



Building Experience and Retention: The influence of principal tenure on teacher retention rates

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This study investigates the influence of principal tenure on the retention rates of the teachers they hire over time. We analyzed the hiring practices and teacher retention rates of 11,717 Texas principals from 1999 to 2017 employing both individual and year fixed effects. Main findings indicate that a principal who stays in the same school for at least three years begins to hire teachers who stay to both three- and five-year benchmarks at increasingly higher rates. However, the average Texas principal leaves a school after four years and while we do find small positive gains in the initial retention rates of teachers at the next school, the majority of principal improvement in teacher retention does not appear to be portable.

Key Words: *principal hiring, educational policy, principal/teacher turnover, leadership, regression analyse*

Teacher turnover is widely recognized as a factor that contributes to school instability and dysfunction (e.g., Ingersoll, 2001; Ronfeldt, Loeb, & Wyckoff, 2013; Carver-Thomas & Darling-Hammond, 2017; Grissom & Bartanen, 2019). A similarly robust body of research informs our understandings of principal tenure and specifically, the ways in which school and individual characteristics interact to shape principal pathways and turnover (Bailes & Guthery, 2020; Tekleslassie & Villarreal, 2011). Less well mapped is the degree to which principal hiring of teachers contributes to the organizational stability of a school (Holme, Jabbar, Germain & Dinning, 2017). Much of the extant research addresses the relationship between teachers and schools, bypassing the principal as a factor which influences teacher entry and longevity within a single school. We identify the ways in which a principal's site-specific expertise impacts teacher retention rates over time and whether or not any gains are portable for a principal should they move to another school.

Abundant evidence attests to the importance of principal leadership for school success (e.g., Bryk et al., 2010). While principals' influence on student achievement is almost entirely indirect, it is nevertheless critical and is consistently affirmed through empirically established pathways such as teacher quality. Principals are human resource managers within their buildings, yet few findings have emerged to indicate the success rate of principals' hiring and whether or not it improves over time. Scholars and policy analysts have recognized teacher retention as a cost-efficient strategy that also protects the organization against the mission erosion that can take place in buildings with large annual turnover rates (Miller, 2013). Still emergent, are the ways in which principals' hiring choices contribute to the stability of their organizations or the ways in

which principals' years of experience contribute to more effective hires in terms of teacher retention.

Extent research coalesces around the idea that principal skills regarding the hiring of new teachers are critical to the improvement and success of a school. Bryk and colleagues assert that, "recruiting capable teachers is critical to the breadth and depth of expertise needed to undertake school improvement" (2010, p. 54-55). Additionally, researchers find that consistent principal leadership over the course of multiple years has significant implications for the culture and success of a school (Spillane & Lee, 2014; Meyer, Macmillan, & Northfield, 2009). However, in practice, principals tend to move from school to school about every four years (Levin & Bradley, 2019). Effective hiring is a long-term investment made by a principal in organizational stability and school success. When leaders effectively recruit, retain, and develop instructional faculty, they contribute to lasting organizational stability and insulate schools against shocks that might otherwise undercut progress toward the organization's goals (Doyle & Locke, 2014; Griffith, 1999; McREL, 2009).

Independent of principal hiring research, literature associates teacher turnover with organizational instability. In schools with a large proportion of annual teacher turnover, students' individual academic achievement suffers and the relational characteristics necessary to sustain the work of teaching and learning develop weakly if at all (Bartanen, Grissom, & Rogers, 2019; Hanselman, Grigg, Bruch, & Gamoran, 2016). Scholars have identified principal hiring decisions, specifically hiring teachers, as essential to a school's success and to the academic trajectory of a school. Hiring teachers is among principals' most critical work but what remains uncertain is how principals contribute to their schools' overall stability and success through their hiring choices.

States' principal accountability policies increasingly focus on principal effectiveness as defined by their human resource management ability- specifically hiring, developing, and retaining staff (Milanowski & Kimball, 2013). Fifteen states have adopted the Professional Standards for Education Leadership (PSEL) and more are expected to sign on (National Policy Board for Educational Administration, 2015). These standards represent a broader set of expectations for school leaders than did their predecessors (e.g., the Interstate School Leadership Licensure Consortium). In particular, PSEL Standards 6 and 7 (respectively) emphasize two aspects of personnel development: Professional Capacity of School Personnel and Professional Community for Teachers and Staff. The PSEL standards place the onus on school leaders to improve the instructional capacity of staff through effective management of staffing, time, and material resources. Although Texas is not a PSEL signee, they have nevertheless also increased focus throughout the state on principals' responsibility to effectively manage teachers under their direction (Texas Education Code §149.2001). Effective instructional leaders are also effective human resource managers and so hiring likely teacher stayers is an essential function of the principalship (Hess & Kelly, 2007).

Main Findings and Contribution

This study investigates the ways in which principals' hiring patterns change over time and whether improvement in hiring (as measured by teacher retention) is portable as principals accrue experience and move from school to school. After the first five years of school leadership experience, principals' skill at hiring teachers who stay tends to plateau, but not regress. These findings suggest that principals establish a great deal of building-specific situational expertise that is not easily portable or applicable in a subsequent school placement. When principals move

to a second school, they maintain a small skill advantage but they must rebuild that improvement over the course of many additional years of experience.

Our main finding indicates that principals who enter an unstable school (less than 69% retention in the two years prior to the principal's arrival) and stay at least five consecutive years, can counteract prior instability. The average principal tenure in Texas is four years but principals who extend their tenure to five or more years accrue substantial hiring expertise. Their improvement over time mitigates prior organizational instability. In year five, these principals hire teachers whose retention rates are comparable to those hired by a new principal in schools with the highest prior stability. Taken together, these findings suggest that there are likely tangible returns for districts that lengthen principal tenures within individual schools, and contribute to increased rates of teacher retention. This paper, then, comprises a unified investigation into whether or not a principal's hiring expertise improves over time and whether or not that skill is transferrable to another setting. We therefore contribute to research on both principal hiring and teacher turnover by quantifying principal improvement over time and site-specific expertise as factors in organizational stability.

