

Teacher Turnover in Organizational Context: Staffing Stability in Los Angeles Charter, Magnet, and Regular Public Schools

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Background/Context: *Studies that compare the achievement benefits of charter public schools versus traditional public schools (TPSs) yield quite uneven results. The quality and long-term commitment of teachers represent related mediators that may help to explain effective and ineffective charter schools. Early findings on the comparative rates of annual turnover—exiting from one’s school—appear to show higher turnover in charter schools relative to TPSs. But longitudinal data that allow scholars to track teachers over time remain rare. Little evidence exists on how organizational context may interact with individual teacher characteristics to further explain the propensity to leave one’s school.*

Purpose/Objective: *Prior research on teacher turnover focused mostly on whether or not and who leaves. Our research builds on and extends prior studies by investigating not only whether and who but also when a teacher leaves. The phenomenon of our study emphasizes the dynamic nature of teacher exit; namely, we are interested in examining when teachers are at the greatest risk of exiting schools. This dynamic focus marks a departure from the typical teacher turnover analysis in which exit is conceptualized as a status (i.e., exit or not).*

Population/Participants/Subjects: *We used a large sample of elementary (4,788) and secondary teachers (8,467) panel data (from 2002–03 to 2008–09) from the LAUSD. A little over 80% of the teachers in the elementary sample were female, while 61% of the secondary teachers were female. About 40% of the elementary and 47% of the secondary teachers were white. The average years of teaching experience was about two for both elementary and secondary teachers. Special education teachers accounted for 12% of the elementary and 15% of the secondary study sample, respectively.*

Research Design: *We combined event history and multilevel modeling analysis in order to investigate when a teacher exits his or her first assigned school and how organizational membership conditions decision processes at the individual level.*

Conclusions/Recommendations: *The longitudinal and multilevel analysis of teacher turnover supports our theoretical position that organizational dynamics and contextual factors are likely to condition the decision process made at the individual level and thereby influence individual behaviors (i.e., decision to leave a school at certain point in time). This cross-level theoretical perspective adds further support to the argument that focusing on recruiting capable teachers and paying attention to working conditions for long-term staffing stability are aspects of schooling that matter most for student learning, as opposed to a horse-race game (i.e., choice and competition).*

Charter school proponents argue that their decentralized form of schooling will produce stronger student learning outcomes by creating more motivating and innovative working conditions, compared with the organizational features that characterize traditional public schools (TPSs) (Chubb & Moe, 1990; Hill, Pierce & Guthrie, 1997; Nathan, 1996). But studies that compare the achievement benefits of charter public schools versus traditional public schools (TPSs) yield quite uneven results, depending upon state policy regimes, locations of charter schools, and variability in their internal organizational features (Center for Research on Education Outcomes [CREDO], 2009; Chingos & West, 2014; Zimmer et al., 2009).

The quality and long-term commitment of teachers represent related mediators that may help to explain effective and ineffective charter schools. Early findings on the comparative rates of annual turnover—exiting from one’s school—appear to be higher in charter schools, relative to TPSs (Gross & DeArmond, 2010; Harris, 2007; Miron & Applegate, 2007; Podgursky & Ballou, 2001; Stuit & Smith, 2012). We also know that persistently high rates of turnover can erode a school’s social cohesion and morale, as well as drive up costs related to recruiting and training new teachers (Guin, 2004; Milanowski & Odden, 2007; Roseman, 1981; Shields et al., 2001).

However, longitudinal data that allow scholars to track teachers over time remain rare. Little evidence exists on how organizational context may interact with individual teacher characteristics to further explain the

propensity to leave one's school. Prior research on teacher turnover focused mostly on whether or not and who leaves. Our research builds on and extends prior studies by investigating not only whether or not and who but also when a teacher leaves. The phenomenon of our study emphasizes the dynamic nature of teacher exit; specifically, we are interested in examining when teachers are at the greatest risk of exiting schools. This dynamic focus marks a departure from the typical teacher turnover analysis in which exit is conceptualized as a status (i.e., exit or not). We tracked 13,255 teachers in successive cohorts over the 2002–03 to 2007–08 period longitudinally so as to observe how long a teacher stayed teaching in his or her first assigned school before exiting.

Following individuals longitudinally and asking when teachers leave are important tasks. A longitudinal perspective on teacher turnover provides nuanced information on staffing stability at a school. Prior analysis of teacher turnover typically provides only average annual (or one-year) staffing turnover or stability rates. But, as a study of teacher mobility in Chicago public schools showed, “A focus on one-year stability rates obscures the enormous challenge that exists for many schools as they implement school improvement initiatives and professional development programs, and as they try to sustain program continuity” (Allensworth et al., 2009; p. 1). The average one-year teacher turnover rates, as Allensworth and colleagues (2009) pointed out, are limited because they mask the sobering statistic that many schools lose half of their teachers every three years. In contrast, our analysis produces a statistic, median lifetime, which tells us not only how long an average teacher stays teaching in a school before he or she exits but also sheds light on the fact that half of the teachers stay teaching in the school for shorter than the median lifetime. Therefore, median lifetime provides a more realistic picture of the stability of teaching staffing at a school than average annual turnover rates. Moreover, the longitudinal analysis of teacher turnover, with its focus on the timing of teacher exit, could provide empirical evidence on when intervention is most needed.

Second, like most previous empirical research on teacher turnover, we draw our theoretical framework from the economic labor market theory of supply and demand and relevant theoretical perspectives from sociology to guide our empirical analysis of factors influencing teacher turnover. We extend prior analysis by explicitly testing how organizational membership conditions decision process at the individual level and by examining the possible cross-level interaction effect between school type (charter school vs. TPS, which is a school-level variable) and teachers' characteristics (e.g., age, which is a teacher-level variable). The theoretical perspectives (i.e., cross-level interaction effect) and the focus of the study (i.e., when to exit)

require both multilevel modeling and event-history analysis. The combined use of this innovative methodology is another unique feature of our study. To the best of our knowledge, we are not aware of its application in studying teacher turnover to date. This in-sync feature between methodology and theory enriches our investigation and opens up new avenues for investigating the important topic of teacher turnover.

Finally, we have access to data from large samples of both elementary and secondary teachers in the second-largest urban school district in the country. This sampling advantage allows us to conduct analyses separately by the schooling level in order to compare and contrast similarities of and differences in elementary and secondary teachers' behaviors within the same district.

LITERATURE REVIEW

We first synthesize themes that have emerged from prior studies comparing charter schools and TPSs so as to provide a basis for our theorization on why charter schools tend to have higher teacher turnover than TPSs. We then describe the existing knowledge base on factors influencing teacher retention so as to show where the factors in our analytic model came from.

THEORETICAL ACCOUNTS OF TEACHER TURNOVER IN CHARTER SCHOOLS

It is well documented in the literature that charter schools have higher teacher turnover than TPSs (Miron & Applegate, 2007; Podgursky & Ballou, 2001; Smith & Ingersoll, 2004), though the reason for the high turnover is less understood (Stuit & Smith, 2012). Different studies offer different explanations. We focus on three plausible explanations alluded to by previous research. These explanations focus on three themes: (a) teacher demographic characteristics, in particular, correlated indicators of teacher qualifications such as teachers' age, years of teaching experience, and certification status; (b) school organizational context, conditions, and governance; and (c) personnel policy and management.

