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**Work Environments and Labor Markets: Explaining Principal Turnover Gap between
Charter Schools and Traditional Public Schools**

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Abstract

Purpose: Knowledge about principals' leadership roles in charter schools' success has become more important as the number of charter schools increases and as we have learned more about the influence of principal leadership on school effectiveness. To contribute to the limited empirical literature on the principal labor market, this study explores the reasons for the disparity of turnover rates between charter school principals and their counterparts in traditional public schools (TPSs). It focuses on the differential distributions of observable factors, including principal characteristics, principal leadership practices, school contexts, and working conditions. It also examines how the associations between these observables and the likelihood of principal turnover differ between these two types of schools.

Research Methods/Approach: This study uses data on a nationally representative sample of principals from the Schools and Staffing Survey (SASS) in the 2007-08 school year and its following-year Principal Follow-up Survey (PFS). The main analytic strategies include logit models and the Fairlie non-linear decomposition technique.

Findings: A statistically significant difference in charter-TPS principal turnover rates was confirmed. The explanatory variables collectively explained about 49% of the charter-TPS turnover gap: principal characteristics explained 3%, principal leadership quality explained 4%, school contexts explained 2%, and working conditions explained 28%. Moreover, relative to TPS peers, three factors have stronger associations with the likelihood of charter school principal turnover: the improvement of principal leadership quality, fewer barriers to the dismissal of poor-performing or incompetent teachers, and higher salary.

Implications for Research and Practice: This is one of first few studies that empirically explore the charter school principal workforce and labor market movements. Findings are practically informative for retaining principals in charter schools.

Empirical Study

Keywords: Principal turnover, Charter school, Logit regression, Fairlie Non-linear decomposition

Introduction

Although the charter school movement has gained momentum nationwide, research findings on the effectiveness of charter schools have been mixed (e.g., Author, 2012a; Bifulco & Ladd, 2006; Booker, Gilpatric, Gronberg, & Jansen, 2007; Hanushek, Kain, Rivkin, & Branch, 2007; Sass, 2006; Zimmer, Gill, Booker, Lavertu, & Witte, 2012). Researchers have called for probing into organizational practices that affect charter schools' effectiveness in promoting student learning (Berends, Watral, Teasley, & Nicotera, 2007; Betts & Loveless, 2005). Among these organizational factors and practices, principal leadership has been regarded as instrumental in promoting students' graduation and achievement in both charter schools and traditional public schools (Coelli & Green, 2012; Hoy & Miskel, 2007).

Of all school factors, the effect of principals on students' learning has been second only to the teacher quality, explaining about one quarter of all school effects (Leithwood, Louis, Anderson, & Wahlstrom, 2004). One standard deviation increase in the estimated principal effects would lead to a 2.6 percentage point increase in graduation rate and 2.5 percentage point increase in English exam scores (Coelli & Green, 2012). Principals influence students' learning through multiple avenues. They influence recruiting, developing, and retaining high-quality teachers (Ladd, 2011; Leithwood, Harris, & Hopkins, 2008; Plecki, Alejano, Knapp, & Lochmiller, 2006). They also take essential roles in creating a positive learning culture and successfully implementing school reforms (Author, 2013; Hoy & Miskel, 2007; Leithwood et al., 2004).

Given principals' significant contribution to school effectiveness, a growing number of studies have shown that principal turnover matters for schools' organizational capacity and student learning. Certain scope and type of principal turnover may be desirable if it results in a

better match between the leader and the organization, or the infusion of new ideas into the organization, or dismissal of ineffective leaders (Béteille, Kalogrides & Loeb, 2012). However, excessive principal turnover often leads to disruptive teaching and learning environments, which are detrimental to school performance, as illustrated by the increased likelihood of high teacher turnover rates and low student achievement gains (Béteille, Kalogrides & Loeb, 2012). This negative impact of principal turnover is especially salient for low-performing schools. Although the causal relationship between the rate of principal turnover and student achievement in charter schools has not been well established, it is believed that principals need extended periods of time to realize their full effect in schools (Coelli & Green, 2012), because leaders need at least five years to institute a change initiative in schools, and many major changes can take even longer to be fully implemented (Fullan, 1991, 2001; McAdams, 1997).

Studies have indicated that charter schools and traditional public schools (TPSs) have different principal turnover patterns. Our prior analyses of Utah administrative data showed that an average of 26% of principals left charter schools annually, which varied from roughly 14% to 44% across the years of 2004-2010. This average annual turnover rate is significantly higher than the average of TPSs (Author, 2014) and is equivalent to the TPS schools that serve the highest percentages of poor, minority, or low-performing students, as this type of schools often experiences more severe principal turnover than other TPSs (Béteille, Kalogrides & Loeb, 2012)¹. This higher turnover rate of charter school principals was also confirmed by the report on the performance of New York City charter schools (New York City Charter School Center, 2012). Principal turnover issues have also attracted public media attention (e.g., Education Week, Warner Perspectives) and made policymakers and charter school managers concerned about the capacity-building of charter schools.

However, the reasons for the disparity in principal turnover between these two school types have not been well explored. Given the importance of principal leadership to student learning, the lack of explanations for the significantly higher turnover rate in charter schools stands as a gap in the literature that should be addressed to advance our understanding of who left from charter schools and the potential impact of this turnover. Comparing charter schools and TPSs on this issue will highlight the disparities in principal labor markets between these two types of schools.

The purpose of this study then is to examine comprehensively how the charter–TPS principal turnover gap is associated with observable principal and school factors that the literature has identified as linked, either empirically or theoretically, to principal turnover. In studying this question, we use the nationally representative sample from the Schools and Staffing Survey (SASS) in school year 2007-08 and its following-year Principal Follow-up Survey (PFS). Foreshadowing our analysis, the data show a statistically significant 8.1% difference in charter–TPS principal turnover rates, with 28.7% of charter school principals and 20.6% of TPS principals leaving their schools (also see Battle & Gruber, 2010). We use a non-linear decomposition technique proposed by Fairlie (2005) to identify and quantify the contributions of charter–TPS differences in a battery of measurable characteristics to the turnover gap. These explanatory variables collectively explained about 49% of the charter–TPS turnover gap. We also identify three policy-malleable factors that have larger correlations with principals leaving charter schools: principal leadership quality, barriers to the dismissal of poor-performing or incompetent teachers, and principal salary. Finally, we discuss the implications of our findings on understanding the principal labor market in charter schools, given the caveats of data availability and analysis.

Explanatory Factors of Charter-TPS Principal Turnover Gap

In this study, “principal turnover” is defined as a principal leaving a school, either voluntarily or involuntarily. Upon leaving, a principal can move to another school but remain as the principal, leave principalship, or retire. Due to the limitations of our data, which we will discuss when explaining our measures, principals’ transition patterns were not examined in this study; rather, we were primarily interested in identifying and explaining the gap in turnover rates.

Scholars argue that, compared to TPSs, charter schools are even more vulnerable to high rates of principal turnover because most charter schools are mission-driven, which makes it harder to recruit candidates with the right “fit.” In addition, unlike TPSs, charter schools are “often independent and unable to tap into a pool of ready candidates when it comes to hiring” (Campbell, 2010, p. 5). Understanding which factors influence principal turnover is critical to improving leadership sustainability and leadership succession in charter schools. In this study, we investigate four categories of explanatory variables: principal characteristics, principal leadership practices, school contexts, and working conditions. We review literatures on the differences between charter schools and TPSs in the distributions of these factors, and hypothesize (a) how these differences might explain the principal turnover gap, and (b) how these factors may have differential influences on principal turnover due to charter schools’ operational mechanisms.

Principal Characteristics

Prior studies have shown that principals in charter schools differ from their TPS peers in many characteristics that may predict the likelihood of turnover. Principal age and experience are two examples. Texas principals who were 45 years old or younger were more likely to stay in their building positions than principals who were older than 45 (Fuller, Young, & Orr, 2007). In

North Carolina, Gates, Punswick and Belt (2006) found that the probability that principals would change schools or positions decreased as experience increased. Moreover, this probability decreased more rapidly as a principal's experience deviated from the average in the sample; that is, very young and very old principals were least likely to change schools or positions.

Gender and race also influence the likelihood of principal turnover. While some studies found that female principals left their positions at a higher rate than men (Fuller, Young, & Orr, 2007; Gates et al., 2006), others reported a higher turnover rate for male principals (Baker et al., 2010). Black and Hispanic principals were more likely to leave their positions than White principals (Baker et al., 2010; Gates et al., 2006). Principal stability was higher in schools where the principals were of the same race as the majority of the student population (Gates et al., 2006). Since charter school and TPS principals tend to have similar demographic characteristics (Author, 2012b; Campbell & Gross, 2008), we anticipate that demographic characteristics (e.g., age, gender, race) will not be the main sources of the charter-TPS turnover gap.