Background and Framework

In this paper, we build on research that has investigated principals' hiring patterns, the ways in which those hires contribute to longer tenures of teachers in their buildings, and resultant effects on organizational stability. While studies of teacher turnover are well established, still emergent is research that attends to principal improvement over time (Guthery & Bailes, 2019; Atteberry, Loeb, & Wyckoff, 2017; Boyd, Grossman, Loeb, & Wyckoff, 2006; Hanushek & Rivkin, 2007). We therefore examine the ways in which principals shape the teacher labor force during their tenure in a school and influence stability even after their departure.

We recognize that principal skill in human resource management must extend to firing of teachers when necessary, but also note that removing, recruiting, and replacing teachers is expensive and time-consuming. Some estimates suggest the national cost of teacher turnover is approximately seven billion dollars per year and estimates in Texas suggest the cost is as much as \$5000 per teacher (Carroll, 2007; Benner, 2000). Given the cost of churn, more effective principal hiring practices are a more cost-effective personnel strategy than firing and replacing teachers, especially in schools that already experience economic disadvantages (Watlington, Shockley, Guglielmino & Felsher, 2010). We therefore frame teacher hiring as an investment in organizational stability, which has enduring benefits for teachers and students. Hiring teachers who are likely to stay in a single building for at least five years offers the following benefits: increased organizational stability, greater likelihood of teachers staying in the profession long-term, and enhanced instructional expertise and mentoring for novice teachers (Holme et al., 2017; Smith & Ingersoll, 2004).

In order to anchor this study in extant literature, we review research on the ways in which principals' function as human resource managers, potential benefits to schools of principal experience, consequences of principal turnover, and principals' contributions of to the stability of the teacher corps.

Principals as human resource managers

This study examines the demand side of teacher labor force markets, which is a relatively recent approach to the study of teacher turnover—much of the prior work in this area addressed supply side interests (e.g., teacher wages, working conditions, and certifications; Jacob, 2010). Harris, Ruteledge, Ingle, and Thompson (2011) indicate that while supply side dynamics are important to understanding the teacher labor force and movement within it, “developing more

quality teachers will do little for teacher quality if the best teachers are not hired” (p. 229).

Hiring and retaining teachers, then, is essential to school quality and school improvement.

Principal work includes a varied range of instructional and managerial tasks, but research has repeatedly emphasized teacher selection and training—that is, human resource management—as one of a principal’s most critical jobs with respect to increasing student achievement in a school (Murphy, 2017). The majority of a principal’s influence on students is indirect, and takes place through the instructional work of teachers as they are selected and retained by principals. Principal autonomy to hire teachers has increased over the past three decades (Engel, Cannata, & Curran, 2018). While districts were historically the primary agents of teacher hiring, principals have reported more perceived control over the processes of hiring and assigning teachers. The quality of a teacher hire is significant for the health of the organization: hiring a quality teacher immediately offers leverage in classrooms and developing teachers results in fewer resources devoted to cyclical recruitment and induction efforts. Taken together, principals’ hires have the potential to increase student achievement, preserve school resources, and provide longer-term institutional stability.

Teachers, especially new and early career teachers, leave schools at an alarmingly high rate (Guthery & Bailes, 2019; Ingersoll, 2001). This is especially true for schools categorized as high-needs or hard-to-staff because they have high proportions of students of color, students living in poverty, students who chronically underachieve on standardized assessments, or some combination thereof (Watlington, Shockley, Guglielmino & Felsher, 2010). Additionally, teacher who entered the profession via an alternative certification program or who were initially placed into a charter (as opposed to traditional public) school are more likely than their traditionally certified counterparts to leave the profession within five years (Guthery & Bailes, 2019).

Whether teachers depart the school or the profession is immaterial to the individual school which absorbs the financial and human resource cost of teacher attrition. In a financially under-resourced organizational environment, dollars spent on recruitment may mean fewer dollars spent on updated curricula, professional development, or safe, updated facilities. Not only do principals have to make challenging decisions about terminating employment for ineffective teachers but they also need to make effective hiring decisions in order to promote continuity of the academic program. The burden of human resource management—including both hiring and retention—falls heavily on school leaders in these contexts.

Teacher churn is not limited, however, to teachers who are new to a school. Atteberry, Loeb, and Wyckoff (2017) find that nearly 40% of New York City teachers are in some way novice each year—they may be new to the profession, the district, the school, the assignment within the school or some combination. The authors find that that all degrees of newness have some significant negative effect on student achievement but within-school reassignments are the least costly to students. Some number of reassignments are essential because schools' needs change as do teacher preferences but principals who retain teachers within a building mitigate student achievement losses while also reaping the benefit of teachers who stay in both the profession and the building.

Hiring of teachers varies widely depending on context, school level, time of year, and the school's level of achievement. Principals exhibit different employment styles when recruiting beginning teachers as compared to veteran teachers (Broadley & Broadley, 2004). Additional research indicates that principal hiring is highly consistent across principals: Mason & Shroeder (2010) found no significant differences between school or individual principal characteristics and their preferences for different facets of a teacher candidate's application. Finally, timing in the

school does play some role in patterns of hiring teacher candidates. Engel (2012) found that urban schools tend to extend offers of employment to teacher candidates much later in the hiring cycle than do their suburban counterparts. While this may not directly mean that urban schools tend to hire lower quality teachers, late hires still represent disruptions to school systems and academic programs.

Our research attends to patterns of principal hiring over time, rather than directly addressing the quality of hires. Several teacher labor market findings remain relevant to our investigation. Loeb, Kalogrides, and Beteille (2011) find a host of key differences between effective and ineffective schools: individual teachers with high value-added scores tend to transfer to schools with higher aggregate value-added ratings and more effective schools provide more equitable class assignments to their novice teachers. Their findings suggest that principals' roles in hiring and assigning teachers have major import for sustaining teachers both in the building and in the field. It stands to reason, then, that principal expertise in the recruitment and hiring processes may contribute to the equity teachers perceive in their roles and facilitate longer stays within a single school.