Teacher Demographics Including Correlated Indicators of Teacher Qualifications

Younger or underqualified teachers, who may not be committed to the teaching profession may be one explanation for charter schools having higher turnover rates than TPSs. Charter schools typically employ younger, more academically high achieving but less experienced and sometimes uncertified teachers than TPSs (Gross & DeArmond, 2010; Stuit & Smith,

2012). Research has shown that age is a significant predictor of teacher turnover, with younger teachers at a greater risk of leaving the teaching profession or switching schools than their older peers (Ingersoll, 2001; Stuit & Smith, 2012). Because charter schools enjoy more freedom than TPSs from legislative regulations, studies suggest that they often are able to hire less experienced but more academically achieving teachers (e.g., Teach for America recruits who tend to be graduates of highly selective universities) (Baker & Dickerson, 2006; Burian-Fitzgerald & Harris, 2004; Podgursky, 2006). On the other hand, research found that less experienced teachers were at greater risk for exiting teaching than their more experienced peers (Boyd et al., 2005; Hanushek, Kain, & Rivkin, 2004). Certification has also been examined extensively as one of the key teacher qualification indicators in teacher turnover studies. Studies suggest that higher turnover rates tend to exist among teachers who are not certified than among those who are certified (Boyd et al., 2008). Because these teacher qualification factors have been shown to be statistically significant predictors of teacher turnover, some researchers have argued that charter schools face high teacher turnover because of the demographic characteristics of teachers they tend to hire (i.e., young, inexperienced, and often uncertified individuals who might not be committed to teaching as a lifetime career). For instance, Stuit and Smith (2012) found that teachers under the age of 30 (young) and teachers with fewer than three years of classroom experiences (less experienced) accounted for a significant portion of the turnover gap. Our work builds on and extends their work by looking at the relationship longitudinally and separately for elementary versus secondary schools and teachers, and by probing how organizational membership (charter schools vs. TPSs) may interact with age to influence teacher exit.

School Organizational Context, Conditions, and Governance

Charter schools in general tend to be smaller than TPSs. Charter school teachers also tend to engage more in shared decision making than their TPS peers. The small nature of the school also requires teachers to take on a much wider range of job tasks than just teaching (Raywid, 1982). The practice of shared decision making and playing more extended work roles than teaching could make charter school teachers shoulder a heavier workload than TPSs teachers (Ni, 2012). Earlier empirical studies indicate that “many teachers in charter schools work more days and longer hours while receiving lower salaries and less job security than teachers in traditional public schools” (Malloy & Wohlstetter, 2003, p. 227). Studies have shown that, in addition to heavy workloads, charter schools tend to

have insufficient instructional resources (Khouri, et al., 1999; Miron & Applegate, 2007; Weiss, 1997). The lack of sufficient instructional resources could potentially make teaching appear overwhelming (Horn & Miron, 1999; Texas Education Agency, 1999; Wells et al., 1998). There has been recent research suggesting that teachers in charter schools that have management organizations (MOs) do not always have fewer resources than teachers in stand-alone charters; however, teachers in MO charters also have lower levels of autonomy and receive lower levels of compensation than teachers in standalone charters. Consequently, teachers in charter schools in general have lower levels of job satisfaction than teachers in TPSs (Roch & Sai, 2015; 2016).

It appears charter schools' innovation in governance and management is a double-edged sword. On one hand, teachers can participate in shared decision making and play multiple roles; on the other hand, the smallness creates a situation in which teachers have to handle heavy workloads. The interplay of these two dynamics places charter school teachers at a greater risk for burnout than TPSs teachers (Malloy & Wohlstetter, 2003).

Personnel Policy and Management

Charter schools are considered to be innovative in the realm of personnel policy and management because they are typically exempt from state regulations and free of union restrictions placed upon TPSs (Podgursky & Ballou, 2001). Interestingly, this freedom could have created two dynamics that drive teacher turnover in charter schools. On one hand, the loose nature of the teacher contract gives charter school principals the power to let go of underperforming teachers, a luxury that principals in TPSs typically do not have (Ballou & Podgursky, 1997; Podgursky & Ballou, 2001). On the other hand, the lack of job security can drive charter school teachers to look for more secured positions once they have accumulated enough experience (Stuit & Smith, 2012). Though both dynamics could explain teacher turnover in charter schools, the distinction between the two is important. If the former (i.e., principals' letting go of underperforming teachers) is the main driver for teacher turnover, as many charter advocates argue in defense of charter schools having high teacher turnover rates, there would be less reason to worry. However, if the latter (i.e., teacher exit due to the lack of job security) is the main reason that teachers leave, there is a need to reexamine the loose nature of the contract and to rethink the relationship between charter personnel policy innovation and its consequences for staffing stability.

The theory of action underlying charter innovation is that teachers are able to build professional learning communities and work together to

influence favorable student learning outcomes which would be less likely to happen in the absence of a relatively stable teaching staff. Though there has not been extensive research on which of the two is the key driver for teacher turnover at charter schools, available evidence suggests that most teachers in charter schools leave because of a lack of satisfaction with certain aspects of the teaching conditions (e.g., lower salaries, fewer resources, less job security, heavy workload, less emotional support, etc.) (Roch & Sai, 2016). In other words, most charter school teacher turnover is dysfunctional (Miron & Applegate, 2007).

To summarize, the three prior accounts of charter school teacher turnover tend to emphasize either the individual (i.e., teachers' demographic characteristics) or the organizational (i.e., context, characteristics, working conditions, governance, and personnel policy) explanations for teachers' decisions to exit a school. In other words, prior accounts tend to focus on the main effects of individual or organizational factors. If we look at these factors closely, it appears quite possible that these different levels of factors (i.e., individual vs. organizational) interact with one another to impact teachers' decisions to leave or stay. For instance, research consistently shows that teachers who are young tend to leave. This finding has led to the belief that because charter schools tend to hire younger teachers, they face higher turnover than in TPSs. But research also shows that charter school teaching context is demanding (e.g., longer hours, more responsibilities, fewer resources, and more administrative chores). In addition, research shows that teachers who have reached marriage or childbearing age tend to leave (Stinebrickner, 1998). Consequently, it is quite possible that the effect of teacher characteristics, such as age, on teachers' decisions to exit charter schools could be conditioned by school context. In other words, younger teachers might in fact be less likely to exit charter schools than older teachers who have reached marriage or childbearing age.

The relationship between teacher's age and turnover can also be complicated from another perspective. Some studies have documented that teachers in charter schools are often younger than their peers in TPSs (e.g., Harris, 2007; Stuit & Smith, 2012) and the reason for the overrepresentation of young teachers in charter schools is complicated. Research on charter schools by Roch and Sai (2015, 2016) and others (e.g., Torres, 2014) have suggested that some charter schools (e.g., those managed by nonprofit MOs) may "rely on teachers who are energetic and able to work long hours" (Roth & Sai, 2016, p. 6), while charters managed by for-profit MOs appeared "particularly likely to seek to reduce personnel costs by hiring younger and less experienced teachers" (Roth & Sai, 2016, p. 6). Roth and Sai (2016) also pointed out that existing research on the relationship

between teachers' age or experience and teachers' level of job satisfaction tends to be mixed (low job satisfaction is one of the drivers of teacher turnover). These mixed findings might be due to the varied motivations for why younger teachers tended to go to charter schools, which highlights the nuanced relationship between age and teacher exiting school in different organizational contexts.

The possible interplay of age and organizational type is an important issue for investigation, because teachers who are older tend to be more experienced. The policy implication involves how to make working conditions conducive to teachers who need support once they reach the child-bearing or marriage stage of life, if charter schools are to retain more experienced teachers. We intend to examine the possible interaction effect of age and organizational type in our study.

PREDICTORS OF TEACHER TURNOVER

Besides examining the possible interaction effect of teacher age and organizational type, we ask the following question: Conditioning on student and teacher characteristics, is there any difference in teacher turnover between charter schools and TPSs? If the answer is yes, the difference would suggest that something else might be going on that could explain the higher charter school teacher turnover compared to that of TPSs, which would lend further evidence to the important contextual effect of school organizations on teachers' decision to exit a school. We include in our analytic model teacher and school characteristics variables based on prior empirical studies on teacher turnover.

Teacher Characteristics

We focus on the following three types of teacher characteristics variables: (1) teacher demographic backgrounds (gender, ethnicity, and age), (2) proxy measures of teacher quality and qualification (years of teaching experience, degrees, credential, and internship status), and (3) teacher specialty areas. Teachers of different demographic backgrounds may have different preferences for working conditions. It is also plausible they have different priorities when faced with the conflict between the family and teaching obligations. Teacher quality, qualification, and specialty, on the other hand, signal different opportunities as alternatives to teaching that teachers may have, depending on their levels of attractiveness defined by these measures.

Gender, race/ethnicity, and age. Prior studies on the relationship between gender and teacher turnover have produced mixed results. Some studies find that women had higher turnover rates (migration or attrition) than

did men (e.g., Ingersoll, 2001; Kirby, Berends, & Naftel, 1999), whereas other studies suggest that men are more likely to quit teaching or to transfer schools than women (e.g., Boyd et al., 2005; Ingersoll, 2001). Additionally, some research has found no gender differences in teacher turnover rates (e.g., Strunk & Robinson, 2006), while some scholars (e.g., Rees, 1991) have argued that men and women have similar exit behaviors before marriage but diverge after marriage due to childrearing and family obligations. It is possible, therefore, that patterns of exit behaviors may differ among men and women of different ages. We test this hypothesis in our model by incorporating interaction terms between gender and age indicators.