The likelihood of turnover is also related to principals' professional characteristics. Principals with more teaching and school leadership experience were more likely to remain in their positions (Baker et al., 2010; Papa, 2007). Concerning the association between principals' educational levels and the probability of their turnover, research findings have been mixed. For example, Gates et al. (2006) found no effect of education on the probability of leaving the system, but principals in Illinois who had a Master's degree were less likely to change positions within the state system than principals without such advanced degree. Since charter school principals tend to have less experience in teaching and in leading a school than their TPS peers and a smaller percentage of charter school principals have a Master's degree or higher, we

hypothesize that the differences in these professional characteristics can contribute to the principal turnover gap (Author, 2012b; Campbell & Gross, 2008).

Principal Leadership Practices

Leadership effectiveness varies widely among principals. Given a general lack of rigorous measures on principal leadership quality, Branch et al. (2013) used value-added measures and confirmed that in Texas the least-effective principals were least likely to remain in their current position and most likely to leave the public schools entirely. However, most low-performing principals moved to principal positions at other schools, rather than exiting the profession (Branch, Hanushek, & Rivkin, 2013). Bêteille et al. (2012) used data from a large urban school district and found that poor school performance borne little association with principal turnover. In contrast, research studies on leadership turnover in other professions found that leaders were often forced to resign following a significant decline in performance (Denis & Denis, 1995). To our knowledge, studies comparing the quality of principal leadership between charter and TPS schools have been very rare.

In addition, charter school principals experience substantially more autonomy than their TPS peers over internal school activities, including setting performance standards, establishing the curriculum, evaluating and hiring teachers, setting discipline and policies, and deciding how to spend the budget (Gawlik, 2008). Advocates for charter schools argue that granting principals greater decision-making power in their daily activities allows them to organize school resources efficiently to boost students' learning. Such flexibility is expected to result in high job satisfaction of charter school principals, making them more likely to stay in their current positions or schools (Gawlik, 2008).

School Contexts

Earlier studies present mixed results on the influences of several school contextual factors on principal turnover. Although prior studies show consistent findings that schools that serve high percentages of at-risk and low-performing students tend to employ larger numbers of uncertified teachers and suffer from high principal turnover (Baker et al., 2010; Gates et al. 2006; Loeb, Kalogrides, & Horng, 2010; Mitgang, 2003; Papa, Lankford, & Wyckoff, 2002; Papa, 2007; Partlow, 2007), the estimated influences of school location, school size and educational level vary across studies. The variation is mostly due to the differences in comparison groups and local principal labor markets. For example, in terms of school location, Papa et al. (2002) found that urban school principals were more likely to change positions within their current districts and less likely to move to new districts than their suburban peers in New York City schools. In North Carolina, principals in urban schools had a larger probability of leaving the system or changing schools but a smaller probability of changing to a non-principal position than peers in rural areas, while principals in suburban schools were less likely to switch to non-principal positions than rural peers (Gates et al., 2006).

With regard to school size, larger schools showed a greater degree of principal stability in Missouri, Illinois, and North Carolina (Baker et al., 2010; DeAngelis & White, 2011; Gates et al., 2003), while in Colorado, large schools tended to have a greater turnover of school leaders than middle-sized and small schools (Akiba & Reichardt, 2004). In terms of educational level, Missouri middle school principals were less likely to stay than high school principals because middle school principalship is often regarded as a stepping stone to a secondary principalship (Baker et al., 2010). On the other hand, high school principals were significantly more likely to move to principal positions in other districts and to change to non-principal positions (DeAngelis & White, 2011).

Charter schools differ systematically from TPSs in many contextual factors. Charter schools tend to be located in areas with a higher population density to enhance their prospects of attracting enough students. Charter schools are usually smaller than TPSs and tend to hire teachers without state certification (Cannata, 2007). Many charter schools only provide K–8 education since it generally costs less than high school education (Arsen, Plank, & Sykes, 1999). To some extent, charter schools implicitly select or shape their student bodies in terms of socioeconomic, ethnic/racial, or cultural backgrounds (Carnoy, Jacobsen, Mishel, & Rothstein, 2005; Scott & Villavicencio, 2009). We hypothesize that these contextual differences can contribute to the difference in principal turnover between charter schools and TPSs.

Working Conditions

Compared to the volume of studies examining personal and school factors predicting principal turnover, studies on how organizational conditions affect principal turnover have been few. The existing evidence shows that principals with a relatively higher salary, compared to peers in the same labor market with similar education and working experience, are more likely to stay in their current schools (Baker et al., 2010; Papa et al., 2002). Loeb et al. (2010) reported that other non-pecuniary working conditions, including school safety, collegial school culture, availability of resources, and parental involvement are associated with low principal turnover rates. These authors also showed that high rates of principal turnover in schools serving poor, minority, and low-achieving students may not necessarily be driven by these student characteristics but rather by the schools' undesirable working conditions.

Being a charter school principal carries additional responsibilities that TPS principals may not face. Charter school principals often have to secure and manage facilities, recruit students and teachers, raise and manage funds, and coordinate curriculum and instruction, while

the district central office often shares these responsibilities with TPS principals (Campbell & Gross, 2008). As a result, charter school principals generally experience significantly heavier workloads (Campbell, 2010; Campbell & Gross, 2008), which may increase the likelihood of turnover. Moreover, traditional leadership programs and professional development for principals often do not address the specific needs of leading charter schools, which often leaves these principals underprepared for the job. This lack of professional development, guidance and support decreases the retention rate (MacBeath, Gronn, Opfer, Lowden, Forde et al., 2009). Furthermore, principals under collective bargaining contracts stayed in their schools longer on average than those without such contracts (Hawthorne-Clay, 2010). We anticipate that charter school principals would be less likely to have union membership than their TPS peers, which could also contribute to their principals' higher turnover rate. The totality of this evidence led us to anticipate that school working conditions would explain part of the different principal turnover rates between charter schools and TPSs.

Differential Influences of These Factors between These Two Types of Schools

Charter schools are established to incorporate autonomy in school governance and the market mechanisms of choice and competition in their operation (Chubb & Moe, 1990; Finn, Manno, & Vanourek, 2000; Kolderie, 2004). These different operational mechanisms could either augment or reduce the influences of these explanatory factors on principals' likelihood of turnover. For example, charter school personnel management may be more similar to practices in private sector than TPSs in that charter school principals are the executives of the organizations whose job security is more closely related to their performance (Jenter & Kanann, 2006). Therefore, we speculate that lower-performing charter school principals have a higher chance to be fired or forced to quit than their TPS peers.

Moreover, charter schools are structured to establish flexible salary schedules to attract and retain talents. This flexibility may create a larger variation in principals' pecuniary compensation across schools and thus create choices for principals. We expect that charter school principals' career movements are more responsive to the variations in salary than TPS peers. In addition, the principalship in charter schools has greater autonomy of hiring and retaining effective teachers, and firing poor-performing or incompetent ones (Campbell, 2010; Gawlik, 2008; Preston, Goldring, Berends, & Cannata, 2012; Stuit & Smith, 2007). This greater control over school management also comes with greater demands on high performance and more responsibilities, as aforementioned. When job demands exceed the control and support necessary to meet those demands, it is predicted that stress and dissatisfaction would grow among charter school principals and they become more likely to lower their commitment and leave the position (Fox, Dwyer, & Ganster, 1993; Grissom, Nicholson-Crotty, & Harrington, 2014). This leads us to speculate that autonomy in school management would matter more for charter school principals. We empirically test these conjectures.

Methods

Sample

This study draws on nationally representative data from the Schools and Staffing Survey (SASS) in 2007-08 and the Principal Follow-up Survey (PFS) in 2008-09, both of which were sponsored by the National Center for Education Statistics (NCES) of the U.S. Department of Education and were conducted by the U.S. Census Bureau. The PFS includes all schools whose principals completed SASS survey in 2007-08. We also merged the SASS and PFS with Common Core of Data (CCD) to obtain more school-level characteristics.

The SASS public school sampling frame consisted of 90,410 traditional public schools and 3,850 charter schools, whose principals were automatically included in the principal survey sample. The overall base-weighted response rate for the SASS principal survey was 79.4%. Of these who responded to the SASS principal survey, about 99.4% responded to the PFS, which yielded 78.9% of the overall base-weighted PFS response rate. The final weights of the SASS data were adjusted for potential nonresponse bias.²

Moreover, the 2007-08 SASS sampling frame used the 2005-06 CCD public school universe data files. If a state did not have charter schools in the 2005-06 school year, there would be no charter school principals sampled in 2007-08 SASS from that state. The final analytic sample includes 220 charter school principals who represent 2,720 charter school principals nationwide and 4,750 TPS principals who represent a national population of 64,670³ TPS principals.

Measures

We measured *principal turnover*, our outcome variable, as whether principals in the 2007-08 SASS left the school (coded as “1”), or remained as principals in the same schools (coded as “0”) in 2008-09⁴. The indicator of *charter school* was coded as “1” if the principal worked in a charter school during 2007-08 school year, and otherwise “0.”

As discussed above, we include four sets of explanatory factors, with multiple measures in each category: principal characteristics; principal leadership practices; school contexts; and working conditions. As summarized in Table 1, principal characteristics include principals’ personal (i.e., gender, race, age) and professional characteristics (i.e., pre-service training, educational level, years of teaching and principalship, management experience outside of

education). School contextual variables include measures of school size, urbanicity, educational level, and student demographics.

