not find a negative effect on math achievement when a school has a new principal who previously served as a principal at another school in the district. These results suggest 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.

In the third panel of [Table 7](#) we examine whether the negative effect of new principals is particularly large when students have novice classroom teachers. In Model 3 we find a significant negative effect of having a new principal on achievement among students without a novice teacher (shown by the main effect on new principal). However, that relationship is more than twice as large for students with a novice teacher. This suggests that one of the mechanisms through which new principals negatively influence achievement is by either hiring less effective new teachers or by not providing their new teachers with the support (e.g. professional development) they need to be effective early in their careers.

In sum, we find that principal turnover is positively associated with teacher turnover, particularly the turnover of more effective teachers, 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.

5.3. Interactions with school characteristics

In our final set of analyses we examine whether the association between leadership changes and student achievement is different in low performing schools, high poverty schools, and in schools with high concentrations of novice teachers. In [Table 8](#) 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 Models 1 and 2 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. In Models 3 and 4 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 whether the school has a new principal. In Models 5 and 6 we include a variable indicating that the school was in the top quartile in terms of their proportion of first-year teachers and interact this variable with the new principal indicator. We are interested in the interaction terms in these models since they show whether principal turnover is more consequential for students attending failing schools, high poverty schools, or schools with many first-year teachers.

The negative relationship between principal turnover and math and achievement is stronger in failing schools, high poverty schools, and schools with more novice teachers. Here we focus our discussion of the models with student fixed effects (Models 2, 4, and 6); most of these results are similar, though in two cases somewhat smaller, in models that exclude them (Models 1, 3, and 5). While there is little or no evident relationship between having a new principal and achievement in non-poor schools, higher performing schools, or schools with fewer novice teachers (shown by the main effects), students in failing schools have reading and math achievement that is about .04–.06 standard deviations lower in years when they have a new principal, students in high poverty schools have reading and math achievement that is .02–.03 standard deviations lower in years when they have a new principal, and students in schools with high concentrations of novice teachers have math achievement that is about .02 standard deviations lower in years when they have a new principal. 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 9](#), 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% of new principals in low poverty schools have previously served as principal at another school in the district compared to only 30% of new principals in high poverty schools. Similarly, new principals in high poverty schools have about half as many prior years 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 masters degree (65% in low poverty schools compared to 56% 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.

6. Discussion

Many school districts throughout the country—including the district studied in this paper—face high rates of principal turnover ([Branch et al., 2008](#); [Gates et al., 2003](#); [Papa et al., 2002b](#)). While turnover averages approximately 20% in the dis-

Table 8
Principal turnover and math achievement with interactions by school characteristics.

	School characteristic = failing school		School characteristic = high poverty school		School characteristic = top quartile of first year teachers	
	(1)	(2)	(3)	(4)	(5)	(6)
New principal at a school	−0.006** (0.002)	−0.004* (0.002)	−0.002 (0.002)	−0.001 (0.002)	−0.004* (0.002)	−0.004* (0.002)
New principal*school characteristic	−0.016 (0.016)	−0.041** (0.015)	−0.014* (0.005)	−0.027*** (0.005)	−0.005* (0.002)	−0.010*** (0.002)
School fixed effect	X	X	X	X	X	X
Student fixed effect	–	X	–	X	–	X

Notes: Test scores are standardized to have a mean of 0 and a standard deviation of 1 within each grade and year. Failing schools are those that received an accountability grade of F in the prior year. High poverty schools are those in the top quartile of students receiving free or reduced priced lunches. Poverty status, accountability grades, and the first year teacher measure vary within schools across years so all models also include a main effect for these measures that are not shown in the table. All models include controls for time-varying student measures, time-varying school measures, and time varying-classroom measures as well as a control for the prior year test score. They also include grade and year fixed effects, teacher experience, the annual teacher turnover rate, and the student mobility rate. Time-varying student-level controls include limited English proficiency, free lunch eligibility, and retention status. Class and school-level characteristics include all student-level measures aggregated to the school/class level.

* $p < .10$.
 * $p < .05$.
 ** $p < .01$.
 *** $p < .001$.

trict we study as a whole, it is 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. When asked via a survey, principals indicate that they would prefer to work at a school that is higher achieving than the school in which they are currently employed. Those who switch schools tend to move to schools with fewer students in poverty and fewer low achieving students compared to where they start. This is consistent with previous work studying principals' preferences for schools (Loeb et al., 2010).

Schools are not the only type of organization that experiences voluntary turnover—for example, managers may also move among similar firms in the for-profit sector. However, schools are 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 in most districts, there are few opportunities to increase one's earnings outside of acquiring more experience or further credentials. The career trajectories of school personnel therefore may be more affected by non-pecuniary benefits such as positive working conditions than are other workers (Hanushek et al., 2004; Lankford et al., 2002; Loeb et al., 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 we find no evidence of a relationship between school performance and the likelihood that a principal leaves a 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 also leave. A proven track record in improving the performance of a school is likely to make a principal a viable candidate for vacancies in other, more appealing 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 et al., 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 negative, on average. There are a variety of possible explanations for these negative effects and we do not distinguish them in this paper. For example, others have hypothesized that turnover may undermine reform efforts and reduce employee buy-in, 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 could be cause for concern, particularly in high poverty and failing schools where turnover rates are quite high and the negative effects of turnover are large. Our results suggest that practices that bring in experienced (and effective) 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 schools have more advantaged and higher achieving students and likely have an easier time attracting strong 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

Table 9
Characteristics of principals by school type.