Principal turnover

Tran and Buckman (2017) discern three types of movement among principals: within a district at the direction of the central office, voluntary in-district movement, and movement outside of the current district. State datasets often mask whether the third type of movement involves a move to a district-level or central office position or a move that takes the principal out of the profession. In traditional public schools, principals are typically former teachers following a conventional career advancement pathway (Ni, Sun, & Rorrer, 2014; Chubb & Moe, 1990). As principals accrue career benefits associated with seniority and reputation, they are increasingly

able to move to schools of their choosing which are likely to be those with more resources, more desirable working conditions, and fewer at-risk students (Loeb, Kalogrides, & Horng, 2010). The typical tenure of a traditional public school principal is four years and, when principals move schools, they are likely to retain the role of school leader in another building and mostly within the same district (Ni et al., 2014). This may be partially attributable to the fact that traditional public schools are structured similarly, and thus school leadership experience may be portable across relatively similar contexts and combined experience in several schools may contribute to school leader improvement in key aspects of the job.

Other authors have examined the demographic characteristics of principal leavers and found that a school leader's own race and gender are not related to turnover (Tekleslassie & Villarreal, 2001). However, principal turnover is associated with school and student characteristics, including the proportion of minoritized students, school level, school size, and the student-to-teacher ratio. Principal workplace satisfaction is a key predictor of turnover but intent to leave can change when systems implement policies that support greater satisfaction of school leaders. Additionally, Tekleslassie and Villarreal (2001) find that patterns of principal turnover tend to mirror patterns of teacher movement: as schools are higher performing, teachers are more likely to stay. The reverse is also true: as teachers obtain more experience, they are likely to leave schools with records of lower academic achievement and higher proportions of students who are minoritized or poor. Principals are also likely to leave buildings that fail to meet AYP (annual yearly progress) goals and likely to stay as schools meet AYP consistently. Given that replacing a principal tends to cost \$75,000 nationally, cycles of principal turnover and replacement may redistribute valuable resources away from instruction and therefore further

distance high-needs and hard-to-staff schools from their mandated academic benchmarks (Ingersoll, 1999; Weinstein, Schwartz, Jacobitz, Ely, & Landon, 2009).

Not only is principal churn financially costly, but it entails relational and organizational costs, which have enduring implications for the organization (Finnigan & Daily, 2017). This extends throughout a system: constant churn, which produces organizational instability, results in erosion of the administrative vision or clear messaging across the school. Additionally, when relationships are constantly disrupted by churn, it results in decreased network ties within the workplace. Such decreased network density is likely to have negative implications for workers' intentions to stay. In the presence of inconsistent relationships, morale among colleagues is likely to decrease and tenure within organizations is subsequently likely to be shorter (Boyce & Bowers, 2016)

Prior research finds correlations between principals' years of experience and elements of their performance in schools (Bastian & Henry, 2015; Bartanen, 2019; Clark, Martorell, & Rockoff; Grissom, Blissett, & Mitani, 2018). However, uncertainty persists about whether the improvements identified in those studies—which are largely measured by student academic achievement—may be attributed to individuals' improvement or to the ways in which ineffective principals tend to exit the profession. Additionally, the degree to which principal improvement is portable or transferrable across settings is virtually nonexistent. In a notable exception, Bartanen (2019) establishes early evidence that “principals improve substantially over time as measured by increases in student test scores and ratings from supervisors” (Bartanen, 2019, p. 25) but ambiguity remains as to the returns to principal experience when it comes to teacher turnover.

Organizational stability

As currently structured, incentives in school systems tend to deter individual from extended tenure in schools. Principals of high-performing schools who depart for other jobs typically move to higher paying positions and increase their salaries by about 5% per move. In a school that pays about one standard deviation below the system's mean, the likelihood of principal turnover is nine times greater than the national average (Papa, 2007).

Organizational stability is a characteristic of healthy schools and predictive of overall improvement. Principals are essential to directing the routines, practices, and policies that contribute to stability and their hiring practices are included in their work to create stable institutions. Crowson and Porter-Gehrie (1981) developed early conceptions of the principalship (and specifically of the urban school principalship) as a lynchpin of organizational stability. The authors characterize the executive position as chiefly responsible for organizational survival. They identified specific stability behaviors, which included: disciplinary stability, event management, behavior and image control, managing influences external to the school, and assuaging staff conflicts.

Together, the tasks which Crowson and Porter-Gehrie (1981) associate with the principalship comprise a way of anchoring the organization and buffering it against destabilizing influences. Teachers, especially when they turnover frequently, contribute to organizational instability. Mason & Shroeder (2010) conceptualize hiring as reduction in uncertainty; the greater the pool of potential teachers, the greater the uncertainty. Yet, a principal's stabilizing influence extends beyond practices associated with individual teachers' hires, movements, or terminations. The principal's role is critical to the health of the organization and especially the

organization's ability to withstand systemic shocks such as leader or teacher turnover, budget cuts, and extreme or rapid changes in the composition of the student body.

Turnover among teachers is known to have significant negative influence on student achievement and some of that effect is due to the social and relational erosion that takes place in an environment of frequent turnover (Ronfeldt, Loeb, & Wyckoff, 2013). Even though principals' influence on student achievement is indirect, they occupy a unique position in school social networks and so principal churn results in a particular disruption to organizational effectiveness. "Principal turnover lowers school achievement by .03 standard deviations in the next year....[and] principal turnover also increases teacher turnover" (Bartanen, Grissom, & Rogers, 2019). Additionally, Bartanen, Rogers, & Woo (2020) find that principal movement increases the likelihood that assistant principals either leave schools or leave the school leadership pipeline, further underscoring that principal turnover destabilizes personnel at all levels of the organization. Both principal and teacher turnover undercut school social resources but schools tend to be more resilient to teacher than principal churn; principal turnover is a destabilizing influence within school social contexts (Hanselman, Grigg, Bruch, & Gamoran, 2016).

Only a few studies have conceptualized teacher labor force concerns within schools or districts as issues of organizational health. Boyne and Meier (2009), for example, describe organizational stability as its ability to withstand turbulence, which they subsequently define as the unpredictable change over time in both munificence (the economic resources available to an organization) and complexity (the heterogeneity of an organization's clients). Stability itself has two dimensions: vertical stability is the overall consistency of assigned hierarchical roles and horizontal stability is the degree of horizontal differentiation within the organization. In schools,

the setting for their study, vertical stability is measured as a function of total constancy across all leader and staff roles and horizontal stability is measured as a function of turnover in each of Texas's six teacher classifications. They find that more stable organizations are able to better withstand turbulence in terms of standardized test scores.