Principal leadership practices include teacher ratings of principal leadership quality and principals' self-ratings of influence over personnel decisions. *Principal leadership quality* is a composite measure of teachers' reported leadership practices from the 2007-08 SASS Teacher Survey, averaged over five items and aggregated to the school level: a) the school administration's behavior toward the staff is supportive and encouraging; b) my principal enforces school rules for student conduct and backs me up when I need it; c) the principal knows what kind of school he or she wants and has communicated it to the staff; d) in this school, staff members are recognized for a job well done; and e) I like the way things are run at this school, on 4-point scale from 1 (*strongly disagree*) to 4 (*strongly agree*). Factor analysis results indicate one factor with eigenvalue >1 and Cronbach's $\alpha = 0.87$. Factor analysis and Cronbach's α were conducted with sampling weights.

The measure of *influence on hiring and evaluating teachers* is another composite measure of the principal influence on evaluating teachers and hiring new full-time teachers, averaged over two items: a) principal influence on evaluating teachers of this school; and (b) principal influence on hiring new full-time teachers of this school, on 4-point scale from 1 (no influence) to 4 (major influence).

The third measure of *barriers to dismissal of poor-performing or incompetent teachers* (Cronbach's $\alpha = 0.77$) is developed by summing across six barriers, including a) personnel policies; b) length of time required for termination process; c) effort required for documentation; d) tight deadlines for completing documentation; e) tenure; and f) teacher associations or unions, on a 2-point scale from 1(yes) to 0 (no).

Working conditions include measures of principals' salary, workload, union membership, professional development, pupil-teacher ratio as a proxy for school resources, percentages of uncertified and new teachers, and if made Adequately Yearly Progress (AYP) as a proxy for school accountability. Moreover, we also developed two composite measures: parental involvement and school safety. *Parental involvement* (Cronbach's $\alpha=0.80$) is averaged over the percentage of parental participation in a) open house or back-to-school night; b) all regularly scheduled schoolwide parent-teacher conferences; c) one or more special subject-area events (e.g., science fair, concerts); and d) volunteer in the school on a regular basis, on a 4-point scale of 1 (0-25%), 2 (26-50%), 3 (51-75%), and 4 (76-100%). .

School safety is measured by the incidences of abusing teachers⁵ (Cronbach's $\alpha =0.73$), averaged from principals' reported frequencies of the following issues of abusing teachers occurred at the school: a) physical abuse of teachers; b) student verbal abuse of teachers; c) widespread disorder in classrooms; d) student acts of disrespect for teachers, on a 5-point scale of 1 (never happens), 2 (happens on occasion), 3 (happens at least once a month), 4 (happens at least once a week), and 5 (happens daily).

Insert Table 1 about Here

Analytic Strategies

The main analytical strategy used in this study is a non-linear decomposition technique proposed by Fairlie (2005) to identify and quantify the separate contributions of group differences in the various measurable characteristics to predicting the disparity in charter-TPS principal turnover rates. This decomposition technique is an extension of the standard Oaxaca-Blinder approach to non-linear models (Blinder, 1973; Oaxaca, 1973). Both Fairlie and Oaxaca-

Blinder techniques have been used by educational researchers to explain group mean differences. To name a few, Stuit & Smith (2012) used Fairlie’s approach to study the differential teacher turnover rates between charter and TPSs. Harris (2006) used the Oaxaca-Blinder approach to analyze differences and similarities in the salary determinants of Michigan’s charter and TPSs. Brown and Corcoran (1997) used a similar decomposition approach to study the contribution of differences in college coursework and the wage gap between female and male students.

The first step of Fairlie’s approach is to use a binomial logit model to estimate the predicted probabilities of principal turnover by the explanatory variables. The second step is to decompose the mean difference in turnover probabilities for charter and TPS principals into several components, including (a) the part due to the different average values for each variable between the two groups; (b) the part due to the differences in estimates for each observable characteristic between the two groups; and (c) the part of unmeasured or unobserved determinants (Fairlie, 2005). The first part is particularly useful for this analysis. Below we elaborate these two steps in detail.

The first step of Fairlie’s process is to estimate the probabilities of principal turnover using a binomial logit model. We use Stuit and Smith (2012)’s expressions to specify this binomial logit model:

$$P_i = \Pr(y_i = 1 | X_i) = F(X_i \hat{B}) = \frac{\exp(X_i \hat{B})}{1 + \exp(X_i \hat{B})} \quad (1)$$

In equation (1) y_i is a binary indicator equal to “1” if the principal i left his or her school in 2008-09 academic year. F represents the cumulative distribution function from the logistic distribution. X_i is a vector of explanatory variables as listed in Table 1 (e.g. x_{1i}, \dots, x_{ki}) and \hat{B} is the corresponding vector of coefficients (e.g., $\hat{\beta}_1, \dots, \hat{\beta}_k$).

We estimated parameters using full maximum likelihood. We added each set of the explanatory variables into the model separately to avoid multicollinearity issues and to estimate the unique contribution of each set of variables to principal turnover risk. We then added all of them together to the model to estimate each variable's unique contribution and the whole model's explanatory power on principal turnover risk. State fixed effects were added to control for state-specific practices and laws that systematically influence principals' career movement.

Then the mean difference in turnover probabilities for charter and TPS principals was decomposed as follows:

$$\begin{aligned} \overline{P}_i^c - \overline{P}_i^t = & \left[\sum_{i=1}^N \frac{F(X_i^c \widehat{B})}{N^c} - \sum_{i=1}^N \frac{F(X_i^t \widehat{B})}{N^t} \right] \\ & + \left[\sum_{i=1}^N \frac{F(X_i^t \widehat{B}^c)}{N^t} - \sum_{i=1}^N \frac{F(X_i^t \widehat{B}^t)}{N^t} \right] \end{aligned} \quad (2)$$

In equation (2), superscripts c and t identify coefficients and values from the charter and TPS samples respectively. \overline{P}_i^c represents the average probability of turnover and N^c represents the weighted sample size in charter schools, while \overline{P}_i^t represents the average probability of turnover and N^t represents the weighted sample size in TPS schools. \widehat{B} refers to coefficients from the pooled sample of charter and TPS principals, which were obtained from equation (1). The first bracketed term in equation (2) represents the part of the charter–TPS gap that is due to group differences in distributions of X_i ; we discuss this further below. The second bracketed term represents the part due to differences between coefficient \widehat{B}^c (denoted as the estimates of X_i in charter school sample) and coefficient \widehat{B}^t (denoted as the estimates of X_i in TPSs), as well as unmeasured or unobserved determinants (Fairlie, 2005; Stuit & Smith, 2012). In other words, this term captures the “unexplained” portion of the turnover gap.

The first bracketed term in equation (2) used estimates from the full sample of principals, \hat{B} , as weights. The total contribution of all explanatory variables was estimated by calculating the predicted probabilities in the two groups and then taking the difference between the average values of the two. Next, the contribution of individual variables was estimated using equation (3).

$$\frac{1}{N^c} \sum_{i=1}^{N^c} F(\hat{\alpha} + x_{1i}^c \hat{\beta}_1 + x_{2i}^c \hat{\beta}_2, \dots, + x_{ki}^c \hat{\beta}_k) - F(\hat{\alpha} + x_{1i}^t \hat{\beta}_1 + x_{2i}^t \hat{\beta}_2, \dots, + x_{ki}^t \hat{\beta}_k) \quad (3)$$

In equation (3), x_{1i} 's contribution to the gap is estimated to be equal to the difference in the average predicted probability of turnover from replacing the charter distribution of x_{1i}^c with the TPS distribution of x_{1i}^t , holding the distributions of the other variables (such as x_{2i}, \dots, x_{ki}) constant (Fairlie, 2005, p. 308). For instance, if the *Pct. non-white* in a school predicts the likelihood of principal turnover, then the total estimated contribution of *Pct. non-white* to the turnover gap would be equal to the difference between the average predicted probability of principal turnover estimated from the distribution of *Pct. non-white* in charter schools and the average predicted probability based on the observed distribution of *Pct. non-white* in TPSs. The decomposition method requires the variable to have different observed distributions in the two types of schools *and* be a significant predictor of principal turnover to contribute significantly to the turnover gap.

We used a STATA program written by Jann (2006) to carry out the analysis. Fairlie's decomposition estimation requires equally sized samples of charter and TPS principals (Fairlie, 2005; Stuit & Smith, 2012). The STATA program randomly drew samples from the TPS group, which had the larger sample size, to match to the charter school group based on the predicted probabilities of turnover. The final sampling weights of principal surveys were used in this

random draw of TPS principals. Because the estimates may vary in each random draw of TPS teachers used in the matching, the mean value of estimates from the separate decomposition estimates of 1,000 random subsamples was calculated and used to approximate the results of the entire TPS principals. Results may also be sensitive to the order in which the variable distributions are switched, so the ordering of variables was randomized for each of the 1,000 replications (Stuit & Smith, 2012).