In contrast, the finding on the relationship between race/ethnicity, age, and teacher turnover is fairly consistent (Guarino et al., 2006). Studies have observed that minority teachers tend to have lower turnover rates than white teachers (Adams, 1996; Ingersoll, 2001; Kirby et al., 1999). Similarly, younger teachers have higher attrition rates than older teachers until they reach retirement eligible age (Hanushek, Kain, & Rivkin, 2004; Ingersoll, 2001; Kirby et al., 1999).

Years of teaching experience. A U-shaped pattern of teaching experience and teacher turnover has been observed in various studies (Hanushek et al., 2004; Ingersoll, 2001). For instance, using data on more than 300,000 Texas elementary teachers between 1993 and 1996, Hanushek et al. (2004) found that teachers who exited Texas public schools were either young with fewer than 2 years of teaching experience (i.e., 0–2 years) or very experienced and near retirement (30+ years). Similar findings are also observed in additional studies (e.g., Ingersoll, 2001; Murnane & Olsen, 1990; Rees, 1991). These studies typically break years of teaching experience into different categories (e.g., 0–2, 3–5, 6–10, 11–30, and 30+) and include them in the model. One limitation of this approach is that by collapsing years of teaching experience into a limited numbers of categories, we run the risk of masking the true relationship between experience, teacher quality, and teachers' propensity to exit a school (Wiswall, 2011). We model years of teaching experience using a quadratic function.

Degrees, credential, and internship status. In general, research has found that better qualified teachers have higher turnover rates than less qualified teachers. Qualification has been typically measured by teachers' test scores on standardized examinations (e.g., ACT) (e.g., Lankford, Loeb, & Wyckoff, 2002). In our study, we use three proxy measures to signal teachers' quality and qualifications, namely, teachers' degrees, credential, and internship status, in addition to years of teaching experience discussed earlier.

Evidence regarding the relationship between degrees and teacher turnover has been mixed. Strunk and Robinson (2006) found no statistically significant relationship between teachers having advanced degrees and

their propensity to leave. Kirby et al. (1999) observed that teachers entering teaching with advanced degrees were more likely to leave than those entering teaching with bachelor's degrees or less. Adams (1996), however, showed that elementary teachers with bachelor's degrees were more likely to exit than those with graduate degrees, using data from a large district in Texas. It is possible that the relationship between degrees and teacher turnover vary by the schooling level (i.e., elementary vs. secondary). We test this plausibility by modeling the relationship between various factors and teacher turnover, separately, for elementary and secondary teachers.

Teachers' credential status and internship status have been used to approximate teacher quality. While we make no claim about the relationship between these variables and teacher effectiveness measured by students' standardized test scores, we include these variables in our model, to partly account for teacher qualification and partly for potential unobserved differences between teachers who have earned their credentials versus those who are still in the intern programs. Empirical studies of the relationship between credential, internship status, and teacher turnover are rather thin. Strunk and Robinson (2006) examined the relationship between the certification type (e.g., probationary, emergency, regular, etc.) and teacher turnover. They found no statistically significant difference in exit rates between regular teachers and emergency teachers. However, probationary teachers had slightly higher probability of attrition than regular teachers.

Specialty areas. Empirical studies have consistently shown that teacher subject specialty matters when considering teacher turnover rates. Specifically, research suggests that secondary science and math teachers are more likely to leave than elementary (Kirby et al., 1999) or other subject area teachers (Ingersoll, 2001; Murnane & Olson, 1990). In addition, research finds that special education teachers are more likely to leave than other subject teachers (e.g., Ingersoll, 2001). An exception is the study by Strunk and Robinson (2006), which did not find strong relationships between subject specialty and teacher turnover in any subject areas except for foreign language, controlling for teachers having certifications in their main areas of teaching.

Elementary teachers in the United States are typically trained as generalists (mostly with humanities majors), whereas secondary teachers normally need to have a major or equivalent amount of coursework in the subject area they teach. Teachers entering teaching with majors in mathematics, physical sciences, and engineering are typically placed at the secondary level, and they have better alternative opportunities than most elementary teachers. Except for special education teachers (because there is a shortage of such teachers), the potential opportunity alternatives likely differ for elementary and secondary teachers. We therefore run the models separately for elementary and secondary teachers.

SCHOOL CHARACTERISTICS

In addition to the focus on individual teachers' characteristics, we also examine the characteristics of schools in which teachers work. Our study focuses on the set of school characteristics that have the most direct implications for teaching and learning and that have been empirically examined by different scholars in the past, including (a) students' social economic and demographic backgrounds (proportion of Title I students, proportion of Hispanic, proportion of African American students), (b) academic climate approximated through students' achievement level (proportion of students who scored below and far below basic on the accountability tests), (c) the ethnic composition of teachers (proportion of Hispanic teachers and proportion of African American teachers), (d) quality of the teaching force (average years of teaching experiences), (e) physical space (overcrowdedness), and (f) school type, which indicates different management and governance styles from traditional public schools (i.e., new school, charter, and magnet).

STUDENTS' SOCIAL, ECONOMIC, AND DEMOGRAPHIC BACKGROUNDS

Research has consistently revealed that the rate of teacher turnover is higher in schools with higher proportions of low income and minority students than in schools with higher income and fewer minority students (Boyd et al., 2005; Hanushek et al., 2004; Shen, 1997; Smith & Ingersoll, 2004). This finding is common across studies that examined data from Georgia, New York, Texas, and Washington (Strunk & Robinson, 2006) and is consistent with the labor market theory (Guarino et al., 2006). In our study, we use proportions of title I, Hispanic, and African American students to index the types of students schools serve, which signal challenging conditions schools serving high-income and white students do not normally face. The more difficult the working conditions, the less attractive the schools are for teachers, which leads to higher teacher turnover rates.

Academic climate: students' achievement level. We use proportion of students who scored below basic and far below basic on the accountability tests as a proxy for general school academic climate for two reasons. First, research has found a direct relationship between the level of students' performance at a school and teacher turnover rates. Schools with low-performing students tend to have a higher teacher turnover rate than schools with high-performing students (Hanushek et al., 2004; Rees, 1991). Second, students' achievement levels may signal their intrinsic motivation and

learning habits. Students with very low academic achievement might have low intrinsic motivation to learn and unproductive disciplinary behaviors, which makes teaching less satisfactory for some teachers. Boe et al. (1997) found that student discipline problems and poor student motivation to learn accounted for about 35% of the public school teachers in their study sample (they used a national sample from the 1994–1995 Teacher follow-up to the 1993–94 Schools and Staff Survey) who left teaching. Given the current accountability system that pushes for tying teacher evaluation to students' performance, we think it important to include students' performance level in the model of teacher turnover rates. Teachers in schools with a high proportion of far below basic- and below basic-scoring students face challenges that teachers in higher performing schools do not, and this makes the teaching conditions less attractive than otherwise.

Ethnic composition of teachers. We include the ethnic composition of teachers at a school for several reasons. First, urban schools tend to have a high concentration of minority students. In contrast, the teaching force in the United States mostly consists of teachers from white, middle-class backgrounds (Zeichner & Cochran-Smith, 2005). Racial mismatch between students and teachers is common and has implications for teacher satisfaction. Satisfaction, in turn, has been found to be connected to subsequent teacher turnover (Renzulli et al., 2011; Whitener et al., 1997). Renzulli et al. (2011) showed that teaching in racially mismatched schools led to low levels of satisfaction, in particular, among white teachers. This finding is similar to what was found in earlier studies (e.g., Boyd et al., 2005; Imazeki, 2004; Hanushek et al., 2004; Scafidi et al., 2007). These studies suggest that white teachers tend to leave schools with a higher proportion of minorities for schools with a higher proportion of non-minorities. In contrast, African American teachers seem to prefer teaching in schools with a high proportion of African American and minority students.