Holme, Jabbar, Germain, and Dinning (2017) also offer a novel conceptualization of teacher turnover from the vantage point of the organization. They assert that conventional measures of teacher turnover fail to accurately describe the degree to which schools grapple with teacher shortages for years on end. The goal of their essay is to interrogate conventional measures of teacher turnover and to subsequently offer a series of alternative measures that may invite more tailored, precise treatments for individual schools. Instead of employing only a short-term (typically year by year) measure of teacher turnover, Holme and colleagues borrow from United States census measures which examine the difference between cross-sectional poverty and chronic poverty. Similarly, Holme et al. develop a series of indicators of substantial turnover year after year, which they term chronic instability.

Together, the studies reviewed here suggest that when a school leader turns over, organizations are less likely to be successful for several reasons. The costs to replace a school leader are high in both financial terms and human resources. School-level achievement is influenced by principal turnover: student academic achievement decreases in the two years prior to a principal turnover event and continue to decrease two years after that principal's exit (Bartanen, Grissom, & Rogers, 2019). The time it takes for a new principal to establish instructional coherence and stabilize the teacher workforce may require more years than the average principal stays in a school.

Research Questions

This study investigates the influence of principal tenure on the retention rates of the teachers they hire over time with the following research questions:

1. As principals accrue years of experience in one school, are they more likely to hire teachers who persist to three or five years in the school?
2. And, if there is improvement in the three- and five-year retention rates of their new teachers, is that improvement portable to another school?

Data and Analytic Approach

Data

We built a unique dataset using Texas state data inclusive of all teachers and principals from 1999 to 2017, with individuals matched across time, roles and schools. Additionally, we also used Common Core Data (National Center for Education Statistics, 2017) to add school and district level characteristics across time. The full compilation resulted in a panel dataset spanning 18 school years inclusive of 16 million teacher level observations of roughly 750,000 unique teachers over 18 years and the 11,700 principals who hired them. It is from this master database that we defined the following variables for our study.

Identification of Principals

We defined a new principal as the person assigned full-time to the role of principal who had not been in that role in any public school in the state of Texas in the previous two years. We labeled their initial entry year into a campus as their first school, provided they were only assigned to one school in that year. We excluded 113 to 150 principals each year who were assigned to more than one schools during a single school year. We then calculated the number of

years a principal was in each school and the number of school-to-school moves separate from the number of years of experience in any public school and in any role.

Sample Descriptives

We first examined the overall characteristics of principals in our study, including gender, race, mean experience, tenure in school, and pay. Table 1 describes the principals in the study and the characteristics of their assigned school for each move.

Table 1. Summary statistics for principals at each campus

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Principal Descriptives	Campus 1		Campus 2		Campus 3		Campus 4	
	N	%	N	%	N	%	N	%
Gender								
Female	7,065	60.30	1,668	53.14	331	46.16	61	42.66
Male	4,652	39.70	1,471	46.86	386	53.84	82	57.34
Race								
White	7,426	63.38	1,960	62.44	442	61.65	90	62.94
Black	1,573	13.42	381	12.14	83	11.58	19	13.29
Hispanic	2,500	21.34	734	23.38	181	25.24	33	23.08
Other	218	1.86	64	2.04	11	1.53	1	0.70
	M	SD	M	SD	M	SD	M	SD
Experience	15.19	8.30	16.78	8.05	43	17.73	18.10	9.33
Basepay	66,473	13,479	74,481	14,328	78,530	14,756	83,175	21,856
Tenure at Campus	4.07	3.11	3.76	2.67	3.47	2.50	3.45	2.25
% Avg 5yr Teacher Retention	27.30	0.12	27.08	0.25	24.64	0.53	24.64	0.53
Avg Num Teachers Hired	9.23	0.43	11.52	0.13	12.55	0.31	12.55	0.31
Avg Num Teachers Stay 5ys	2.44	0.02	3.22	0.05	3.29	0.12	3.53	0.34
Campus Descriptives	M	SD	M	SD	M	SD	M	SD
% Non-White	62.01	30.98	62.36	31.02	62.35	31.36	66.77	30.99
% Free Reduced Lunch	52.52	27.37	53.15	27.21	54.94	26.13	54.43	27.83
Total Students	561.83	450.87	629.08	568.86	646.06	600.04	773.38	685.47
Avg Retention Prior	73.29	16.04	74.72	14.61	75.50	14.07	73.51	14.60
Unique Cases	11,717		3,139		717		143	
Panel Observations	37,003		8,427		1,733		287	

Note: 23 principals had a 5th school and 5 principals had a 6th school

The sample includes 11,717 unique principals who started in their first schools from 2001 to 2012. The majority of principals were in one school for the duration of our data, and a third of the principals moved to a second school. Only 6% of the principals went on to a third school, and 1% led a fourth school. Only a fraction of a percent moved to a fifth or sixth school. Women were twice as likely to be a new principal in our sample, however, men represented half of the principals in subsequent schools, meaning men are more likely to move schools (Gates, et al.,

2006). There does not appear to be a differential trend in number of campus moves based on race for the principals in our dataset.

We find that new principals have a mean educational experience of fifteen years. The typical tenure of a principal in a school is 4.07 years for the first school and just under four years for subsequent schools. The Texas average of four years echoes Levin & Bradley (2019) national findings, which also estimates the average tenure for a principal is four years. We expect that, with every campus move, the principal's tenure in that building will be shorter due to seniority in their career and some right censoring of data. Reaffirming Papa (2007), there appears to be a salary increase with every move, however, since principals are paid on a step-system, it is likely that some of what appears to be a pay increase is instead related to the pay scale dependent upon years of experience. Principals do tend to move to bigger schools with each subsequent school assignment. Again, there is some sample selection happening as rural districts do not have multiple campuses to move between, so the sample of principals at campuses 3 and 4 is less likely to include rural districts. While there is a slight decrease in teacher retention with each subsequent school, those differences are not statistically significant.