As aforementioned, because of the difficulty in interpreting results, the Fairlie decomposition procedures do not explicitly estimate the contribution of the differential effects of explanatory factors between groups to the turnover gap. The differential effects, rather, are included in the “unexplained” portion, together with unmeasured or unobserved determinants (Fairlie, 2005). Therefore, to test whether some of the explanatory variables have differential effects on principal turnover in charter schools and TPSs, we add interaction terms between these explanatory factors (x_{1i}, \dots, x_{ki}) and the charter school indicator to the logit model in equation (1). These interaction effects capture how the unique mechanisms in charter schools may alter the influences of these explanatory factors on the likelihood of principal turnover.

Results

We first describe the different distributions of key explanatory variables for charter schools and TPSs in Table 2 which summarizes these group differences and also reports the F -statistic from Wald tests⁶ used to assess the null hypothesis that the two means are equal. Because, as stated, a variable must *both* have different distributions in the two groups *and* be a significant predictor of principal turnover to contribute significantly to the turnover gap, we discuss the results from the logit regressions (Table 3) and the Fairlie decomposition (Table 4) together, as well as referring back to the descriptive statistics (Table 2). Lastly, we use

interaction effects in a binomial logit regression to test whether and how charter school market mechanisms augment the influences of these explanatory factors on principal turnover.

Group Mean Differences in Principal Turnover Rates and Distributions of Explanatory Variables between Charter and TPSs

As shown in Table 2, 28.7% of charter school principals and 20.6% of TPS principals left their schools, resulting in a statistically significant 8.1% gap in principal turnover rates ($p \leq 0.05$). We report now on key observed explanatory variables, according to their four groupings: principal characteristics, principal leadership practices, school contexts, and working conditions.

Regarding principal characteristics, 74.9% of charter school principals were White, which was significantly lower than the 88% of TPS principals who were White ($p \leq 0.001$). Similarly, charter school principals had on average less pre-service training as aspiring principals than counterparts in TPSs (mean of charter schools, or “Mean_c” = 49.6%, mean of TPSs, or “Mean_t” = 58.3%, $p \leq 0.05$). A lower percentage of charter school principals had a Master’s degree or higher (Mean_c = 42.5%, Mean_t = 33.6%, $p \leq 0.001$), or a Master’s degree in Education Administration (Mean_c = 67.6%, Mean_t = 86.1%, $p \leq 0.001$). Consistent with the perception that charter school principals had less educational leadership experience, a larger percentage of charter school principals were in their first three years of principalship in their current schools (Mean_c = 42.5%, Mean_t = 33.6%, $p \leq 0.05$) and had management experience outside of education (Mean_c = 53.7%, Mean_t = 38.2%, $p \leq 0.001$). Mean differences in principals’ gender and age between these two school types were not statistically significant.

Regarding principal leadership practices, while there was no significant difference in teachers’ ratings on principals who stayed between these two types of schools, principals who left charter schools, on average, were rated lower by their teachers than counterparts who left

TPSs ($\text{Mean}_c = 3.07$, $\text{Mean}_t = 3.22$, $p \leq 0.05$). Consistent with the literature, charter school principals had more influence over school personnel decisions ($\text{Mean}_c = 3.95$, $\text{Mean}_t = 3.91$, $p \leq 0.01$) and had fewer barriers to the dismissal of poor-performing or incompetent teachers ($\text{Mean}_c = 1.76$, $\text{Mean}_t = 3.52$, $p \leq 0.001$).

In terms of school contexts, a majority of charter schools (i.e., 56.9%) were located in cities and 22.2% of TPSs were located in cities ($p \leq 0.001$). In contrast, 21.4% of charter schools were located in suburban settings and 31.9% of TPSs were located in suburbs ($p \leq 0.01$). While charter and TPSs showed similar distributions of percentages of schools across educational levels (elementary, middle, and high schools), the distributions of school sizes were different. Specifically, about 42.7% of charter schools were small schools with 200 students or fewer enrolled, in comparison to 14.6% of TPSs ($p \leq 0.001$). Just over 1% of charter schools were big, with an enrollment of 1,200 students or more. This percentage was only one fifth of the percentage of big TPSs—6.9% ($p \leq 0.001$). In terms of students' demographics, an average of 56.9% of students enrolled in charter schools were non-white, in comparison to the average of 39.7% in TPSs ($p \leq 0.001$).

Regarding principals' working conditions, charter school principals were paid on average significantly less than their counterparts in TPSs ($\text{Mean}_c = 11.25$ in logarithm, equivalent to an annual salary of \$76,880, $\text{Mean}_t = 11.35$ in logarithm, equivalent to an annual salary of \$84,965, $p \leq 0.001$). Counter to our expectation, charter school principals did not have a heavier work load than their TPS counterparts, as measured by the average percentage of principals who reported spending more than 60 hours per week on school-related activities. As anticipated, a lower percentage of charter school principals were unionized or under a collective bargaining contract ($\text{Mean}_c = 8.1\%$, $\text{Mean}_t = 27.8\%$, $p \leq 0.001$). A smaller percentage of charter school

principals participated in professional development than their TPS counterparts ($\text{Mean}_c = 91.9\%$, $\text{Mean}_t = 98.3\%$, $p \leq 0.01$). Moreover, the percentage of uncertified teachers in charter schools was almost three times as in TPSs ($\text{Mean}_c = 32\%$, $\text{Mean}_t = 11.1\%$, $p \leq 0.001$) and the percentage of new teachers in charter schools was nearly twice as high as in TPSs ($\text{Mean}_c = 63.69\%$, $\text{Mean}_t = 34.72\%$, $p \leq 0.001$). Just over 68% of charter schools made AYP at the end of year 2006-07, in comparison with just over 75% of TPSs ($p \leq 0.1$). Additionally, charter schools had significantly fewer school safety issues as measured by the average frequency of incidences of verbal and physical teacher abuse ($\text{Mean}_c = 1.62$, $\text{Mean}_t = 1.7$, $p \leq 0.05$). The pupil-teacher ratio and parental involvement seemed higher in charter schools than in TPSs, but these mean differences were not statistically significant.

Insert Table 2 about Here

Explaining the Principal Turnover Gap

As stated previously, we interpret the results from logit regression and the Fairlie decomposition together, often referring back to the descriptive statistics on group mean differences in explanatory variables (Table 2). Table 3 summarizes results from the binomial logit models, including both the estimated coefficient in log odds and standard error for each variable in its prediction of principal turnover. Models II, III, IV and V show the estimates of effects from separate models for each of the four categories respectively, along with school type. Model VI shows the effect of all four sets of explanatory variables when entered into the model all together.

Table 4 summarizes the decomposition analysis results: the first two columns of “separate models” use the estimates from Models II-V in Table 3 at the first step in order to

capture the independent contribution of each set of variables, while the last two columns of “full model” use the estimates from Model VI to identify the unique contribution of each variable to the turnover gap after accounting for all other variables. Following Fairlie (2005) and Stuit & Smith (2012), we report estimates of the absolute and relative contributions of all explanatory variables to the charter–TPS turnover gap. A positive sign indicates that the variable contributed to the turnover gap, while a negative sign indicates that the variable closed the turnover gap. In addition to reporting each variable’s individual contribution, we report the total contribution of each of these four sets of variables.

Insert Table 3, 4 about Here

The statistically significant charter–TPS turnover gap of 8.1% is further confirmed by an estimated coefficient of 0.443 (odds ratio=1.557, $p \leq 0.05$; Model I in Table 3); that is, the odds of a principal leaving a charter school were 1.557 times greater than the odds of a principal leaving a TPS. Moreover, the estimated coefficient was reduced by 48% after conditioning on the explanatory variables and became statistically insignificant ($\beta=0.23$, odds ratio=1.259). In other words, the combination of all explanatory variables explained a sufficient amount of the principal turnover gap. As indicated in the last two rows in Table 4, all explanatory variables together explained 48.82% of the charter–TPS turnover gap, while unobserved factors and differential effects of the explanatory variables accounted for the remaining 51.18% of the gap.

Principal characteristics: The combination of 10 principal characteristic variables initially explained 12.63% of the gap using Model II at the first step of logit regression. After accounting for the other three sets of variables in Model VI at the first step, the amount of unique percentage of explained gap was reduced to 3.48%. In particular, since female principals were

significantly less likely to leave their schools than their male counterparts (Table 3) and charter schools employed a higher percentage of female principals than TPSs, the variable *female* significantly closed the charter–TPS turnover gap by 4.9% ($-0.004/0.081 = -0.049$, $p \leq 0.05$, see Table 4). The variable of *same race as the majority of the students* was statistically significant in the separate model—explaining 4.43% of the gap ($p \leq 0.05$), but turned out to be insignificant in the full model.

Other variables were not statistically significant in explaining the gap, because they either did not significantly predict principal turnover or had no significant group mean differences between charter and TPS schools. For example, although the variable of *older than 50* significantly increased principals' likelihood of leaving the previous year's schools ($\beta = 0.376$, $p \leq 0.01$), the percentage of charter school principals who were older than 50 was similar to that of TPS principals; therefore, this variable did not significantly explain the turnover gap. In addition, as previously reported regarding professional characteristics, charter school principals (a) had less pre-service training, (b) were less likely to hold a Master's degree, (c) were more likely to have three years or fewer experience of teaching or principalship, and (d) were more experienced outside of education. Since none of these variables significantly predicted principal turnover, none of them was a significant explanation of the charter–TPS turnover gap⁷.