Second, apart from the racial match or mismatch between students and teachers, we are also interested in testing how the racial match or mismatch between an individual teacher's racial identity and that of the teaching staff where the teacher works. As Strunk and Robinson (2006) argued in their study, the social identity theory holds that "individuals may choose employment opportunities where they can serve and work side by side with people of their own race/ethnicity" (p. 73). The empirical evidence on the racial match between teacher and teaching staff is scant and carries mixed findings. For instance, Bryk and Schneider (2002) showed through a case study in a Chicago elementary school where Hispanic and White students had a low level of trust with each other. Though it was unclear whether the mistrust has led to teacher turnover, it is plausible that mistrust among staff could result in less commitment to the school and

subsequent turnover. Strunk and Robinson (2006), in contrast, found that an increase in the proportion of one's own race resulted in an increase in the likelihood of turnover for Asian and Hispanic teachers.

Quality of the teaching force. We calculated the mean years of teaching experience of teachers at a school and included it in our model to account for two aspects of the school context, namely, the overall teacher quality and the school's ability to retain experienced teachers. Previous research has found that teacher efficacy (measured by students' standardized test scores) increases after the first two years of struggle and then reaches a plateau around seven to ten years (Hanushek et al., 2004). This finding, however, is challenged by Wiswall (2011). Allowing a flexible non-parametric relationship between experience and teacher quality, Wiswall (2011) found that

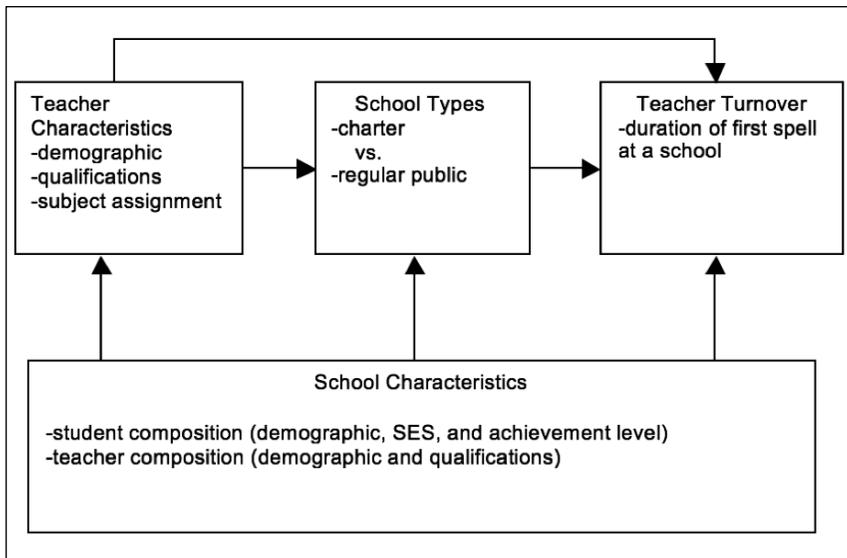
. . . teaching experience has a substantial and statistically significant impact on mathematics achievement . . . a teacher with 30 years of experience has over 1 standard deviation higher measured mathematics effectiveness than new, inexperienced teachers, and about 0.75 standard deviations higher measured mathematics effectiveness than a teacher with 5 years of experience. (p. 2)

Research has also found that most teachers leave during their first two years of teaching (Hanushek et al., 2004; Ingersoll, 2001; Murnane & Olson, 1990). Furthermore, teachers tend to stay teaching in the same schools with fewer inexperienced teachers (Shen, 1997). These findings on the relationship between experience, teacher quality, and teacher retention have implications for teacher sorting across schools and for policies that aim to achieve a balanced distribution of high quality teachers across schools. It is important, therefore, to examine how the overall teaching quality at a school affects individual behaviors.

Physical space: overcrowdedness. Some research (e.g., Buckley, Schneider, & Yang, 2005) shows that the physical environment of schools (i.e., school facility quality) is an important determinant in teachers' decision to leave, even after taking into account other factors such as salary satisfaction. School facility quality covers a range of conditions (e.g., lighting, clean bathrooms, etc.). We focus on physical space as signaled by a "still overcrowded" index because school crowdedness is a challenging problem in the LAUSD. In fact, this problem has led to the new school construction program in an effort to address the overcrowded and dilapidated facility conditions. Our finding on the relationship between the crowdedness and teacher turnover has implications for the district's construction program.

Drawing upon prior theoretical accounts for teacher turnover between charter schools and TPSs and prior research on factors predicting teacher turnover, we developed a general explanatory model that may account for higher teacher turnover rates, including higher rates of exit observed in charter schools (see Figure 1). As shown in Figure 1, we postulate that the types of teachers whom different types of schools tend to hire are partly accountable for teacher turnover. In addition, school characteristics contribute to teacher turnover. Conditioning on teacher and school characteristics, we hypothesize that a strong association between school types and teacher turnover signals that something else is going on in these school organizations that has more to do with teacher turnover than teacher or student intake.

Figure 1. Relationships among variables



RESEARCH QUESTIONS

Though our overarching research purpose was to examine teacher turnover between charter schools and TPSs in the LAUSD, we approached this task systematically by asking the following empirical questions:

1. How long does an average teacher teach at his or her first assigned school before leaving the school?
2. What individual teacher and school-organization characteristics are predictive of the risk of leaving the school?

3. Conditional on teacher and school-organization characteristics, does the risk of teachers leaving differ between those in charter schools versus TPSs for every time period we observed?

METHODS

DATA AND SAMPLE

We used a large sample of elementary (4,788) and secondary teachers (8,467) panel data (from 2002–03 to 2008–09) from the LAUSD. A little over 80% of the teachers in the elementary sample were female, and 61% of the secondary teachers were female. About 40% of the elementary and 47% of the secondary teachers were White. The average years of teaching experience was about 2 for both elementary and secondary teachers. Special education teachers accounted for 12% of the elementary and 15% of the secondary study sample, respectively. The LAUSD provides a unique opportunity to examine the teacher retention issue, because the LAUSD has more charter schools than any other district nationwide and thus represents one of the most important charter school markets in the United States (Newton et al., 2011). In addition, the LAUSD serves more than 640,000 students of diverse social, economic, cultural, and ethnic backgrounds and employs more than 25,000 teachers. The size, diversity, and charter momentum of the LAUSD make it an excellent setting in which to study teacher mobility issues in urban schools.

OUTCOME

We followed Ingersoll's (2001) definition of turnover as teachers' exit from their teaching jobs in schools. While we acknowledge that differentiating types of exit may matter in certain contexts (e.g., comparing teaching versus other professions), these reasons matter little from the perspective of the school, because their departure affects and is affected by schools (Ingersoll, 2001). This perspective has been used in various empirical studies of teacher turnover (e.g., Kelly, 2004; Strunk & Robinson, 2006).

Our analysis focused on *whether* and *when* a teacher exits the first assigned school in the LAUSD. More specifically, for the teachers we observed who were hired by any of the schools in the LAUSD between years 2002–03 and 2008–09, we asked the following question: How long did a teacher stay teaching in the first assigned school before he or she exited? Therefore, the central outcome of our analysis focused on time to event, with event defined as teacher exiting the first assigned school.

EXPLANATORY VARIABLES

Table 1 lists the explanatory variables along with the descriptive statistics used in our analysis. We arranged the variables by teacher and school characteristics.

