The Consequences of Principal and Teacher Turnover for School Social Resources

Paul Hanselman (a)*
Jeffrey Grigg (b)
Sarah Bruch (c)
Adam Gamoran (d)

(a) University of California-Irvine
(b) Johns Hopkins University
(c) University of Iowa
(d) William T. Grant Foundation

*Corresponding author: paul.hanselman@uci.edu

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RUNNING HEAD: STAFF TURNOVER AND SOCIAL RESOURCES

Abstract

Staff turnover may have important consequences for the development of collective social resources based on trust, shared norms, and support among school professionals. We outline the theoretical role-specific consequences of principal and teacher turnover for features of principal leadership and teacher community, and we test these ideas in repeated teacher survey data from a sample of 73 Los Angeles elementary schools. We find evidence that principal turnover fundamentally disrupts but does not systematically decrease relational qualities of principal leadership; negative changes for initially high social resource schools offset positive changes for initially low social resource schools, suggesting that relational instability "resets" the resources that develop in the relationships between leadership and teachers. Greater consistency in measures of teacher community in the face of teacher turnover implies that the social resources inhering in the relationships among teachers are more robust to instability.

KEYWORDS: principal turnover, teacher turnover, attrition, school climate, trust, principal leadership, teacher community

According to national estimates since 2000, more than 15% of public school teachers in the United States leave their school between one year and the next (Goldring, Tale, & Riddles, 2014); the figure for principals, collected since 2008, is greater than 20% (Goldring & Tale, 2014). Such persistent and prevalent turnover is bound to affect the educational work of schools. It also raises specific concerns about equity, since both types of attrition are highest from schools serving poor, minority, and urban populations. However, as befits a complicated organizational phenomenon, there are diverging perspectives on the ultimate consequences of staff turnover. Many, focusing on the value of experience for teaching, worry that unnecessarily high turnover—especially among early career teachers—constitutes a "revolving door" (Ingersoll, 2001) that consigns some students to poorer educational experiences (Darling-Hammond, 2003). Others, focusing on the ineffectiveness of leaving teachers, argue that selective attrition may improve teaching quality (Hanushek, Kain, O'Brien, & Rivkin, 2005).

Discussions of the effects of turnover generally focus on the individual human capital substitutions related to attrition: Who tends to leave? What are the costs of recruitment? Who tends to fill vacancies? Though important, these questions elide the possible collective effects of staff instability on the organizational practice of schools.[1] In contrast to material or human resources, which relate to time and money or individual skills, school social resources consist of the structure and qualities of relationships among staff members that provide resources for instructional practice and improvement. Though instruction is typically carried out alone, relationships and the social resources embedded in them among school staff members are increasingly recognized to be "the lifeblood of activity in a school community" (Bryk, Sebring, Allensworth, Luppescu, & Easton, 2010, p. 137). Productive connections among staff members

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[1] See Ingersoll (2001) for an analogous argument about the organizational *causes* of turnover.

help teachers innovate, coordinate, and improve their practice (e.g. Bryk & Schneider, 2002; Frank, Zhao, & Borman, 2004; Penuel, Riel, Krause, & Frank, 2009), and staff instability may affect these social resources embedded in the school community.

The potential organizational effects of turnover are consistent with a recent detailed consideration of the effects of teacher turnover. Using rich administrative panel data on students and teachers in New York City, Ronfeldt, Loeb, and Wyckoff (2013) find a negative effect of teacher turnover on student achievement for students taught both by the newly recruited teacher and by the new teacher's grade-level colleagues. The latter effect suggests organizational as well as individual effects of teacher turnover and generates questions about how the social organization of schools influences teaching and learning.

This paper focuses on the relationship between principal and teacher turnover and two specific domains of school social resources: one relating to principal-teacher relationships and the other relating to teacher-teacher relationships. The principal-teacher dimension consists of the relational aspects of principal leadership, and the teacher-teacher dimension relates to the qualities of cooperation, support, and trust in the teacher community. We make conceptual, descriptive and explanatory contributions to our understanding of how staff turnover relates to these social resources. First, we develop the conceptual case for the potential effects of organizational turnover on social resources for instructional practice and improvement. Because a key consequence of turnover is less stable social relationships, this conceptual work highlights the likely role-specific impacts on social resources. Second, using a sample of 73 elementary schools in Los Angeles, we provide a descriptive account of the association between turnover and school social conditions for both principals and teachers. Finally, we use these unique data to estimate the effect of principal and teacher turnover on school social resources, drawing on the

hypothesized role-specificity of the results to assess the validity of causal inferences from the observed associations.