Principal leadership practices: The three variables that measure principal leadership practices jointly explained 7% of the turnover gap if using Model III at the first step. The amount was reduced to 3.67% if using Model VI. Among these three variables, the variable of teachers' average ratings on principal leadership was negatively associated with principals' likelihood of leaving ($\beta = -0.272$, $p \leq 0.05$, Table 3), and charter school principals, on average, had a lower rating than counterparts in TPSs; thus, this variable significantly explained 3.67% of the turnover

gap ($0.003/0.081 \approx 0.0367$, $p \leq 0.05$, Table 4). Although we observed mean differences in principals' influence over teacher hiring, evaluation, and dismissal, none of these variables significantly explained the turnover gap because none of these variables significantly predicted principal turnover.

School contexts: The nine explanatory variables of school contexts collectively explained 28.45% of the turnover gap; however, after controlling for other variables, the set of variables uniquely explained about 1.82% of the gap. The amount of the gap explained by some variables (e.g., *suburb*, *pct. non-white*) was offset by other variables that closed the gap (e.g., *city*, *small school*). Particularly, a higher percentage of charter schools served a significantly larger percentage of minority students, as shown in Table 2. Principals who worked in schools with high percentages of non-white students were significantly more likely to leave their schools: a 10-percent increase in non-white students was associated with an increase in the odds of principals leaving their schools by 5% ($\beta=0.005$, $p \leq 0.1$, Table 3). Therefore, it is not surprising to see that the variable *Pct.non-white* alone significantly explained close to 20% of the charter–TPS turnover gap ($0.016/0.081 \approx 0.20$, $p \leq 0.1$, Table 4).

Working conditions: The 10 explanatory variables of working conditions collectively explained about 27% of the gap, and the amount was almost the same after adding the other three sets of explanatory variables (Table 4). As noted, the average percentage of new teachers who had three or fewer years of teaching experience in the charter schools was twice as high as the percentage in TPSs, and a 10-percentage-point increase in new teachers was estimated to increase the odds of principals' leaving by 4%; therefore, the high percentage of new teachers explained about 25% of the turnover gap ($0.02/0.081 \approx 0.25$, $p \leq 0.05$, Table 4), the largest percentage among all variables. Charter school principals, on average, were paid significantly

less than their TPS counterparts. Although the coefficient was not statistically significant, salary explained about 6% of the turnover gap ($0.005/0.081 \approx 0.06$, Table 4). Although statistically insignificant, the variable *collective bargaining contract* also contributed about 5%, a sizable portion of the principal turnover gap.

On the other hand, some of the working condition variables closed the turnover gap. For example, principals were more likely to leave their schools if the schools had more frequent occurrences of teacher abuse and disrespect (Table 3). As reported by their principals, charter schools had fewer occurrences of such abuse; therefore, the variable *abuse teachers* significantly closed the charter–TPS principal turnover gap by 2.45% (Table 4).

Differential Effects of Explanatory Factors between Charter Schools and TPSs

The Fairlie decomposition analyses estimate the amount of principal turnover gap that is explained by the differential distributions of explanatory variables, assuming that these explanatory variables have same influences across school types. We then used logit regression with interaction effects to test conjectures about differential effects of these explanatory variables between these charter schools and TPSs. The addition of interaction effects significantly increased the goodness of fit the model, as the chi-square statistics of model-VI increased from 127.69 in Table 3 to 186.14 in Table 5 (the *p-value* for the increase in chi-square statistics ≈ 0.003).

The first column of Table 5 includes the main effects of explanatory variables and the second column includes interaction effects between these explanatory variables and charter school indicator. Here we focus on interpreting the interaction effects pertaining to three policy-malleable factors: principal leadership quality, barriers to dismissal of poor-performing or incompetent teachers, and principal salary. Specifically, the increase in principal leadership

quality is significantly associated with the likelihood of charter school principal turnover. After controlling for other predictors in the models, an one-unit increase in leadership quality makes the odd ratio for charter school principals leaving be 42% of the odd ratio for TPS peers leaving ($\exp(\beta = -0.861) = 0.42$, $p \leq 0.1$, Table 5). Moreover, if there were to increase one more barrier to the dismissal of poor-performing or incompetent teachers, the odd ratio for charter school principals leaving, on average, could be 1.6 times as the odd ratio for TPS peers leaving ($\exp(\beta = 0.47) = 1.6$, $p \leq 0.001$). In addition, an one-unit increase in salary for charter school principals is associated with a greater reduction in their likelihood of leaving than that for TPS peers ($\beta = -1.776$, $p \leq 0.05$).

Besides, charter school principals who were older than 50 were less likely to leave than TPS peers at the same age ($\beta = -1.157$, $p \leq 0.05$). Relative to TPS peers in similar conditions, charter school principals were less likely to leave suburb schools ($\beta = -1.517$, $p \leq 0.05$), more likely to leave middle schools ($\beta = 1.322$, $p \leq 0.1$), less likely to leave a school with higher percentage of limited English proficiency students ($\beta = -0.001$, $p \leq 0.01$), and less likely to leave schools with high percentage of uncertified teachers ($\beta = -0.019$, $p \leq 0.05$).

Discussion

Findings in this study suggest possible reasons for the significantly higher principal turnover rate in the charter schools than that of TPS principals. Differences in the distributions of observed explanatory variables, which include principal characteristics, school contexts, principal leadership practices, and working conditions, explained close to half of the charter-TPS turnover gap. Findings based on the nationally representative sample contribute to the literature on school administrators' career movement in charter schools and have informative implications for the labor markets of the principal workforce.

The main purposes of our analyses were (a) to identify potential reasons for the observed differential rates of principal turnover and (b) to understand the differential movements in principal labor markets in different types of schools. Findings in this study suggest several possible reasons for the significantly higher principal turnover rate in charter schools. However, because we did not have outcome measures on schools' future performance in this analysis, we could not examine whether higher turnover rate in charter schools is detrimental to school performance. In fact, our analysis shows that, principals with lower teacher ratings on leadership quality were more likely to exit charter schools than peers with higher ratings, which might imply that this higher turnover rate in charter schools may actually benefit future school performance if these ineffective principals were replaced by effective successors.

Based on the nationally representative sample, our analysis shows that differences in the distributions of observed explanatory variables, including principal characteristics, school contexts, principal leadership practices, and working conditions, explained close to half of the charter–TPS turnover gap. These findings could contribute to the literature on school administrators' career movement in charter schools and have informative implications for the labor markets of the principal workforce. However, it should be noted that our analysis merely identifies associations between a variety of variables and the likelihood of principals leaving the previous year's schools, and therefore does not prove causality. For example, it might be a vicious circle that the instability of school leaders leads to a higher rate of teacher turnover and results in a higher percentage of new teachers, which further damages school working conditions and undermines schools' effectiveness, which in turn leads to a higher probability of principals leaving. This question needs to be explored using longitudinal data when they are available in the

future. Until then, our recommended strategies to improve principal retention remain as suggestive.

Summary of Main Findings

Analytic results in this study provide us with a relatively comprehensive description of who constitutes the principal workforce in charter schools in comparison to their TPS counterparts and their working conditions in those schools. More importantly, this study identifies several key explanatory variables of principal turnover that could contribute to the literature on principal turnover.

In terms of demographic characteristics, charter school principals were not very different from their TPS peers; these findings generally confirmed our hypothesis that these variables would not be major reasons for the disparities in principal turnover. On the other hand, charter school and TPS principals differed significantly on professional characteristics. Lower percentages of charter school principals had pre-service training as aspiring principals, a Master's degree or higher, or a Master's degree in Education Administration. A higher percentage of charter school principals were new to the principalship in their current schools and had management experience outside of education. Overall, the differences in principal characteristics between charter schools and TPSs accounted for 3% of the turnover gap.

Moreover, principal leadership practices after entering the profession account for another 4% of the turnover gap, almost all of which was attributed to the measure of leadership quality, the average teacher rating of principals' leadership in school management and instruction. Charter schools were more able to exit principals with lower teacher ratings than TPS schools, due to charter schools' flexibility to fire principals and lower numbers of charter school principals under collective bargaining contracts.

Across the board, principals were more likely to leave schools that served minority students. Since charter schools are often established to respond to the needs of traditionally underserved student populations, the higher turnover rate of their principals seems to be related to these schools' defining type of students served. Interestingly, once accounting for other variables, particularly school working conditions, the amount of turnover gap explained by school contexts dropped significantly from 28% to less than 2%. This finding indicates that the influence of school contexts on the likelihood of principals leaving and on the charter-TPS turnover gap can be reduced by changes in other variables, particularly by improving working conditions of schools. In contrast, the amount of turnover gap explained by the set of variables of school working conditions stayed the same after accounting for school contexts and other variables. This implies that school working conditions are relatively independent of the influences of school contexts and other variables. The set of variables of working conditions uniquely explained about one third of the turnover gap, which is about three times as the proportion of gap uniquely explained by the other three sets of variables altogether.