Table 1. Variable Definitions and Descriptive Statistics

Variable	Elementary		Secondary	
	Mean	St. Dev	Mean	St. Dev
Baseline Hazard Indicator Variables				
D1–Interval 1-2	0.253		0.264	
D2–Interval 2-3	0.173		0.158	
D3–Interval 3-4	0.111		0.090	
D4–Interval 4-5	0.064		0.050	
D5–Interval 5-6	0.025		0.015	
Individual Teacher Characteristics				
Female-Teacher is female	0.858		0.615	
Ethnicity variables (reference group: white)				
Hispanic-Teacher is Hispanic	0.355		0.278	
African American-Teacher is African American	0.085		0.115	
Other ethnicity-Teacher is other ethnicity	0.168		0.153	
Age variables (reference group: teacher between 30 and 50 years)				
Young-Teacher is younger than 30 years	0.573		0.458	
Old-Teacher is older than 50 years	0.050		0.099	
Experience-Teacher experience	2.359	1.592	2.162	1.457
Experience squared-Teacher experience squared	8.101	24.512	6.798	18.037
Degree variables (reference group: bachelor's degree)				
Less than Bachelor-Teacher does not have a bachelor's degree	0.004		0.005	
Bachelor plus extra 30 hours units-Teacher degree is bachelor's plus extra 30 hours units	0.250		0.200	
Master-Teacher holds a master's degree	0.103		0.106	
Master plus extra 30 hours units-Teacher holds a master's degree plus extra 30 hours units	0.111		0.109	

Variable	Elementary		Secondary	
	Mean	St. Dev	Mean	St. Dev
Doctorate-Teacher holds a doctorate	0.008		0.018	
Full credential-Teacher has full credential	0.847		0.656	
Intern-Teacher is an intern	0.159		0.287	
Teacher subject assignment variables (reference group for elementary is non-special education and for secondary is English)				
Math			0.131	
Science			0.114	
Social science			0.062	
Special education	0.124		0.155	
Other subjects			0.605	
School Characteristics and Organizational Context				
% Title 1-Percentage of Title 1 students	0.860	0.256	0.667	0.323
% Hispanic students-Percentage of Hispanic students	0.725	0.264	0.708	0.246
% African American students-Percentage of African American students	0.143	0.191	0.137	0.174
% Low achieving students-Percentage of students below and far below basic	0.353	0.142	0.437	0.141
Mean teacher experience	11.17	2.376	10.86	2.254
Mean teacher experience squared	130.5	54.60	123.0	49.10
Still overcrowded-Teacher teaches in a still overcrowded school	0.057	0.233	0.078	0.268
New school-Teacher teaches in a new school	0.031	0.173	0.063	0.244
Charter-Teachers teaches in a charter school	0.034	0.182	0.021	0.145
Magnet-Teacher teaches in a magnet school	0.019	0.137	0.021	0.144

Statistical Model: Two-Level Discrete-Time Survival Analysis

Our multilevel discrete-time hazard model, informed by prior scholars' work (Barber et al., 2000; Hedeker et al., 2000; Rabe-Hesketh & Skrondal, 2008; Reardon et al., 2002), can be specified as follows:

Level 1 equation: teacher level.

$$\text{Logit } (p_{ijk}) = \beta_{0k} + \beta_{1k} (X_j) + \beta_2 (\text{Time Period Indicators } t_j) \quad (1)$$

Where:

- ρ_{tjk} represents the hazard of leaving for teacher j in school k during year t (given that he or she has not yet left);
- β_{0k} represents the average logit of hazard of leaving in school k ;
- X_j is a teacher level predictor (e.g., educational level);
- β_{1k} is the regression coefficient that captures the relationship between a teacher level predictor variable, X_j , and outcome (i.e., logit hazard of leaving); and
- β_2 so on represents the effects of Time (i.e., Time indicator variable is used to capture the baseline hazard function of leaving).

Note that we use a general specification to describe the effect of time (i.e., a system of dummy predictors). In theory, we could also use polynomial functions (e.g., linear, quadratic, cubic, etc.) to capture the dependence of logit-hazard on time. Our decision to use a general formulation is due to the following two considerations: (1) we do not need to use many dummy variables because the time series were not long and, (2) as Singer and Willet (2003) pointed out, “the completely general specification of TIME provides an invaluable anchor on the continuum of goodness-of-fit” (p. 411).

Level 2 equation: school level.

$$\beta_{0k} = \gamma_{00} + \gamma_{01} (W1)_k + u_{0k} \quad (2)$$

$$\beta_{1k} = \gamma_{10} + \gamma_{11} (W1)_k \quad (3)$$

$$\beta_2 = \gamma_{20} \quad (4)$$

and so on, where:

- β_{0k}, β_{1k} are the intercept and slope from the level-1 model; note here we allow the intercept to vary randomly across schools (see the random effect term: u_{0k});
- γ_{00}, γ_{10} represent the mean of intercept and slope respectively;
- $(W1)_k$ is a school level variable (e.g., type of school);
- γ_{01} are regression coefficients that capture the effects of school-level variables (i.e., type of schools) on hazard;
- γ_{11} are regression coefficients that capture the cross-level interaction between school-level variables (i.e., type of schools) and the teacher level predictor (X_j) effect on hazard; and
- u_{0k} represent the residual or variability in β_{0k} after taking school characteristics into consideration.

We conducted all two-level discrete-time survival analysis using the xtlogit procedure available in STATA software.

VARIABLE CENTERING

Variable centering is important in multilevel models, because choice of location for Level 1 predictors affect the meaning of Level 1 intercept in two-level models and the estimation of regression coefficients of Level 1 predictors (Castellano, Rabe-Hesketh, & Skrondal, 2014; Raudenbush & Bryk, 2002). We use group-mean centering for all teacher level predictors (i.e., Level 1). The group-mean centering defines the intercept as the logit of hazard for an average teacher in an average school. In addition, group mean centering produces unbiased estimators of the effect of teacher characteristics (for a technical discussion of our reasoning, see Raudenbush & Bryk, 2002, pp. 134-141). The choice of Level 2 centering (i.e., school level predictors) is not as critical as for the Level 1 predictors. Following Raudenbush and Bryk (2002), we use grand-mean centering for school level predictors.

CENSORING

Left-censoring. One point worth mentioning is that for teachers who were present in the data during the 2002–03 year (the first year of our observation period), the beginning of the observation period does not necessarily coincide with when a teacher is at risk for exiting a school for some of the teachers. This creates a potential left-censoring problem, in the sense that some of the teachers were already at risk of exiting before our observation started (2002–03). To remove the impact of potential left-censoring problem, we ran the models with a restricted teacher sample by excluding all 2002–03 teachers whose years of teaching experience in the LAUSD were greater than 1 at the time. Excluding these teachers ensured that teachers who were kept in our sample were most likely teaching in their first assigned LAUSD schools during 2002–03.

Non-informative (right) censoring. In addition, when our observation periods ended, there were teachers whose exit behaviors were not observed because our data collection ended. This is called right censoring and is the type typically encountered in practice. We conducted demographic analysis for teachers who left (i.e., uncensored cases) versus those who stayed when our data observation period ended (i.e., right-censored cases). The descriptive statistics suggest no systematic demographic differences in most key demographic variables (e.g., gender, ethnicity, age, years of teaching experiences, educational level, and subject areas) between uncensored and censored cases. Furthermore, right-censoring occurred because our

data collection period ended, not because of actions taken by teachers in our study sample. Taken together, we can be confident that censoring is non-informative. Therefore, we assume that teachers who stayed after the censoring date are representative of those “who *would have remained in the study* had censoring not occurred” (Singer & Willet, 2003, p. 318).

RESULTS

HOW LONG DOES AN AVERAGE TEACHER TEACH AT HIS OR HER FIRST ASSIGNED SCHOOL BEFORE LEAVING THE SCHOOL?

Tables 2 and 3 present data describing the career survival of 4,788 elementary and 8,467 secondary teachers at their first assigned schools, hired by the LAUSD, who were observed between 2002–03 and 2008–09. The numbers indicate whether or not, and if yes, when these teachers exited the first assigned schools between the first year of observation period and 2008–09, which was the last year of observation period. The first column, *year*, in Tables 2 and 3, refers not to the calendar year (e.g., 2002, 2003, etc.); rather, *year* refers to the year of teaching at the first assigned schools during the data collection period. For instance, *year* 1 is 2002 for those *first* observed in 2002, 2003 for those hired in 2003, and so on.