The empirical results highlight the disruptive consequences of staff turnover for some but not necessarily all forms of school social resources. We find that principal turnover is associated with changes in teachers' perception of principal leadership, with improvements in schools with initially low principal leadership, and declines in schools with initially high levels. Teacher turnover is associated with smaller and statistically insignificant changes in reports of teacher community, suggesting that the qualities of teacher relationships are a more diffuse social property of school organization, less sensitive to instability and potentially more difficult to improve.

Turnover and School Social Resources

Our perspective on the organizational consequences of staff turnover follows from the basic sociological insight that the network and interactions among a social group shape possibilities for individual actions. We draw implicitly on the rich and diverse literature on social capital (e.g. Coleman, 1988; Lin, 1999; Portes, 1998). One broad lesson from this research is that social arrangements, including how they develop and how they benefit or harm individuals, depend on the specific context: which social relationships, in what circumstances, and with respect to what ends. We therefore focus our theoretical discussion on specific social resources identified among school staff for instructional practice and improvement, recognizing that unique characteristics of school organization shape principals' and teachers' work.

[Take in Figure (1) here]

Figure 1 provides the conceptual context of this paper, which focuses on the potential effect of turnover on meaningful social resources (Arrow A). This pathway is important because

social resources in turn impact instructional practice (Arrow B) and ultimate student experiences. The two critical features of this framework are that we do not expect a direct effect of turnover on instructional practice and that indirect effects are possible through distinct pathways. For reference, the gray elements in Figure 1 represent the human capital pathways through which exits also likely impact student learning, such as through changes in teacher experience or quality that result from the replacement of teachers. In addition, associations represented by the curved, dashed arrows (C1 and C2) potentially confound the observed association between turnover and social resources, a matter we will return to explicitly below.

Whereas the conceptual argument applies to turnover and social resources in general, it must be fleshed out theoretically and empirically with respect to specific measurable domains of school social resources. We focus on two domains, reflecting two primary sources of teacher instructional support: principals and fellow teachers. In the remainder of this section, we introduce these concepts, highlighting the established connections to instructional practice and ultimate student outcomes (Arrow B). We then turn to the theoretical and empirical evidence suggesting that relational stability/instability (i.e. turnover) is a precursor to these social resources (Arrow A). Finally, we develop the role-specific differences between these hypothesized effects for principals and teachers.

<u>Principal Leadership and Teacher Community</u>

The importance of social organizational factors in shaping instructional quality and improvement can be traced to the diverse and ambiguous goals and uncertain technology of teaching (Dreeben, 2005; Lortie, 1975; Secada, Williams, & Williams, 2005) and aspects of loose-coupling that buffer privatized classroom instruction from external influence (Weick, 1976). In this context, features of social capital—especially norms for individual practice and access to instructional support—shape how and how well teachers teach.

For principals, whose positive impacts on instruction and student learning are necessarily indirect, successful relationships with school staff are an integral component of effective school leadership (Hallinger & Heck, 1998; Witziers, Bosker, & Kruger, 2003). We use the term *principal leadership* to refer to the features of principal-teacher relationships that enable cohesive, high quality, and improving instruction.[2] Principal leadership includes at least three important resources for teachers' instructional practice: setting a collective mission, providing instructional support, and relationships characterized by trust. Each highlights that principal leadership resources are social; they inhere in features of relationships between the principals and teachers rather than the abilities and skills of the principal alone.[3]

First, principals promote positive outcomes by defining and communicating the school mission (Witziers et al., 2003). A coherent school mission implicitly creates social resources in the form of shared staff orientations to the work of the school, and principals may therefore promote collaboration and exchange among school staff (Cosner, 2009; McLaughlin & Talbert, 2001). Second, principals can provide support for specific instructional practices. Although principals may not be closely engaged in specific classroom instruction, they often influence instructional change or stasis through their interactions with staff, including by mediating policy-messages from outside the school, monitoring practice, and shaping teacher's opportunities to learn (Coburn, 2005; McLaughlin & Talbert, 2006; Printy, 2008; James P. Spillane et al., 2004; Supovitz, Sirinides, & May, 2010; Wahlstrom & Louis, 2008). Third, principals provide a

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[2] More precisely, our use of principal leadership can be thought of as a shorthand for school social resources related to the principal's relationships with teachers. While principal leadership could be defined to include non-relational components (such as organizational skills [e.g., scheduling]), our terminology follows previous research in highlighting the social dimensions of leadership (for instance, see: Bryk & Schneider, 2002; Pallas, 1988; Rowan, Raudenbush, & Kang, 1991).