Since principal leadership practices and working conditions are more subject to school improvement strategies than pre-existing school contextual factors (e.g., students' demographics and school locations), we urge practitioners to explore strategies of retaining school leaders by improving school working conditions and principal leadership practices. For example, in an average charter school, the principal managed a workforce with over 60% of teachers who were either new to the profession or new to the school. Teachers are often less effective in their first few years of teaching (e.g., Atteberry, Loeb, & Wyckoff, 2013; Kane, Rockoff, & Staiger, 2008). Even if experienced, teachers' effectiveness can be significantly reduced in a new school when they need to acquire local knowledge about the students and new working environments (Author,

2013b). Supporting and coordinating ineffective workers often consume more time and efforts, which may lead to a quicker burnout of the leader and further increase the instability of principal workforce. This association between the percentage of new teachers and the higher likelihood of principal turnover was observed across school types (as shown in Model VI in Table 3). Of course, we acknowledge that principal leadership practices can contribute to the development of their own working conditions. Unfortunately, the nature of the data used in this study does not allow us to further separate these two mechanisms. Moreover, as shown in the second column of Table 5, the findings about interaction effects between these explanatory variables and charter school dummy indicator suggest three factors that may have stronger associations with retaining principals in charter schools. These factors include improving principal leadership practices, removing barriers to the dismissal of poor-performing or incompetent teachers, and increasing salary. Charter school principals could be more sensitive to interventions that address these three factors than TPS peers.

Limitations and Suggestions for Future Studies

There are several limitations related to the datasets and data analysis in this study which generate caveats in interpreting the findings. First, the measures in the SASS data had limitations. For example, the number of hours spent on school-related activities may not be the best measure of principals' workload, since the counted number does not reflect the nature and difficulties of principals' work. Similarly, the measure of professional development participation in this study could not capture the quality of professional development programs in terms of their ability to promote effective principal leadership. More precise and complete measures are needed to collect better evidence to understand who constitutes the principal workforce in charter schools and their career path after entering the principalship. Additionally, there may be other

factors contributing to the turnover gap that were not measured or considered in this study. These factors may include other personnel management strategies of hiring, retaining, and developing effective principals. Future studies could examine these factors to inform a more comprehensive policy strategy of staffing charter schools with effective leaders.

Second, due to the structure of the data, we only examined turnover rate and status between two adjacent years. We were not able to distinguish different types of turnover behaviors (e.g., transfer to another school within the district or state, leaving the principal profession, or moving to higher-level administrative positions), or to follow a cohort of principals over time to compare the different dynamics of the principal labor market for charter school and TPS systems. We strongly urge future studies to continue this line of inquiry and anticipate that this line of inquiry may yield additional insights on what contributes to the charter-TPS principal turnover gap (Farley-Ripple, Solano, & McDuffie, 2012). Moreover, the practical implications of our findings for retaining effective principals were further constrained by the fact that the PFS did not distinguish between principals leaving their schools voluntarily or involuntarily.

Finally, future studies need to examine the differential impacts of principal turnover on charter schools and TPSs. Studies of the impact of principal turnover on student achievement and teacher retention are emerging (e.g., Béteille, Kalogrides & Loeb, 2012). However, more rigorous data are needed to understand how the impact of principal turnover on the effectiveness and capacity building of charter schools differs from that in TPSs. Moreover, we still need data to determine the different desirable retention rates for charter and traditional public schools, an additional aspect of the principal turnover gap (see also Stuit & Smith, 2011).

Conclusion

This study is a response to a gap in the literature and a practical call to understand the reasons for the higher principal turnover rate in charter schools. Using data from a nationally representative sample of principals and quantitative analyses strategies (e.g., logit models and Fairlie's decomposition), we presented a comparative picture of principal personal and professional characteristics, leadership practices, school contexts, and working conditions for charter schools and traditional public schools. The differential distributions of these observables collectively explained about half of the charter-TPS principal turnover gap. Moreover, relative to TPS peers, the change in three factors could lead to a greater reduction in likelihood of charter school principal turnover: the improvement of principal leadership quality, fewer barriers to the dismissal of poor-performing or incompetent teachers, and higher salary. Despite the limitations of data and data analysis, this is one of first few studies that empirically explore the charter school principal workforce and labor market movements. As the charter school movement and Great Principals Initiatives as a major component of the Race to the Top competition remain in the center of policy discussions, we strongly urge future studies to continue this line of inquiry to enrich our understanding of the organizational effectiveness of charter schools in attracting and managing leaders who are the key to schools' success.

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Tables

Table 1. Variable definitions

Variables	Descriptions
Turnover	1 if the principal left the school; 0 if the principal stayed
Charter school	1 if the principal worked in a charter school during the 2007-08 school year; 0 if worked in a TPS
Principal characteristics	
Female	1 if the principal was female; 0 if the principal was male
Race/ethnicity:	
White	1 if the principal was White; 0 if the principal was non-White
Same race as the majority of the students	1 if the principal was the same race as the majority of students in this school; 0 if otherwise
Age:	
Under 35	1 if the principal was 35 years old or younger; 0 if older than 35
Older than 50	1 if the principal was 50 or older; 0 if younger than 50
Training:	
Pre-service training	1 if the principal participated in any district or school trainings or development programs for aspiring school principals; 0 if otherwise
Having a Master's degree or higher	1 if the principal had a Master's degree or higher (e.g., educational specialist or professional diploma at least one year beyond Master's level, doctorate or first professional degree (Ph.D., Ed.D, M.D., L.L.B, J.D., D.D.S.); 0 if otherwise
Having a Master's degree in Education Administration	1 if the principal had a Master's degree in Education Administration; 0 if otherwise
Experience:	
New principal in this school	1 if the principal had 3 or fewer years of principalship experience in this school; 0 if otherwise
Management experience outside of education ⁸	1 if the principal had any management experience outside of the field of education; 0 if otherwise
Principal leadership practices	
Principal leadership quality	Composite measure of teachers' reported leadership practices (Cronbach's $\alpha = 0.87$)
Influence on hiring and evaluating teachers ⁹	Composite measure of the principal influence on evaluating teachers and hiring new full-time teachers
Barriers to dismissal of poor-performing or incompetent teachers	Composite measure of barriers to the dismissal of poor-performing or incompetent teachers in this school (Cronbach's $\alpha = 0.77$)
School contexts	
Urbanicity:	
City	1 if the school was classified as a city by the U.S. Census; 0 if suburb, small town, or rural
Suburb	1 if the school was classified as a suburb by the U.S. Census; 0 if city, small town, or rural
Education level:	
Middle school	1 if the school was a middle school; 0 if an elementary or high school
High school	1 if the school was a high school; 0 if an elementary or middle school

School size:	
Small school	1 if the school had fewer than 200 students; 0 if otherwise
Big school	1 if the school had 1,200 or more students; 0 if otherwise
Student demographics:	
Pct. FRL ¹⁰	The percentage of students eligible for free- and reduced-price lunch
Pct. non-white	The percentage of non-white students
Pct. limited English proficiency	The percentage of students with limited English proficiency
Working conditions	
Log(salary)	Logarithm of the principal's annual salary before taxes and deductions
Working hours per week >60	1 if the principal spent more than 60 hours on all school-related activities during a typical full week at this school; 0 if otherwise
Under collective bargaining contract	1 if the principal was represented under a collective bargaining agreement; 0 if otherwise
Professional development	1 if the principal had participated in any professional development activities related to the role of principal; 0 if otherwise
Pct. uncertified teachers	The percentage of teachers who were uncertified
Pct. new teachers	The percentage of teachers who had three or fewer years of working experience in the current school in the 2007-08 school year
Pupil-teacher ratio, a proxy for school resources	Pupil-teacher ratio in the 2007-08 school year
Made AYP, a proxy for accountability pressure	1 if the school made AYP at the end of the 2006-07 school year; 0 if the school failed to make AYP
Parental involvement	Composite measure of frequencies of parental participation in school events (Cronbach's $\alpha=0.80$)
Abuse teachers, a proxy for school safety ¹¹	Composite measure of principals' reported frequency of abusing teachers issues occurred at the school (Cronbach's $\alpha=0.73$)