Measures

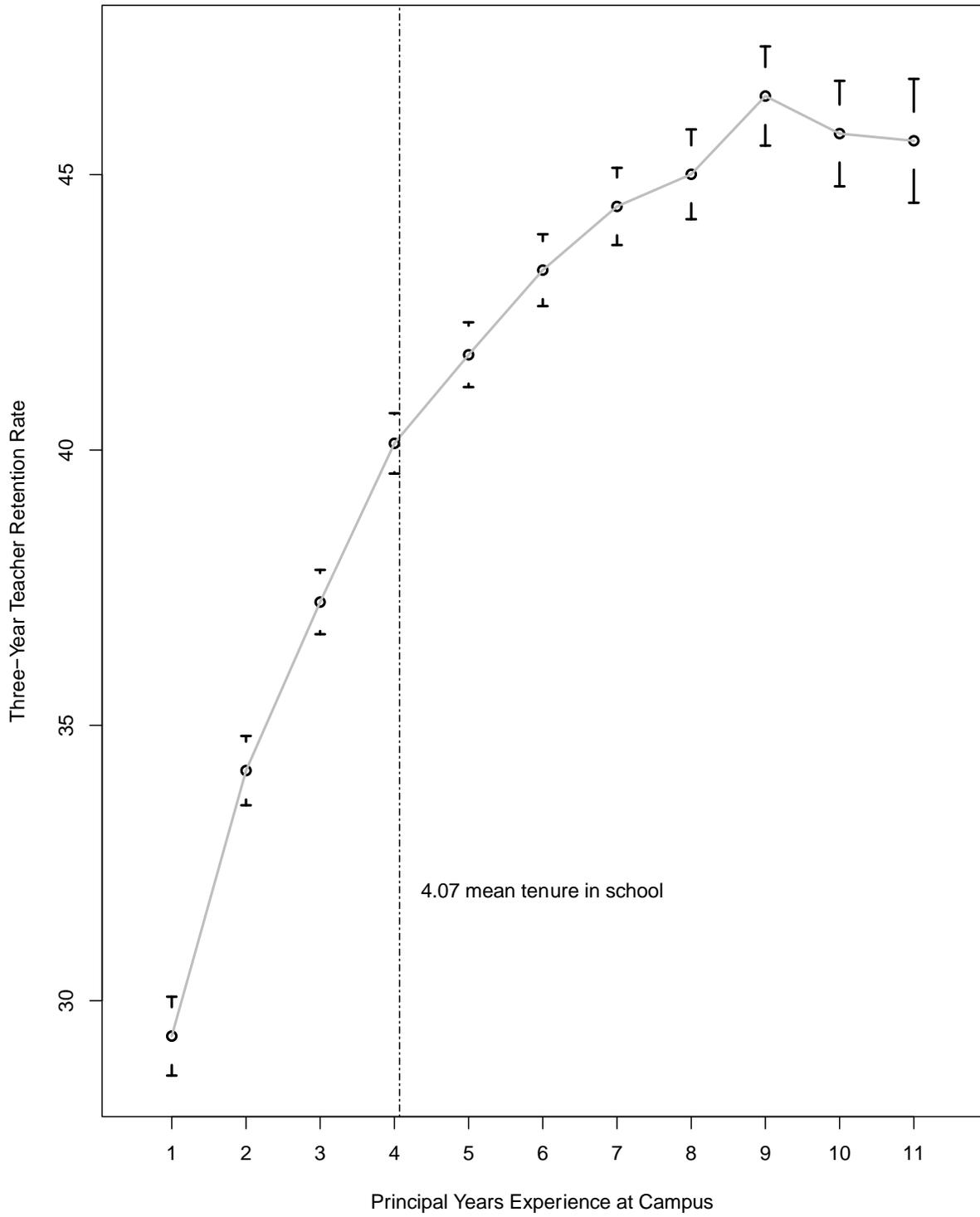
Teacher Retention

We calculated teacher retention (the dependent variable) as the percentage of teachers hired in each year of the principal's tenure at each school that remained in an instruction or leadership position within that school three and five years later. We defined a new teacher as a full-time teacher of record for a class. A new teacher was counted as hired by the principal in the school if that teacher met three criteria: 1) They had to have been hired starting in the year the principal was assigned to their school, 2) They were not employed as an aide, or working in the

building in any capacity in years prior to the principal's arrival, and 3) They had to initially be assigned to a classroom teacher position. We excluded aides and other building staff employed in the school prior to the principal's arrival, based on the assumption that principals would have less autonomy over the selection of personnel already working within the building. While there remains some discussion amongst researchers about what constitutes longevity in school, we selected the three- and five-year benchmarks due to the five-year acceptance in research (e.g., Ingersol, 2005; Guthery & Bailes, 2019) and the three-year benchmark due to the statewide decrease in longevity based on policy analysis in Texas by the state board of education (Reyes & Alexander, 2017). Based on these parameters, the first principals enter school in 2002 and the last year of hiring is 2012 for the five-year benchmark and 2014 in order to calculate the three-year retention rates by the end of the data in 2017. Figure 1 plots the mean three-year teacher retention rate of teachers hired in each year of a principal's tenure in school. Figure 1 illustrates that the percentage of teachers who stay at the school increases with each year of situational experience the principal gains hiring for that school. Additionally, the demarcation line illustrating the average length of tenure for a principal in a Texas school at 4.07 years.

Figure 1. Retention Rate of Teachers Hired in Each Year of Principal Tenure

Retention Rate for Teachers Hired in Each Year



School Stability

In order to account for school stability prior to the new principal's arrival, we created covariates that averaged the retention rates of teachers on that campus prior to their arrival. By averaging the teacher retention two years prior to the principal's arrival, we calculated a representative measure of the recent stability of that school, rather than capturing only the stability of the year in which the previous principal departed the school. Additionally, averaging the prior two years attenuates any one year's fluctuation in teacher turnover. This average was possible for all but the first year (2000-2001) where we only used one prior year. From there, we divided all levels of school stability into quartiles, and the cut points for quartiles are: 69.1%, 77.78% and 84.62%. The schools in the lowest quartile of teacher retention (below 69.1%) prior to the new principal's arrival are interpreted as relatively the least stable.

Analytic Approach

In order to measure principal hiring success year after year, we assembled a unique panel dataset with the principal as the unit of analysis. However, we needed to account for the likelihood of overestimation due to observational dependence within individuals rather than across a panel of independent observations. By using fixed effects with robust standard errors clustered at the ID-time level, we controlled for the autocorrelational and heteroscedastic nature of longitudinal panel data (Singer & Willett, 2003).