[3] Though mostly outside the scope of this paper, the social bases of the practice of leadership in schools, from individuals in formal administrative roles and others, is also a central theme in the educational literature on distributed leadership (e.g. James P. Spillane, Halverson, & Diamond, 2004).

foundational social resource when they develop trust with the teachers at their school. Trust

provides a relational resource for mitigating uncertainty in school practice, and trust between

teachers and the principal provides resources for both leadership and teaching practice, including

facilitating both communication and instructional support (Bryk & Schneider, 2002; Kochanek,

2005).

School resources for instruction are also located in the quality of relationships among

teachers. We use the term *teacher community* to refer to the social resources embedded in

teacher-teacher relationships throughout a school. Teacher community entails collective

commitment to shared values and interpersonal trust that enable cooperative practice and access

to expertise and support through informal networks (Bryk & Schneider, 2002; Frank et al., 2004;

Gamoran et al., 2003). More holistically, these features are core components of schools

organized as professional communities, in which teachers draw on social resources to de-

privatize and improve their teaching practices, and are characterized by high levels of staff

commitment, student engagement, and student achievement (Bryk, Camburn, & Louis, 1999;

Bryk et al., 2010; Louis, Marks, & Kruse, 1996; McLaughlin & Talbert, 2006; Newmann &

Associates, 1996).

Principal leadership and teacher community are especially important components of

instructional change and school improvement, which present additional challenges to educators

(Coburn, 2001; Elmore, 2004; Louis et al., 1996; O'Day, 2002). For principals, transformational

leadership practices lead to authentic instruction and increased achievement only when they are

integrated with leadership from the teaching community (Marks & Printy, 2003). For teachers,

changing instructional practice requires foregoing familiar strategies in favor of new ones.

Teachers are more likely to take on such uncertainties when they have access to expertise and are

subject to normative pressure (Frank et al., 2004). Once teachers attempt to change their practice, collaborative relationships with colleagues provide resources for the de-privatized practices, such as reflective dialogue, that foster success (Bryk et al., 1999; Louis et al., 1996). Throughout, trust and shared obligations in school relationships provide a core resource for educators to manage the uncertainty involved in the endeavor (Bryk & Schneider, 2002). Schools are complex adaptive systems in which coherent change requires coordination, and instructional improvement requires schools to effectively generate, process, diffuse and act upon information throughout the entire organization (O'Day, 2002). Therefore, a coherent professional community provides the resources for educators "to hear, share and experiment with new ideas about practice" (Halverson, 2003, p. 3).

In short, valuable school social resources inhere in the relationships between teachers and school leadership and among teachers themselves. Relationships characterized by trust and a community characterized by strong norms and clear expectations provide resources for educators to draw on as they teach students. These social resources do not guarantee beneficial instructional practice, but they provide both the resources and impetus for teachers to face challenges and pursue improvement in their individual teaching practice.[4]

Staff Turnover Potentially Destabilizes Principal Leadership and Teacher Community

We know relatively little about how organizational social capital develops within schools (J. P. Spillane, Kim, & Frank, 2012), and building and maintaining school social resources presents unique challenges for educators. In contrast to more concrete resources such as time or teaching materials, social resources cannot be simply allocated, nor can administrators mandate

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[4] While the vast majority of school social resources literature focuses on presumed benefits, the qualities of social structure and relationships can also detract from school practice and improvement. As with the concept of social capital more generally, it is important to recognize the ill effects of "negative cases" of social resources (Smylie & Evans, 2006).

beneficial characteristics of social relationships, such as trust among staff or a shared commitment to collaboration. At the core of principal-teacher and teacher-teacher social resources are repeated interactions and developing relationships between staff members over time (Bryk & Schneider, 2002). This interactional and relational foundation means that the development of social resources is a necessarily complex, contingent, and multi-staged process (Bryk & Schneider, 2002; Kochanek, 2005; McLaughlin & Talbert, 2006). Nonetheless, specific school initiatives can catalyze interactions and opportunities to develop relations that lead to greater social resources, as when a high school department focuses on the needs of a specific student population (McLaughlin & Talbert, 2001) or a group of teachers participates collectively in an ambitious professional development program (Gamoran et al., 2003). Among more general school characteristics, some evidence suggests that smaller school communities are more conducive to positive social interactions and relations (Bryk et al., 2010) and that chronic teacher turnover may detract from it (Guin, 2004).