	New principals to a school			All principals at a school			
	Percent with prior experience as principal	Years of previous experience as principal	Master's degree	Years of previous experience as principal	Years as principal at current school	Master's degree	First Year principal
<i>Free lunch quartiles</i>							
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
<i>Proportion of low achieving students in math quartiles</i>							
Quartile 1 (Few low achieving students)	0.66	3.34	0.55	5.50	3.77	0.72	0.07
Quartile 4 (Many low achieving students)	0.38	2.40	0.61	2.99	2.37	0.65	0.21
<i>Proportion of low achieving students in reading quartiles</i>							
Quartile 1 (Few low achieving students)	0.61	3.63	0.61	5.47	3.63	0.73	0.09
Quartile 4 (Many low achieving students)	0.47	2.79	0.64	2.84	2.22	0.64	0.23
<i>School accountability grades</i>							
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

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.

This study is not without limitations. First, it is based on data from a single school district with fairly high rates of turnover and the results do not necessarily generalize to all schools. At the same time, however, Miami is the fourth largest school district in the US with nearly 400 schools and 350,000 students. The racial and economic composition of the district as well as the principal turnover rate is not unlike other large urban districts in the country. Second, though we have some indirect evidence that suggests that most principal exits are voluntary, we cannot distinguish voluntary exits initiated by principals from involuntary exits initiated by the central office. The effect of principal turnover on school outcomes may depend on circumstances surrounding principal exits. However, our results only capture the total effect of turnover and combine the impacts of voluntary quits and district initiated dismissals. Future research exploring whether voluntary and involuntary principal departures exert varied effects on schools is warranted.

Appendix A. Teacher value-added estimation

The goal of value-added models is to statistically isolate the contribution of schools or teachers to student outcomes from all other factors that may influence outcomes (Meyer, 1997; Rubin et al., 2004). Isolating causal effects is important given that differences in student and family characteristics account for more of the variation in student outcomes than school-related factors (Coleman, 1990; Downey et al., 2004) and that students are not randomly assigned to teachers or schools (Lankford et al., 2002; Rothstein, 2009).

A student's achievement level in any given year is a cumulative function of current and prior school, family, and neighborhood experiences. While researchers seldom have access to complete information on all factors that would predict a student's current achievement level (Rivkin et al., 2005), much of the confounding influence of unobserved student academic and family characteristics can be eliminated by focusing on *gains* in student achievement over specific time periods, usually of one school year. The inclusion of prior achievement as a way of controlling for prior student or family experiences reduces the potential for unobserved factors to introduce bias in the estimation of teacher effectiveness. Yet, there still may be unobservable differences between students that influence the amount they learn each year in addition to their score at the beginning of the year. Factors such as innate ability, motivation, familial support for education, or parental education could all have an impact on student learning gains. We can control for some of these differences by including student-level covariates in the model; however, the information available in administrative datasets such as ours is limited. One way of controlling for all observed and unobserved student characteristics that may be associated with achievement gains is to include a student fixed effect in the value-added estimation. Such a specification is appealing because it allows for the examination of differences in learning within the same student in years they are in a class with a different teacher.

Eq. (1) describes our teacher value-added model which predicts the achievement gain between year t and $t - 1$ for student i with teacher j in grade g as a function of time-varying student characteristics (X_{ijgst}), time-varying school characteristics (S_{st}), grade, year, and student fixed effects (π_g, π_t, π_i) and a teacher by year fixed effect (δ_{jt}). Characteristics of students' classrooms are omitted from the model since they are collinear with the teacher by year fixed effect.

$$A_{ijgst} - A_{ijgs(t-1)} = \beta X_{ijgst} + \gamma S_{st} + \pi_g + \pi_t + \pi_i + \delta_{jt} + \varepsilon_{ijgst} \quad (1)$$

The parameter δ reflects the contribution of a given teacher to growth in student achievement after controlling for all observed time-varying student characteristics, observed and unobserved time invariant student characteristics, and characteristics of students' schools that may be associated with learning. Note that these models account for all unobserved time-invariant attributes of students that may be associated with learning (via the student fixed effect), but not for differences across teachers in unobservable time-varying student characteristics that are associated with learning.

The test scores used to generate the value-added estimates are the scaled scores from the FCAT, standardized to have a mean of zero and a standard deviation of one for each grade in each year. Subscripts for subjects are omitted for simplicity but we estimate Eq. (1) separately for student achievement gains in math and reading. Since we use a lagged test score to construct our dependent variables, the youngest tested grade (grade 3) and the first year of data we have (2003) are omitted from the analyses though their information is used to compute a learning gain in grade 4 and in 2004. The time-varying student characteristics used in our analyses are whether the student qualifies for free or reduced priced lunch, whether they are currently classified as limited English proficient, whether they are repeating the grade in which they are currently enrolled, and the number of days they missed school in a given year due to absence or suspension. Student race and gender are absorbed by the student fixed effect. The school-level controls used in the models include average prior achievement, and proportion black, Hispanic and receiving free or reduced priced lunches. After estimating Eq. (1) we save the teacher by year fixed effects and their corresponding standard errors.¹¹ The estimated coefficients for these fixed effects include measurement error as well as real differences in achievement gains associated with teachers or schools. We therefore shrink the estimates using the empirical Bayes method to bring imprecise estimates closer to the mean. After shrinking the estimates, we standardize them to have a mean of 0 and a standard deviation of 1 in each year.

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¹¹ To estimate Eq. (1), we use the program *felsdvregdm* developed in Stata by Mihaly et al. (2010). This program generates fixed effects estimates and standard errors for each teacher relative to the mean effect for a user-specified reference group (in our case, teachers in a given grade) rather than relative to an arbitrarily omitted reference teacher.

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