Model Identification

We employed regression with fixed effects controlling for principals in schools in each year, using robust standard errors to estimate the influence of principal experience on the three- and five-year retention rates of the teachers hired in each year at each school. We estimated the following equations using fixed effects at the ID-time level and robust standard errors:

$$\text{Model 1: } Y_{is,t+3} = \beta_{1:11} \text{Years on Campus} + \beta_{FE} + \beta_i + \beta_s + \varepsilon_{ist}$$

$$\text{Model 2: } Y_{is,t+5} = \beta_{1:11} \text{Years on Campus} + \beta_{FE} + \beta_i + \beta_s + \varepsilon_{ist}$$

Model 1 estimates $Y_{is,t+5}$ the three-year retention rate of teachers hired in year t , by principal i , in school s . $\beta_{1:15}$ *Years on Campus* is the number of years' in role attributed to a principal on that campus. β_{FE} is the fixed effect control at the individual level, for the unique variance attributed to individual principal characteristics and the year controlling for contextual changes per annum. β_i controls for time-varying attributes of principals, and β_s controls for time-varying attributes of schools. The standard errors are ID-time clustered for each principal i , in school s , in each year t . Model 2 estimates the same equation, but using the five-year benchmark of retention.

School and Principal Controls

The models include time-varying and invariant school level controls including the urbanicity of the school (urban, suburban, rural or charter) and the campus level (elementary, middle, high school or mixed). Additional controls include the proportion of students eligible for free- and reduced-priced lunch, the proportion of minoritized students, the prior teacher retention of that school, and the campus achievement rating (meeting state standards, improvement required, or not rated).

Additionally, the models included fixed covariates for principal gender, race, as well as time-varying covariates including: years of experience, the number of schools the principal has led, the number of years as principal on each campus, base pay, the number of teachers the principal hired each year, and educational attainment (bachelors, masters, or doctorate).

Sensitivity Checks

We employed a variety of robustness checks to test the sensitivity of variable definition, measurement and model selection. For the three year and five-year retention fixed effects model,

we ran a random effects model and compared the two using a Hausman test. In both cases, we rejected the assumptions of the random effects model and used fixed effects. We also tested the sensitivity of calculating teacher retention rates by defining retention as teachers who remained in the classroom, versus those who remained in the school in a broader educational capacity. By rerunning the models testing only for classroom teacher retention rates, the effect sizes are attenuated by about half a percent to a whole percent in every year. We also estimated models 1 and 2 using first difference to test the sensitivity of the method of analysis (Table 2).

Results

We find that the rate at which teachers are retained does improve over a principal's tenure at the school. Table 2 reports the main effect of principal years on the two main outcomes, the three- and five-year retention rate of teachers as estimated by both fixed effects and first difference models. When looking at the three-year retention rate, we find that the rate improves with small gains in the first four years, and then significantly greater gains starting in the fifth year. While the year over year gains do tend to plateau, the retention rates of teachers hired by a principal are significantly higher with increased duration in the building. When considering the five-year retention rate of teachers, principals show statistically significant improvement in year five (5.13***) according to the first difference model, and year 7 (7.73***) in the fixed effects model.

Table 2. Principal Experience Main Effect

Covariates	3 year Retention				5 year Retention			
	Fixed Effects		First Difference		Fixed Effects		First Difference	
	B	SE	B	SE	B	SE	B	SE
Year 2	1.83	1.20	1.73	1.43	0.26	1.01	0.28	1.30
Year 3	3.92**	1.55	2.57*	1.50	2.17*	1.32	1.08	1.59
Year 4	3.79**	1.45	3.73**	1.76	0.93	1.47	0.96	1.66
Year 5	6.12***	1.93	6.90***	1.77	3.17	2.17	5.13***	1.95
Year 6	5.36***	1.95	4.76	3.05	2.15	1.62	4.36**	1.91
Year 7	8.98***	1.67	8.68***	2.15	7.73***	1.72	8.77***	2.49
Year 8	10.17***	1.46	6.87***	1.50	6.16***	1.83	6.84**	3.38
Year 9	8.49***	3.32	9.14**	4.26	6.29**	2.66	7.85**	3.26
Year 10	7.83**	4.06	7.78**	3.18	5.02	4.24	3.71	3.34
Year 11	7.30*	4.07	3.82	5.48	9.69**	4.06	6.08	3.83
Campus 2	1.70**	0.68	2.63***	0.65	1.07*	0.57	1.17	0.70
FE Controls								
Individual	X		X		X		X	
Year	X		X		X		X	
Observations	31,043		31,043		29,732		29,732	
Hausman Test	0.00				0.00			

Note: All error terms are clustered by individual by year and Hausman results compare each fixed effects model to random effects model

*p<0.1; **p<0.05; ***p<0.01

The portability of improved teacher retention rates

From the primary analysis, we established that there were annual gains in the retention rate of teachers for principals who accrued years of experience at a school. The main fixed effects and first difference models show that a principal moving from school 1 to school 2 does increase the base retention rate in the first year by about 2% (Table 2). In order to test the effect of moving schools on the rate of improvement of principals' hiring retention rates, we tested the interaction of years' experience and number of campuses in the fixed effects model. The coefficients for the interaction of campus and years' experience were not significant, indicating that there was not a significant difference in the rate of improvement of principal hiring between the first and second school. We then ran separate models using pooled OLS to estimate the intercept and slope of retention rates to compare principal improvement over time between the two campuses.

Figure 2.