Table 2. Descriptive statistics

	Charter		TPS		Diff.	Wald Test
	Mean	S.E.	Mean	S.E.		
Employment status						
Turnover rate	0.287	0.037	0.206	0.009	0.081	4.20*
Principal characteristics						
Female	0.567	0.041	0.499	0.011	0.068	2.51
Race/ethnicity:						
White	0.749	0.038	0.880	0.007	-0.131	11.58***
Same race as the majority of the students	0.730	0.037	0.782	0.010	-0.052	1.80
Age:						
Under 35	0.098	0.023	0.104	0.007	-0.006	0.04
Older than 50	0.467	0.041	0.481	0.011	-0.014	0.11
Training:						
Pre-service training	0.496	0.041	0.583	0.011	-0.087	4.10*
Having a Master's degree or higher	0.898	0.025	0.989	0.002	-0.091	13.49***
Having a Master's degree in Education Administration	0.676	0.038	0.861	0.008	-0.185	22.81***
Experience:						
New principal in this school	0.425	0.041	0.336	0.011	0.089	4.45*
Management experience outside of education	0.537	0.041	0.382	0.011	0.155	13.26***
Principal leadership practices						
Principal leadership quality	3.235	0.045	3.282	0.011	-0.047	1.03
Influence on hiring and evaluating teachers	3.952	0.015	3.908	0.006	0.044	7.60**
Barriers to the dismissal of poor-performing or incompetent teachers	1.758	0.164	3.517	0.044	-1.759	106.70***
School contexts						
Urbanicity:						
City	0.569	0.041	0.222	0.009	0.347	68.79***
Suburb	0.214	0.033	0.319	0.010	-0.105	9.21**
Education level:						
Middle school	0.142	0.029	0.182	0.009	-0.040	1.70
High school	0.234	0.036	0.189	0.007	0.045	1.46
School size:						
Small school	0.427	0.042	0.146	0.008	0.281	42.69***
Big school	0.012	0.006	0.069	0.004	-0.057	68.51***
Student demographics:						
Pct. FRL	38.510	2.900	41.380	0.654	-2.870	0.93
Pct. non-white	56.900	2.900	39.700	0.800	16.200	30.09***
Pct. limited English proficiency	9.400	1.700	8.700	4.000	07.000	0.17
Working condition						
Log(salary)	11.250	0.024	11.348	0.005	-0.098	15.96***
Working hours per week > 60	0.293	0.038	0.290	0.010	0.003	0.01
Under collective bargaining contract	0.081	0.021	0.278	0.010	-0.197	72.57***
Professional development	0.919	0.022	0.983	0.003	-0.064	7.90**
Pct. uncertified teachers	32.000	2.900	11.100	0.400	20.900	51.63***
Pct. new teachers	63.690	2.890	34.720	0.670	28.970	95.22***
Pupil-teacher ratio	15.074	0.510	14.432	0.104	0.642	1.52
Made AYP	0.681	0.038	0.752	0.009	-0.071	3.21 [†]

Parental involvement	2.684	0.087	2.591	0.018	0.093	1.10
Abuse teachers	1.620	0.033	1.696	0.011	-0.076	4.74*

Notes: † $p \leq 0.10$, * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$.

The descriptive statistics and Wald test were performed using final weights.

Table 3. Marginal effects of binomial models

Variables	Model I	Model II	Model III	Model IV	Model V	Model VI
Charter school	0.443*	0.402*	0.417*	0.335 [†]	0.317	0.230
	(0.191)	(0.201)	(0.202)	(0.198)	(0.204)	(0.235)
Principal characteristics						
Female		-0.324**				-0.342**
		(0.116)				(0.123)
Race/ethnicity:						
White		-0.279 [†]				-0.126
		(0.162)				(0.183)
Same race as the majority of the students		-0.363**				-0.215
		(0.138)				(0.157)
Age:						
Under 35		0.055				0.076
		(0.209)				(0.212)
Older than 50		0.351**				0.376**
		(0.118)				(0.119)
Training:						
Pre-service training		-0.143				-0.129
		(0.113)				(0.118)
Having a Master's degree or higher		-0.404				-0.435
		(0.450)				(0.463)
Having a Master's degree in Education Administration		0.288 [†]				0.254
		(0.160)				(0.162)
Experience:						
New principal in this school		0.111				0.044
		(0.125)				(0.128)
Management experience outside of education		0.082				0.063
		(0.123)				(0.114)
Principal leadership						
Principal leadership quality			-0.361**			-0.272*
			(0.112)			(0.117)
Influence on hiring and evaluating teachers			-0.027			0.071
			(0.189)			(0.197)
Barriers to the dismissal of poor-performing or incompetent teachers			-0.007			0.002
			(0.031)			(0.031)
School contexts						
Urbanicity:						
City				-0.223		-0.160
				(0.155)		(0.160)
Suburb				-0.325*		-0.225
				(0.141)		(0.152)
Education level:						
Middle school				-0.074		-0.212
				(0.152)		(0.158)
High school				0.235 [†]		0.054

	Principal turnover gap	
	(0.134)	(0.158)
School size:		
Small school	-0.063 (0.158)	-0.202 (0.174)
Big school	-0.023 (0.180)	0.052 (0.194)
Student demographics:		
Pct. FRL	-0.000 (0.003)	-0.000 (0.003)
Pct. non-white	0.009*** (0.002)	0.005 [†] (0.003)
Pct. limited English proficiency	-0.000 (0.000)	-0.000 (0.000)
Working conditions		
Log(Salary)	-0.114 (0.281)	-0.276 (0.351)
Working hours per week > 60	-0.088 (0.117)	-0.111 (0.123)
Under collective bargaining contract	-0.158 (0.127)	-0.123 (0.130)
Professional development	-0.224 (0.338)	-0.176 (0.353)
Pct. uncertified teachers	-0.000 (0.003)	-0.002 (0.003)
Pct. new teachers	0.003 (0.002)	0.004* (0.002)
Pupil-teacher ratio	-0.014 (0.011)	-0.019 (0.012)
Made AYP	-0.227* (0.115)	-0.131 (0.122)
Parental involvement	-0.084 (0.069)	0.001 (0.084)
Abuse teachers	0.211* (0.100)	0.148 (0.102)

Model statistics

Wald chi-square test statistic	5.4*	41.08***	14.89***	34.99***	27.75**	127.69***
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Notes: Coefficients are in log odds.

[†] $p \leq 0.10$, * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$.

Model I only includes the indicator of charter school. Model II adds the set of principal characteristics into the model. Model III includes a set of measures on principal leadership practices in schools. Model IV includes a set of measures on school contexts. Model V includes a set of measures on working conditions. Model VI includes all explanatory variables and state fixed effects.

Table 4. Decomposition of gap in charter and TPS principal turnover

	Separate Models		Full Model	
Explanatory Variables	Estimates ^(a)	Pct. of Gap ^(b)	Estimates ^(a)	Pct. of Gap ^(b)
Charter turnover rate			0.287	
TPS turnover rate			0.206	
Charter-TPS gap			0.081	
Principal characteristics^(c)	0.010 (0.013)	12.63	0.003 (0.011)	3.48
Female	-0.004* (0.002)	-5.17	-0.004* (0.002)	-4.90
Race/ethnicity:				
White	0.008 [†] (0.005)	9.27	0.003 (0.005)	3.67
Same race as the majority of the students	0.004* (0.002)	4.43	0.002 (0.002)	2.45
Age:				
Under 35	0.000 (0.001)	-0.05	0.000 (0.000)	0.00
Older than 50	-0.001 (0.001)	-1.13	-0.001 (0.001)	-1.22
Training:				
Pre-service training	0.002 (0.002)	2.78	0.002 (0.002)	2.45
Having a Master's degree or higher	0.008 (0.009)	9.39	0.007 (0.009)	8.57
Having a Master's degree in Education Administration	-0.010 [†] (0.006)	-12.65	-0.008 (0.005)	-9.79
Experience:				
New principal in this school	0.002 (0.002)	2.37	0.001 (0.002)	1.22
Management experience outside of education	0.003 (0.004)	3.38	0.002 (0.004)	2.45
Principal leadership practices^(c)	0.006 (0.011)	7.02	0.003 (0.010)	3.67
Principal leadership quality	0.003** (0.001)	4.27	0.003* (0.001)	3.67
Influence on school's personnel decisions	-0.000 (0.002)	-0.3	0.001 (0.002)	1.22
Barriers to the dismissal of poor-performing or incompetent teachers	0.002 (0.012)	3.05	-0.001 (0.01)	-1.22
School contexts^(c)	0.022 (0.017)	28.45	0.002 (0.016)	1.82
Urbanicity:				
City	-0.015 (0.011)	-18.52	-0.010 (0.010)	-12.24
Suburb	0.006* (0.003)	6.91	0.004 (0.003)	4.90
Education level:				

Middle school	0.001 (0.001)	1.13	0.001 (0.001)	1.22
High school	0.002 (0.001)	2.79	0.000 (0.001)	0.00
School size:				
Small school	-0.003 (0.009)	-3.377	-0.010 (0.008)	-12.24
Big school	0.000 (0.002)	0.000	-0.001 (0.002)	-1.22
Student demographics:				
Pct. FRL	0.000 (.002)	0.000	0.000 (0.002)	0.00
Pct. non-white	0.032*** (0.008)	38.653	0.016 [†] (0.009)	19.58
Pct. limited English proficiency	0.000 (0.001)	0.000	0.000 (0.001)	0.00
Working conditions^(c)	0.022 (0.016)	26.92	0.023 (0.016)	27.61
Log (Salary)	0.002 (0.005)	2.41	0.005 (0.006)	6.12
Working hours per week > 60	0.000 (0.000)	0.03	0.000 (0.000)	0.00
Under collective bargaining contract	0.005 (0.004)	6.02	0.004 (0.004)	4.90
Professional development	0.003 (0.004)	3.34	0.002 (0.005)	2.45
Pct. uncertified teachers	0.001 (0.010)	1.11	-0.005 (0.010)	-6.12
Pct. new teachers	0.014*** (0.001)	17.19	0.020* (0.01)	24.48
Pupil-teacher ratio	-0.001 (0.001)	-1.50	-0.002 (0.001)	-2.45
Made AYP	0.003 [†] (0.002)	3.95	0.002 (0.002)	2.45
Parental involvement	-0.001 (0.000)	-1.22	0.000 (0.001)	0.00
Abuse teachers	-0.003* (0.001)	3.53	-0.002 [†] (0.001)	-2.45
State fixed effects^(c)	0.010 (0.003)	11.87	0.010 (0.004)	12.24
All included explanatory variables			0.040	48.82
Unexplained portion of turnover gap			0.041	51.18

Notes: [†] $p \leq 0.10$, * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$.