Table 2. Descriptive Statistics of Elementary Teacher Hazard

Year	Total	Move	Lost	Stay	Hazard
1	4,788	1,033	519	3,236	0.216
2	3,236	631	365	2,240	0.195
3	2,240	417	373	1,450	0.186
4	1,450	222	376	852	0.153
5	852	123	401	328	0.144
6	328	49	279	-	0.149

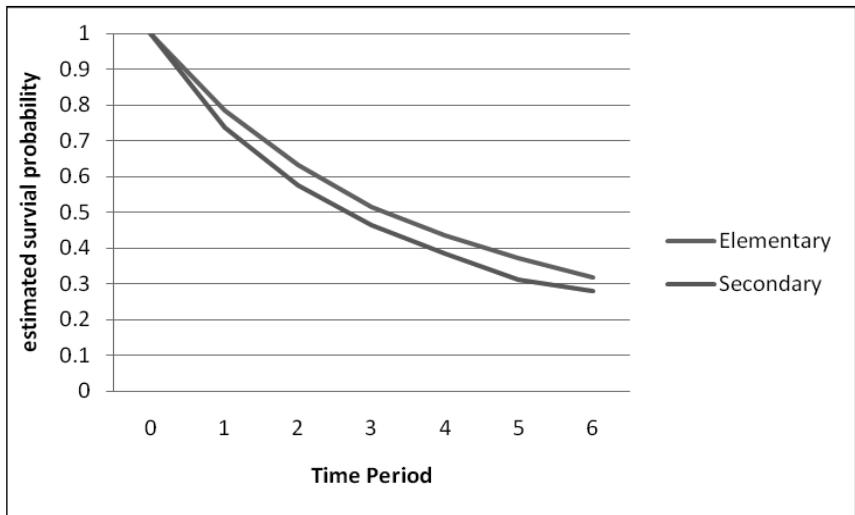
Table 3. Descriptive Statistics of Secondary Teacher Hazard

Year	Total	Move	Lost	Stay	Hazard
1	8,467	2,239	1,223	5,005	0.264
2	5,005	1,083	954	2,968	0.216
3	2,968	587	728	1,653	0.198
4	1,653	278	469	906	0.168
5	906	169	466	271	0.187
6	271	30	241	-	0.111

As shown by the numbers under “hazard” column in Tables 2 and 3, both elementary and secondary school teachers were at the highest risk of leaving their initially assigned schools during the first year of teaching at their schools. This risk of exit in general decreases over time for both elementary and secondary teachers. In addition, the risk (i.e., the hazard probabilities) was slightly higher among secondary teachers than elementary teachers.

Based on the sample hazard probabilities, we can estimate the sample survival probabilities under the assumption of independent censoring. The estimated survival probabilities are calculated based on the hazard probabilities, where $S(t_j) = [1-h(t_j)][1-h(t_{j-1})] \dots [1-h(t_1)]$ (Singer & Willet, 2003; p. 337). Figure 2 displays the estimated survival function based on the sample hazard function for both elementary and secondary teachers.

Figure 2. Survival function



As can be seen in Figure 2, secondary teachers’ survival probabilities were slightly but consistently lower than those of elementary teachers. Consequently, for the sampled teachers we observed between 2002–03 and 2008–09, the estimated median survival lifetime for secondary teachers was roughly 2.5 years, which was slightly shorter than the estimated median survival lifetime for elementary teachers (i.e., slightly over 3 years).

WHAT INDIVIDUAL TEACHER AND SCHOOL-ORGANIZATION CHARACTERISTICS ARE PREDICTIVE OF THE RISK OF LEAVING THE SCHOOL?

Teacher Characteristics

We examined three major categories of teacher characteristics, including their demographics, qualifications, and subject assignments. Many of our findings (Table 4) on the relationship between individual teacher characteristics and risk of leaving school are consistent with those reported by prior empirical research. For instance, for every time period, older teachers near retirement age are more likely to leave. Similarly, as teachers' years of experience increase, the risk of their leaving tends to increase. Secondary physical sciences teachers had higher risk of leaving than English language arts (ELA) teachers for every time period we observed, given wider career options.

Table 4. Two-Level Discrete-Time Survival Analysis Results

Variable	Elementary		Secondary	
Number of person-period observations	n=12,640		n=18,773	
<i>Baseline Hazard</i>				
D1–Interval 1-2	0.79***	(0.05)	0.84***	(0.04)
D2–Interval 2-3	0.70***	(0.05)	0.75***	(0.05)
D3–Interval 3-4	0.48***	(0.04)	0.56***	(0.05)
D4–Interval 4-5	0.39***	(0.04)	0.54***	(0.06)
D5–Interval 5-6	0.32***	(0.06)	0.30***	(0.06)
<i>Individual Teacher Characteristics</i>				
Female	0.91	(0.08)	0.90**	(0.05)
Hispanic	0.75***	(0.07)	0.78***	(0.06)
African American	0.95	(0.12)	0.98	(0.08)
Other ethnicity	0.99	(0.09)	0.85**	(0.06)
Young	1.09	(0.06)	1.09**	(0.05)
Old	1.31**	(0.16)	1.07	(0.08)
Experience	1.08***	(0.02)	1.17***	(0.02)
Experience squared	1.00***	(0.001)	1.00	(0.002)
Degree: Less than bachelor	4.81***	(1.52)	2.04***	(0.46)
Degree: Bachelor plus extra 30 hours units	0.95	(0.06)	0.78***	(0.04)
Degree: Master	1.31***	(0.10)	1.05	(0.07)
Degree: Master plus extra 30 hours units	1.13	(0.09)	1.02	(0.07)

Variable	Elementary		Secondary	
Degree: Doctorate	0.87	(0.24)	1.08	(0.15)
Full credential	0.67***	(0.06)	0.65***	(0.04)
Intern	0.77***	(0.07)	0.70***	(0.04)
Math			1.01	(0.06)
Science			1.22***	(0.07)
Social science			0.83***	(0.06)
Special education	1.52***	(0.11)	1.01	(0.06)
Other subjects			0.82***	(0.04)
<i>School Characteristics</i>				
%Title 1	0.99	(0.17)	1.17**	(0.09)
%Hispanic students	0.77	(0.20)	1.04	(0.18)
%African American students	1.14	(0.31)	1.74**	(0.41)
%Low achieving students	2.18**	(0.75)	2.24***	(0.58)
Mean teacher experience	1.23***	(0.02)	1.09***	(0.02)
Mean teacher experience squared	1.01**	(0.004)	0.99***	(0.003)
Still over crowded	1.09	(0.13)	0.86*	(0.08)
<i>School Organizational Context (School Type)</i>				
New school	0.80	(0.14)	1.23*	(0.15)
Charter	1.35*	(0.22)	3.93***	(0.72)
Magnet	0.81	(0.18)	1.13	(0.20)
<i>Teacher Level Interactions</i>				
Hispanic*Young	0.81*	(0.10)	0.87	(0.09)
African American*Young	0.68**	(0.12)	0.83	(0.11)
Other ethnicity*Young	0.78**	(0.10)	1.00	(0.10)
Hispanic*Old	1.43	(0.41)	1.25	(0.25)
African American*Old	0.94	(0.30)	1.18	(0.24)
Other ethnicity*Old	1.56	(0.44)	1.07	(0.20)
Female*Young	0.96	(0.14)	1.14*	(0.095)
Female*Old	0.71	(0.19)	1.05	(0.14)
<i>School Teacher Cross-Level Interactions</i>				
%Hispanic students*Hispanic	1.07	(0.27)	0.64**	(0.13)
%African American students*African American	0.76	(0.26)	0.67	(0.18)
Charter*Young	0.57**	(0.15)	0.83	(0.23)
<i>Intraclass correlation</i>	0.024***		0.023***	

* <.10, ** <.05, *** <.01

With regard to teacher ethnicity, research literature generally indicates that minority teachers are less likely to leave teaching than are their White peers. We found some subtle differences among teachers of different ethnic backgrounds. Specifically, we found that elementary Hispanic teachers had lower propensity for leaving their schools than their White counterparts for every time period we observed. The odds of leaving for Hispanic teachers were 25% lower than those for White teachers (odds ratio: .75; p value: .003). African American or teachers of other ethnic backgrounds did not differ significantly from their White colleagues in their propensity for leaving a school. These patterns of relationship observed at the elementary level between a Hispanic or African American teacher and his or her propensity for leaving a school hold, for the most part, at the secondary level (odds ratios: .78, .98; p values: .001, .81 respectively). The odds of leaving for secondary teachers of other ethnic backgrounds, however, were about 15% lower than the odds of leaving for White teachers (odds ratio, .85, p value: .03).

Similarly, we found some subtle differences with regard to teacher assignments, in particular, special education teachers. Because elementary teachers are often trained as generalists and teach every subject at the elementary level, we could compare only one assignment group with others, namely, the special education teachers with everyone else. As shown in Table 4, special education teachers had higher propensity to exit a school than other teachers (odds ratio: 1.52; p value: .001). In other words, the odds of leaving, for special education teachers, were about 52% higher than for general elementary teachers for every time period we observed.