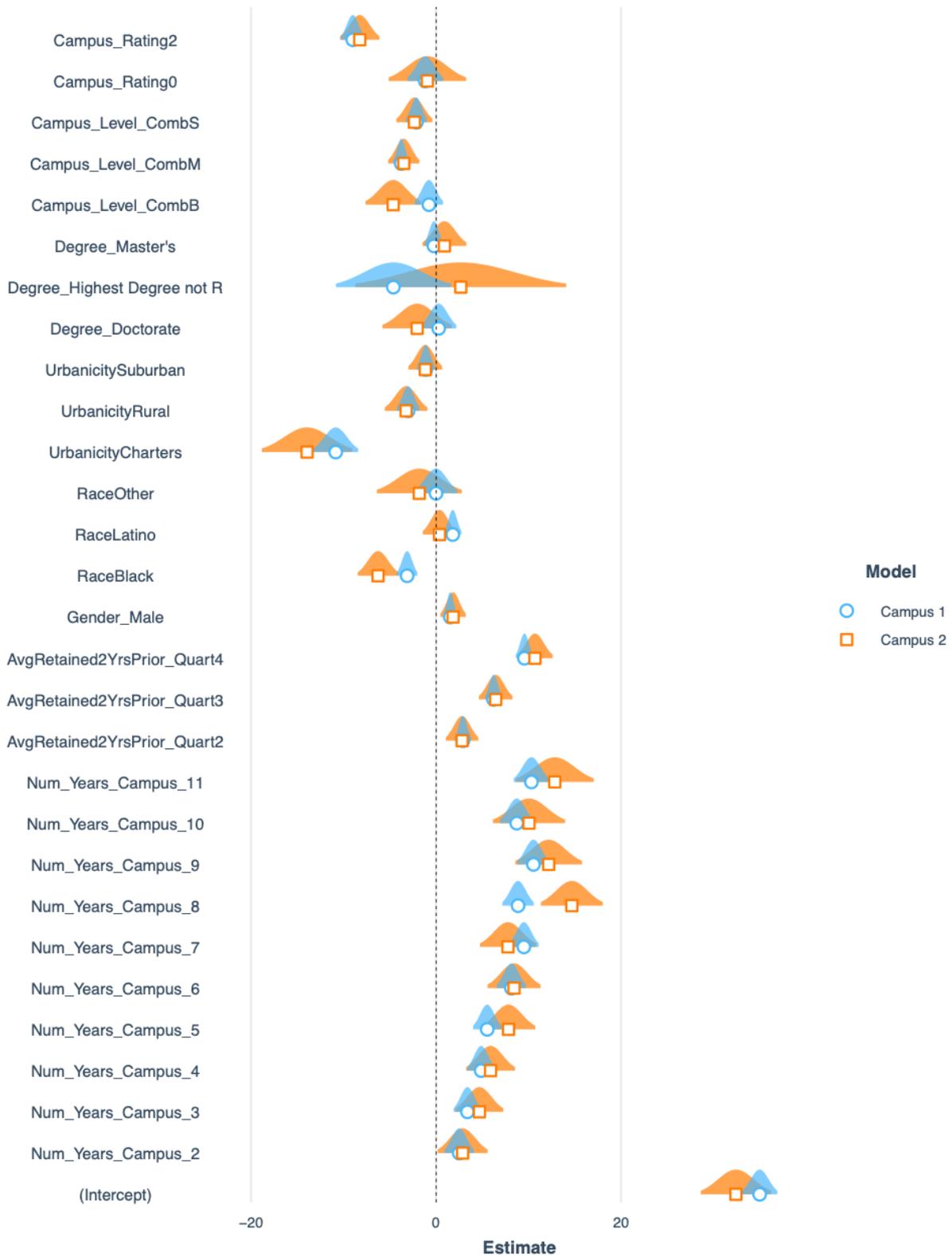


Figure 2 illustrates the differences between the first and second campuses. The interpretation of the effects is in reference to a white male principal with a master's degree, in an urban elementary school rated as acceptable, but in the previous two years was in the lowest quartile of staff retention with individual and school level controls. There is not a statistically significant difference in the initial success rate of teacher retention, nor the trajectory of improvement with subsequent years of school experience, other than year 8, which we attribute to likely Type I error.

Teacher Retention Rates and Student Achievement

We also considered the possibility that principals who increased their school three- or five-year retention rates did so at the expense of school quality. Perhaps principals with higher retention rates were retaining teachers they should have been letting go, thus the outcome variable of improved retention over time was actually a proxy for diminished personnel management as Grissom and Bartanen (2019) have suggested. As a robustness check on our interpretation of the results, we tested whether or not principals with a lower teacher retention rate were actually more likely to improve overall school ratings.

In addition to the fixed effects and first difference models in which we controlled for school ratings, we also looked at the small subset of principals who entered a failing school in their first year as principal. The three-year retention rate of teachers hired by a new principal in their first year at a failing school is 28.50% compared to a new principal hiring in a school in good standing is 41.06%. We then examined the teacher retention rates of principals assigned to failing schools in subsequent years to see if principals who had increased the school rating had done so with higher teacher turnover, indicating lower retention rates could be interpreted as an

organizational benefit. However, we found that those principals who had raised the rating of their school in year 2, 3 and 4 had higher retention rates (~35%) than principals whose ratings stayed flat. Principals who helmed persistently failing schools also had lower 3-year retention rates of teachers (~25%), indicating that principals who had originally entered a failing school and increased school ratings had also simultaneously increased teacher retention.

Finally, while this study does positively associate increased teacher retention rates with the length of a principal's tenure in a school, it is limited to a strict interpretation. Further research is needed to determine whether a principals' increased tenure improves teacher retention, or if the principal improves their hiring practices to select teachers who will stay. This study only concludes that the longer a principal is in school, the more likely they are to hire teachers who will stay. Further ongoing analysis will quantify the cost of more and less effective principals in terms of their legacy in shaping a teacher corps for a school.

Discussion

We find that Texas principals increase the teacher retention of their schools but that increased stability requires a longer tenure in a single school than is typical in Texas or nationally. The average tenure of a principal in Texas is four years for the first school, and slightly less than that for each subsequent school. However, we identify a significant interaction between a principal's tenure in a school and improvement in building-level teacher retention rates over time. We find that a principal in year three begins to hire teachers who stay to both three- and five-year benchmarks at increasingly higher rates. These gains continue to increase over time: at year seven, principals plateau and retain three-year teachers at rates almost 10% better than in their first years in the school. A principal's seventh year is also significant for the five-year teacher retention benchmark. That is, with seven years of site-specific experience, the

principal improves the rate of five-year teacher retention by 6-7%. Principals' hiring success tends to peak at the end of their tenure in schools with a roughly 10% improvement in selecting teachers who will stay at the school for at least five years. We therefore offer a novel framing of teacher turnover, which accounts for improved chances of retention from the point of hire. Principal improvement, then, can also be understood as skill development in the area of human resource management.