Standard errors are included in the parentheses.

The first two columns of “separate models” use the estimates from Models II-V in Table 3 at the first step in order to capture the independent contribution of each set of variables, while the last two columns of “full model” use the estimates from Model VI to identify the unique contribution of each variable to the turnover gap after accounting for all other variables.

^(a) This column includes the estimated amount of turnover gap explained by each variable or by a set of variables collectively. The estimates were calculated as the mean values from 1,000 random samples.

^(b) This column is calculated by dividing the estimates in column^(a) by the amount of the turnover gap (0.081), which represents the proportion explained by the corresponding variable or set of variables.

^(c) These rows include the combined estimates of a set of explanatory variables.

Table 5. Marginal effects of binomial models with interaction effects

Variables	Main effects	Factor × Charter school dummy
Charter school	14.967 (11.109)	
Principal characteristics		
Female	-0.379** (0.129)	0.472 (0.458)
Race/ethnicity:		
White	-0.111 (0.194)	-0.886 (0.673)
Same race as the majority of the students	-0.189 (0.164)	-0.397 (0.674)
Age:		
Under 35	0.054 (0.225)	0.721 (0.79)
Older than 50	0.417*** (0.124)	-1.157* (0.498)
Training:		
Pre-service training	-0.131 (0.122)	0.094 (0.49)
Having a Master's degree or higher	-0.398 (0.644)	0.265 (0.981)
Having a Master's degree in Education Administration	0.314 [†] (0.174)	-0.742 (0.605)
Experience:		
New principal in this school	0.045 (0.135)	0.551 (0.491)
Management experience outside of education	0.064 (0.118)	-0.201 (0.524)
Principal leadership		
Principal leadership quality	-0.252* (0.122)	-0.861 [†] (0.47)
Influence on hiring and evaluating teachers	0.055 (0.198)	0.093 (1.094)
Barriers to the dismissal of poor-performing or incompetent teachers	-0.004 (0.031)	0.47*** (0.128)
School contexts		
Urbanicity:		
City	-0.206 (0.168)	-0.216 (0.62)
Suburb	-0.214 (0.156)	-1.517* (0.755)
Education level:		
Middle school	-0.238 (0.165)	1.322 [†] (0.727)
High school	0.019 (0.166)	0.324 (0.65)
School size:		

Small school	-0.208 (0.189)	-0.067 (0.526)
Big school	0.045 (0.198)	1.47 (2.412)
Student demographics:		
Pct. FRL	<0.001 (0.003)	0.008 (0.009)
Pct. non-white	0.005 [†] (.003)	-0.007 (0.013)
Pct. limited English proficiency	<0.001 (<0.001)	-0.001** (0.000)
Working conditions		
Log(Salary)	-0.206 (0.374)	-1.776* (0.906)
Working hours per week>60	-0.089 (0.128)	-0.34 (0.483)
Under collective bargaining contract	-0.153 (0.133)	0.639 (0.818)
Professional development	0.014 (0.436)	-0.88 (1.065)
Pct. uncertified teachers	<0.001 (0.003)	-0.019* (0.008)
Pct. new teachers	0.004 [†] (0.002)	0.001 (0.007)
Pupil-teacher ratio	-0.019 (0.013)	-0.004 (0.05)
Made AYP	-0.148 (0.127)	-0.612 (0.56)
Parental involvement	-0.004 (0.089)	0.131 (0.259)
Abuse teachers	0.136 (0.106)	0.209 (0.559)
Model statistics		
Wald chi-square test statistic		186.14***

Notes: Coefficients are in log odds.

[†] $p \leq 0.10$, * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$.

The model includes state fixed effects.

Endnotes

¹ Schools that serve high proportions of poor, minority, or low-performing students often experience more severe principal turnover. As included in Miami-Dade County Public Schools, an average of 28-29% of principals left annually from schools that served the most percentages of free-lunch students, minority students, or the low performing students (the top quartile), in comparison to the average of 16-18% of principals in schools that served the least percentages of poor, minority, or low performing students (the bottom quartile; Béteille, Kalogrides & Loeb, 2012, see Table 3 on p.31). Similarly, using data from this study, the national average of charter school principal turnover rates was about 29% in 2008-09 school year, which was about 4% higher than the average turnover rate in TPSs that served the highest percentage of free- and reduced-price lunch students or minority students (the top quartile), in comparison to an average 19% principal turnover rate in TPSs that served the least percentage of poor or minority students (the bottom quartile).

² In order to fill “not answered” items with data, analysts at NCES used two separate stages of imputation. The first stage of imputation involved using other items on the same principal record or items on the corresponding school questionnaire record to impute missing items. The second stage used “hot deck” imputation. This procedure first establishes “donors” who were similar (e.g., similar age, experience, education, etc.) and worked at similar schools (e.g., a school that offered the same grade levels). Then the unanswered items were imputed by using the mean or mode for groups of “donors.” Once the first two stages of imputation were complete, there were no more unanswered items. Census Bureau analysts then performed checks on the imputed data to make sure that imputed values were consistent with other data on the same record. For a small number of cases where imputed data were either inconsistent with other data on the same record or appeared to be outlier data, analysts made adjustments to the imputed data during a post-imputation data review process (Tourkin, Thomas, Swaim, Cox, Parmer et al., 2010).

³ According to restricted-data use agreement, sample sizes are rounded to the nearest ten.

⁴ The PFS includes four categories of principal turnover status: “stayers” are 2007–08 principals who were principals in the same schools in 2008–09; “movers” are 2007-08 principals who were principals in different schools in 2008–09; “leavers” are 2007–08 principals who were no longer principals in 2008–09; “other” includes principals who had left their 2007–08 schools, but for whom it was not possible to determine 2008–09 status. Since the percentage of charter school principals who were categorized as “other” was significantly larger than that in TPSs (7.4% in charter schools vs. 1.5% in TPSs), it would not be a fair comparison between charter school principals and their counterparts in TPSs on “moving to another school” or “leaving the principalship profession all together.” Therefore, we only focused on the binary coding of the principal turnover status (1=left; 0=stayed).

⁵ We considered other measures of school safety, such as students’ discipline problems and the number of students expelled or suspended in schools. These measures were highly correlated with the variable of *abuse teachers* but weak predictors of the dependent variable of principal turnover. Therefore, we decided not to include them in the analysis.

⁶ We used the Wald test for two reasons. First, the Wald test statistic is asymptotically equivalent to the statistical inferences yielded from either *t* or *chi-squared* statistics, when sample size (or

degree of freedom) goes to infinity. Our sample size after applying final weights is sufficient large enough so that the results from F statistics lead to the same inference as either *t* or *chi-squared* statistics. Second, the Wald test was used to adjust the degree of freedom for the complex sampling design used by SASS survey, so that our inferential statistics were calculated at the population level, rather than at the sample level.

⁷ Many variables in Model-VI (Table 3) are not statistically significant, because they are correlated with other variables in the model. The estimated effects are marginal effects after accounting for more than 30 other variables.

⁸ Since the number of years of principals' teaching experience is highly correlated with several variables (e.g., had a Master's degree in Education Administration and management experience outside of education), we dropped this variable from the final model.

⁹ We considered using a longer version of principals' influence by including principals' influence on other school activities, such as setting performance standards, establishing curriculum, determining the content of in-service professional development for teachers, and deciding how the school budget will be spent. We then decided to use this short version of principals' influence on evaluating teachers and hiring new full-time teachers for two reasons: (a) the means of the short version differed significantly between charter school and TPSs while the longer-version did not; (b) the short version had a stronger correlation with the outcome variable of principal turnover rate than the longer version.

¹⁰ Since the percentage of students approved for free- or reduced-price lunch is highly correlated with the school's Title-I status ($\rho = 0.44$, $p \leq 0.001$), we did not include the variable of "Title-I status" in the model.

¹¹ We also considered other teachers' reported measures of school working conditions, such as *collegiality among teachers* (e.g., most of teachers share the same beliefs and values, or cooperative efforts among staff members) and *teacher morale* (e.g., the stress and disappointments involved in teaching, enthusiasm of teaching). These two variables are highly correlated with *abuse teachers* ($\rho = -0.208$ or $\rho = -0.147$, $p \leq 0.001$). Thus, they were not included in the final analysis.