At the secondary level, teacher assignments are subject-specific. In our analysis, we focused on the following subject assignment areas: ELA, social sciences, physical sciences, mathematics, special education, and other subjects. ELA teachers were the reference group. Results in Table 4 indicate that compared to ELA teachers, physical sciences teachers had higher propensity for exiting schools (odds ratio: 1.22; p value: .001). Specifically, the odds of leaving for physical sciences teachers were 22% higher than those for ELA teachers for every time period we observed. This is not surprising, because based on the utility maximization theory, physical sciences teachers have more career options than ELA teachers. In contrast, social sciences and other subject assignment teachers tend to have lower odds of leaving, about 17% and 18% lower than those for ELA teachers (odds ratios for social sciences and other subjects: .83, and .82 respectively; p values: .006 and .001 respectively). Surprisingly, no statistically significant difference was observed in odds of leaving between mathematics, special education, and ELA teachers at the secondary level (see Table 4).

SCHOOL CHARACTERISTICS

Student Composition

We examined school demographic characteristics in terms of poverty level (i.e., proportion of Title I students) and demographic populations (i.e., proportion of Hispanic and African American students). Results in Table 4 show these three aspects of the social, economic, and demographic backgrounds of students at a school were not related to teacher turnover at the elementary level but were related to teacher turnover at the secondary level. Specifically, teachers in schools with a 1-unit higher proportion of Title I students had about 17% higher odds of leaving than teachers in schools with an average proportion of Title I students, holding constant other factors (odds ratio, 1.17; p value, .045). Schools with a higher proportion of African American students also saw higher teacher turnover than those with a lower proportion of African American students. The odds of teachers leaving schools with a 1-unit higher proportion of African American students were as about one and three quarters as the odds of teachers leaving in schools with an average proportion of African American students, other things being equal (odds ratio, 1.74; p value, .019).

Academic climate. We used proportion of students who scored far below basic and below basic on the California reading standards tests as a proxy for the academic climate at a school. Prior research shows when teachers move within a school system, they tend to move from lower performing schools to higher performing ones (Hanushek, Kain, & Rivkin, 2004; Rivero, 2015), and new teachers are less effective than the experienced ones they replace on average (Rockoff, 2004; Harris & Sass, 2011; Papay & Kraft, 2015). Results in Table 4 suggest that the achievement level of students at a school was a statistically significant predictor of teacher turnover at both the elementary and secondary levels. Specifically, the odds of teachers leaving schools with 1-unit higher proportion of students who scored far below basic or below basic were more than twice that of teacher leaving in schools with average proportion of students who scored far below or below basic on the state standards tests (odds ratios, 2.18 and 2.24, respectively; p values .024 and .002, respectively). These results showed a consistent relationship between a school's academic climate and teacher turnover for every time period observed, supporting the notion that school context is one of the key drivers for teacher turnover.

Racial match. Building on the existing theory and empirical studies (e.g., Renzulli et al., 2011), we also tested the potential impact of the racial match or mismatch both in terms of the teacher-to-student and the teacher-to-teacher racial match at a school. Specifically, we tested the interaction terms between a teacher's ethnic background and proportions of students

belonging to differing ethnicities. To avoid possible co-linearity caused by high correlations among the four variables, we tested each interaction term individually and dropped the interaction that was not statistically significant. Table 4 displays the final model with two cross-level interaction terms that test the racial match between teachers and students they serve. Results in Table 4 show that the proportion of Hispanic or African American students did not have any impact on the teacher turnover among Hispanic and African American teachers at the elementary level. At the secondary level, however, the odds of Hispanic teachers leaving in schools with a 1-unit higher proportion of Hispanic students were about 36% lower than in schools with the average proportion of Hispanic students (odds ratio, .64; p value, .025). The proportion of African American students at a secondary school did not affect teacher turnover.

Teacher experience. While it makes sense that teachers with more years of experience have better opportunities and therefore are more likely to leave than their peers with less experience (Hanushek et al., 2004), we expected that the average experiences of teachers at a school would help to slow down teacher turnover, given there are more experienced teachers at the school. Our results, however, did not support this hypothesis. As shown in Table 4, the average experience of teachers at a school actually accelerates teacher turnover. In other words, the odds of teacher leaving increase by 23% and 9% at the elementary and secondary levels, respectively, with a 1-unit increase in average teacher experience (odds ratios, 1.23 and 1.09 respectively; p values, .001), holding constant other factors. There is also acceleration in the odds of leaving as suggested by the quadratic term of teacher experience, which is statistically significant. It is possible that the average experiences of teachers at a school would help to slow down teacher turnover if more experienced teachers support newer teachers instead of being set in their ways.

CONDITIONAL ON TEACHER AND SCHOOL-ORGANIZATION CHARACTERISTICS, DOES THE RISK OF TEACHER LEAVING DIFFER BETWEEN THOSE IN CHARTER SCHOOLS VERSUS TPSS?

We observed the main effect of charter at both the elementary and secondary levels (see Table 4) (odds ratios: 1.35 and 3.93 respectively; p values: .067 and .001 respectively). Specifically, at the elementary level, charter school teachers had approximately 35% higher odds of leaving than TPS teachers, for every time period we observed. The charter school effect on teacher turnover was also observed at the secondary level (odds ratio, 3.93; p value, .001). Charter school teachers at the secondary level had close to four times the odds of leaving compared to TPS teachers, for every time period we observed. In addition, we also found that teachers in

new schools (created to address the overcrowding problem) had higher odds of leaving than did teachers in public schools (odds ratio, 1.23; p value, .082). Specifically, the odds of teachers leaving new schools were 23% higher than that of teachers leaving public schools.

In addition to the main effect of charter, we also observed one interesting, statistically significant cross-level interaction effect between charter and teacher age (specifically, the young indicator variable) (odds ratio: .57; p value: .031). To interpret the cross-level interaction effect between charter and young, recall results presented earlier indicated that younger teachers in general did not have a higher propensity for exiting a school than middle-aged teachers. However, the interaction effect means that younger teachers in charter schools had a lower propensity for exiting than younger teachers in public schools. Specifically, the odds of younger charter school teachers leaving were about 43% less than that of younger public school teachers.

SUMMARY AND DISCUSSION

Our study focuses on teacher turnover as an important intermediate organizational outcome because of its implications for important aspects of schooling that supports student learning (e.g., professional learning communities, instructional cohesion, etc.). Taking advantage of longitudinal data gathered from the LAUSD, we investigated how long a teacher stayed teaching in the first assigned school before he or she left and whether there was any difference between charter schools and TPSs in teacher turnover, conditioning on various individual and school factors. We also explored whether factors typically offered as explanations for the difference in turnover between charter schools and TPSs, such as teachers' age, might be the reason charter schools as a group face higher teacher turnover than TPSs, by probing the possible cross-level interaction effect between age and organizational context. Our study has produced some important and interesting findings.

To begin with, our analysis shows that both elementary and secondary school teachers are at the highest risk of leaving their initially assigned schools during the first year of teaching at those schools. However, the risk (i.e., the hazard probabilities) of leaving among secondary teachers is slightly higher than the risk of leaving among elementary teachers. The estimated median survival lifetime for secondary teachers at a school is roughly 2.5 years, which is shorter than the estimated median survival lifetime for elementary teachers (i.e., a little over 3 years). The statistic we often hear is that the teaching profession loses one-third of its teachers after 3 years and half within 5 years. Our analysis reveals a more sobering picture of staffing instability for individual schools and highlights the challenges schools face as they attempt various reform initiatives that rely on staffing stability and long-term commitment of teachers.