Prior research addresses concerns that increased teacher retention over time may be detrimental to a school's achievement. Henry and colleagues (2020) find that principals increase test scores over the first three years of their tenure in schools and that teacher turnover is negatively associated with student test scores. This further substantiates our interpretation that increased teacher retention is a positive outcome for school stability that does not necessarily come at the cost of school achievement. Additionally, Bartanen (2019) also finds in a working paper that principal tenure is positively associated with raising student test scores. Given the prior work associating principal tenure with increased student achievement, it is likely that principal tenure positively influences teacher retention without sacrificing student achievement.

Principals who move to a second school are likely to see a slight bump in teacher retention that appears to be attributable to the principal's experience. In the fixed effects analysis, we find that principals who move buildings have a 1.7% higher initial retention rate at the second school than at the first. However, the benefit of experience in a previous school does not appear to translate into long-term increases in selecting teachers who will stay in the subsequent school. Analyzing the retention rates for a principal at schools 1 and 2 shows that, while there are statistically significant returns to principal experience year over year, the portability of the site-specific expertise from the first school is dubious (Figure 3). The benefits of previous experience

wane quickly and principals effectively start over with regard to establishing their hiring expertise in a new setting. That is, teachers hired by a veteran principal in a new school do not stay to either the three- or five-year thresholds at markedly different rates than do teachers hired by that same principal in year one at school one. We show that principals do indeed improve these skills over time in a single school, but on average do not stay long enough for a school to experience the maximum benefit of a principal's expertise. Additionally, site-specific expertise seems to play a significant role in principals' hiring efficiency and the degree to which they are able to orchestrate or contribute to stability in a school.

Finally, for the few principals who stay longer than either the Texas or the national average, we find school workforces stabilize under their leadership and principals significantly improved over time in their ability to retain the teachers they hired. In order to estimate the importance of prior teacher workforce instability in advance of their start, we examined the level of instability at the time of the principal's initial placement. We found that, controlling for average retention in the two years prior to the principal's arrival, principals in schools in the highest quartile of retention tended to start their tenure by retaining 4-6% more teachers on average than did principals in the lowest quartile of retention. This suggests that first-year principals in a high-stability school had teacher retention rates equivalent to that of a fifth-year principal in a low-stability school. Thus, first-year principals in a stable, low-turnover school have a significant and lasting advantage over first-year principals who enter an unstable, high-turnover school. While we show that it is possible to stabilize previously unstable schools after several years of a principal's hires, the resources dedicated to that process are necessarily redirected from other elements of the academic program. If teacher retention is a resource that contributes to organizational stability, and stability is a years-long endeavor, we imagine this gap

exacerbates inequities that hard-to-staff schools already face. We address each of these findings in turn and discuss their implications for policy, practice, and future research.

Implications

Research repeatedly underscores our finding regarding principal tenure in a single school: school leaders move on from their placements about every four years (e.g., Taie & Goldring, 2017). As indicated in a recent report, that average masks much more variation including the fact that about one in five (18-21%, depending on school contextual factors) novice principals will turn over every year (Levin & Bradley, 2019). That study goes on to say that principals tend to leave their current school placements for five main reasons: insufficient preparation or development, unsatisfactory work conditions, low salaries, lack of autonomy, or onerous accountability policies. On the other hand, some personal and contextual factors offset the likelihood of principal turnover, including: age, race, school urbanicity, and type of move (e.g., Papa, 2007; Baker, Punswick, & Belt, 2010; Tekleselassie & Villarreal, 2011; Farley-Ripple, Bruton, McDuffie, & Solano, 2010). Our findings show that principals' experience offers maximum benefit to the school in terms of minimized teacher turnover starting in their fifth year. Yet the average principal will not persist to a fifth year in one school placement. While compelling evidence exists about the factors at work in principals' career movement decisions, it behooves researchers to better understand why the mean time to turnover functionally precludes schools from the stabilizing benefit of principal experience. More research, then, is needed regarding the supports and incentives necessary to retain principals.

Additionally, principal preparation programs must integrate more human resource management training into their curricula. The main candidate pool from which principals are drawn are career instructors who pursue school leadership positions so their on-the-job training is unlikely to include human resource management (Tweedie, Riley, Chubb & Moe, 1990). Hess and Kelly (2007) examined what proportion of 56 different principal preparation programs included managerial training, including the human resource capacities essential to effective

teacher recruitment and retention. They found that an average of 11% of all course weeks were dedicated to instruction in managing personnel. Additionally, more than two thirds of the programs in the study “covered the hiring process only once or not at all” (p. 13). The absence of training in human resources results in school leaders who are ill-equipped to manage school staffing. . Instead, principal managerial skills are, in this regard, largely left to chance as is the workforce stability of the schools they lead.

Finally, state and district policy shifts may bolster principals’ commitments to individual schools for longer periods of time. Given the costs of principal and teacher turnover and the degree to which the two are often correlated (Hanselman, Grigg, Bruch, & Gamoran, 2016), large school systems may choose to invest in financial or resource stipends or bonuses for school leaders who remain in their placements longer than the national mean of four years. Incentive structures are currently designed such that, as principal accrue years of experience, they qualify for more desirable schools; that is, those schools with more experienced teachers, more resources, and fewer high-needs students. Simply put, principals move among schools in much the same way that experienced teachers tend to. Additionally, pay scales typically reward years of experience as well as moves to wealthier schools and districts, allowing principals to pursue better working conditions, more autonomy, better resourced organizations, and more effective leaders as they accrue years of experience. Rational choice disincentivizes the kind of longevity needed to turn the tide of principal- and, subsequently, teacher- stability in schools. If, as an alternative, policy systems incentivize principals to stay for the duration of time it takes to stabilize a school, principals may be more likely to consider longer terms at each school rather than moving as often as they do.

This study offers a novel quantification of principal improvement over time and site-specific expertise as factors in organizational stability. We identify a significant interaction between a principal's tenure in a school and improved teacher retention over time in that same school. However, principals tend not to stay long enough to maximize their hiring effectiveness. When principals do leave, only some of their improvement is portable to the new school, thus illustrating the benefits of principal retention. Perhaps improved teacher retention is not a benchmark to be met, but a skill to be honed over time. If principals' hiring skill is malleable, then education systems are likely to experience large-scale returns to investments in principal coaching. Organizational stability is a critical component of school improvement and we find that principal tenure is necessary to preserving or restoring that stability.

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