Second, we found that, conditioning on teacher and school characteristics, a statistically significant difference existed in teacher turnover between charter schools and TPSs at both the elementary and secondary levels for every time period we observed, with the difference more pronounced at the secondary level than at the elementary level. In other words, the results suggest that, apart from the measurable characteristics of teachers, students, and schools, there could be something about working in a charter school that might have led to more frequent turnover than when working in a TPS. This finding points to the importance of further examining organizational factors and conditions of these schools instead of focusing solely on the characteristics of teachers and students when dealing with teacher turnover and staffing problems. This finding is important because traditional studies using student or teacher characteristics to predict teacher turnover tend to interpret the significant predictors as teachers favoring teaching certain students over others (Boyd et al., 2005; Carroll et al., 2000; Hanushek et al., 2004; Scafidi et al., 2007). In contrast, our finding signals something else may be going on at charter schools that contributes to the high teacher turnover as opposed to individual teacher or student characteristics. This “something” could be factors related to working conditions or non-working conditions. Nonetheless, our finding lends empirical support to the perspective that the context of disadvantaged schools might be a more powerful driver for teacher turnover than the types of students whom these schools serve (Allensworth et al., 2009; Ingersoll, 2001; Ingersoll & Smith, 2003; Johnson, Kraft & Papay, 2012).

The perspective that organizational context is more important than individual characteristics for understanding teacher turnover is further supported by our finding that the propensity for younger teachers’ exit is conditioned by the school type (i.e., charter school vs. TPS). Specifically, we found that younger teachers in charter schools had lower propensity for exiting than younger teachers in TPSs. This finding suggests that the relationship between age and teacher turnover is more complicated (i.e., the cross-level interaction effect) than just the main effect of age as the explanation for charter schools having higher turnover than TPSs. Instead, our finding suggests that the relationship between age (in this case, being young) and teacher turnover is conditioned by school context. To some extent, it makes sense that younger teachers in charter schools might have lower risk of leaving than their peers in TPSs. Some research (e.g., Stinebrickner, 1998) has found that the reality of the job demand in small charter schools is such that younger teachers who may not have family responsibilities (e.g., not yet married with children) may be able to handle the intense teaching demands more than those who have family responsibilities. Or it is possible that charter schools may provide better support to newer teachers compared to TPSs.

Our finding that the organizational context interacts with individual characteristics (in this case, age) to shape the outcome has theoretical implications for understanding teacher turnover as well. The market theory behind school choice (hence the creation of charter schools) assumes that charter schools are an attractive alternative to TPSs because the former frees teachers from the bureaucratic control of public education and gives them freedom to innovate learning. Yet institutional theorists argue that significant improvement in instruction on a large scale is rare and often short-lived because of the strong institutional condition of American schooling (Berends et al., 2010; Elmore, 1996). What our analysis shows is that perhaps a cross-level theoretical perspective is needed. Specifically, our theoretical position is that organizational dynamics and contextual factors are likely to condition the decision process made at the individual level and thereby influence individual behaviors (i.e., decision to leave a school at certain point in time). This cross-level theoretical perspective adds further support to the argument that focusing on recruiting capable teachers and paying attention to working conditions for long-term staffing stability are aspects of schooling that matter most for student learning, as opposed to a horse-race game (i.e., choice and competition).

In the spirit of not pitting charter schools against TPSs, we would like to discuss several broader implications of our empirical findings on teacher turnover issues. Understanding who leaves, when, and under what conditions is important for policy formulations that target teacher retention, especially for teachers working in inner city schools and shortage specialty areas (e.g., mathematics, sciences, and special education). Our findings are relevant for current policy formulation and for future research on teacher turnover and retention issues. There are several ways to think about the implications of these empirical findings. For instance, conceptually and theoretically, we may need to broaden our policy formulations in terms of what works for whom and in what context, and stay away from a one-size-fits-all mind-set, as our findings show differences in the patterns of the relationship between who is likely to leave, when, and under what conditions.

With respect to the policy target population, our findings offer some insights on differences in propensity for leaving among teachers of different demographic backgrounds. We find that although younger teachers, on average, may (i.e., secondary) or may not (i.e., elementary) have higher exit rates, non-White younger teachers are less likely to exit schools than their White peers. This finding provides data that researchers can use to further probe (e.g., through qualitative in-depth studies) the motivation and reasons behind the different decision-making processes, an understanding of which could lead to better policy formulation for these teachers.

In a similar manner, teachers of different ethnic backgrounds may have different motivations in their choices of teaching in urban schools, which

in turn may affect their decisions regarding how long to stay teaching in urban schools before their exit. Our analysis shows that non-White teachers differed from their White colleagues in terms of propensity for exiting their first assigned urban schools. While incentives such as high salaries may help stave off teacher exit, they might not be the motivating factor for a teacher to enter or exit the teaching force in the first place.

We also find that differences exist in the relationship between some factors and teacher turnover between elementary and secondary teachers. For instance, the relationship between the risk of leaving and level of experience is stronger among elementary teachers than secondary teachers. Similarly, our findings show that the district's initiative to address the crowdedness problem through creating new schools has led to different results for elementary and secondary schools. In particular, the results that teachers in new schools at the secondary level did not display a lower exit rate calls for further examinations of why the difference exists.

In terms of the timing of policy interventions, the results show that the hazard or risk for exiting schools is highest during the earlier stage of teaching career (and higher for secondary teachers than for elementary teachers). The implication of this finding is that interventions for teacher retention should pay particular attention to early career teachers. To some extent, our finding supports teacher educators' push for beginning teacher support as a way to address the teacher retention problem, especially supporting those teaching in urban schools (Smith & Ingersoll, 2004).

Last but not least, some may argue that teacher mobility among urban schools might not be a bad thing, because it is possible that teachers who leave are replaced by better teachers. This argument has merit only if all teachers who exit a school are "bad" teachers and thereby only high quality teachers are retained in a school. From the cost-benefit perspective, the gain of having a more mobile teaching force at urban schools benefits students only if high quality teachers come and then *remain* teaching in those schools. In the absence of such empirical evidence, we consider frequent teacher exits at urban schools, especially those serving high proportions of minority and low-achieving students, as less of a blessing and more of a curse.

Taken as a whole, our study adds empirical support to the argument (e.g., Ingersoll, 2001) that policy initiatives aimed at increasing the quantity (and quality) of teacher supply need to be balanced by efforts that decrease the demand for new teachers by reducing teacher turnover. This balanced approach is important, as a recent study showed that teacher turnover has a harmful influence on student achievement, not just for those whose teachers have left but also for students of teachers who stayed, regardless of whether incoming teachers are better than those they replaced or not. This harmful effect is particularly strong for students in schools with large populations of low-performing and Black students (Ronfeldt, Lankford, Loeb, & Wyckoff, 2011).

LIMITATIONS AND FURTHER RESEARCH

Our measures of teacher quality and qualifications may be imperfect in light of the recent debate surrounding teacher evaluation and accountability. If we had a valid and reliable measure of teacher quality in terms of students' achievement, we would have been able to include such a measure in our model and see whether teachers who are effective at raising students' achievement tend to stay or leave urban schools. Unfortunately, the popularized but highly controversial value-added measure of teacher quality in the LAUSD is restricted to grades 3 to 5 teachers only, which makes its use limited in our analysis. A different study may confine the teacher population to reading or ELA and mathematics teachers at grade levels where value-added estimates may be calculated (i.e., 3rd through 11th), though the drawback is a lack of external validity (i.e., the extent to which we are able to generalize findings from such a study).

A second limitation of our study is that among the teacher characteristics and factors we examined, teacher salary was not one of them. Our decision was mostly attributable to the lack of access to such information for each individual teacher. However, given that the LAUSD follows a standard salary schedule largely based on teachers' educational backgrounds and years of teaching experience, we have incorporated these two pieces of information in our model to partly account for earning differences among teachers. While we do not know the salary differences between beginning teachers in charter schools vs. TPSs in the LAUSD, research using nationally sampled data shows that salaries for first-year teachers are similar in charter schools and TPSs (Burian-Fitzgerald, 2004). Also, in some states (e.g., Michigan), the average charter school teacher earns in excess of \$15,000 less than the average TPS teacher (Harris, 2006). For LAUSD teachers, we suspect that teaching in urban schools may pose more difficulties than salary variation, as what Lankford et al. (2002) found using New York state data.

Finally, because our study used district administrative databases, we did not have direct and rich measures of working conditions that a database such as Schools and Staffing Survey (SASS) would provide. However, Ni (2012) found that teachers in charter schools and TPSs did not perceive any differences in many aspects of their working conditions (e.g., principal leadership, sense of community and collegiality, classroom autonomy, opportunities for professional development, etc.) except for the influence over school policies at the expense of a heavier workload among charter school teachers. Further research could examine how workload might explain teacher turnover gap between charter and TPSs.

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