Conceptually, staff turnover is clearly related to the relationships that undergird social resources. By definition, turnover involves replacing one individual staff member with another; however, it also means replacing a series of existing social relationships (those involving the "leaver") with a set of brand new social relationships (those that involve the replacement). This potentially introduces two types of relational instability. First, it threatens the density of social connections in the school, since the new recruit may know different (and likely fewer) colleagues than her predecessor. Second, it threatens the strength of specific relationships, since the new recruit must initiate new relationships with her colleagues. For instance, a new teacher has less of an interactional history with the teacher across the hall than the teacher she replaced, meaning fewer previous opportunities to develop social resources. In other words, by "resetting"

relationships within the school, turnover may fundamentally disrupt the development of social

resources among staff.

Note that such disruption does not necessarily imply that turnover is detrimental or

beneficial. On the one hand, the consequences of turnover can be deeply negative. It may undo

gains in interpersonal trust (especially in schools with high existing levels of social resources)

and hinder trust from developing over time in all schools (Bryk & Schneider, 2002; Holme &

Rangel, 2012). Moreover, Guin's (2004) qualitative work demonstrates the toll that persistent

turnover places on relationships among teachers, particularly on experienced teachers'

willingness to invest in their new colleagues:

> With such high frustration levels among staff, collaboration among teachers at the
> school was not common. One teacher attributed this to a lack of trust among the
> staff, noting that with new people coming in each year, it took a while to
> understand how a person works, both personally and professionally. The energy
> required to build a relationship with a new teacher, paired with the uncertainty of
> the length of time one would be working with that person, made collaboration in
> the school extremely difficult. (p. 13)

On the other hand, relational instability may benefit school social resources. In schools

with dysfunctional social arrangements, it may be best to disrupt social relationships, especially

if distrust and norms of complacency are entrenched among a core staff group (Bryk et al., 1999;

Kochanek, 2005). This suggests that schools with low social resources may benefit in the short

term from turnover. Conversely, schools with high social resources may mitigate any ill effects

of relational instability with socialization routines that integrate new members into existing

norms and routines of conduct (Bryk et al., 1999; McLaughlin & Talbert, 2001). In other words,

schools with high social resources may successfully integrate new members into a productive

social climate rather than simply "resetting" specific social relationships to an average baseline

level. One example is that turnover can be particularly beneficial for the school community when

exits and replacements are curated with an eye towards a specific vision for the school (Bryk &

Schneider, 2002; Kochanek, 2005).

In summary, the theoretical effects of staff turnover on principal leadership and teacher

community follow from a general feature of social resources: they develop over time through

repeated social interactions among school staff. While turnover may stand as a barrier to the

development of social resources over time, as is often assumed, the impact may also be positive,

especially in specific circumstances. Further, the effects of turnover may be contingent on school

conditions, such as the initial level of social resources.

Effects of Turnover on Principal Leadership and Teacher Community should be Role-Specific

Because the theoretical effects of staff turnover on social resources operate through

disrupting specific social relationships, we expect distinguishable effects for principal and

teacher turnover. For instance, principal turnover should impact principal leadership, because it

fundamentally alters principal-teacher relationships, but not teacher community directly.

Similarly, teacher turnover ought to be relatively more consequential for teacher community,

based on the network of teacher-teacher ties, than principal leadership.

We refer to the notion that principal turnover should only impact principal leadership and

that teacher turnover should primarily influence teacher community as the *role-specificity* of the

potential effects of staff turnover on school social resources. As we have discussed, role-

specificity derives conceptually from the fact that social resources develop in the interactions

between specific individuals and that these relationships are differentially destabilized by

principal and teacher turnover. It is important to recognize that role-specificity is not absolute,

particularly given the complex and interrelated character of school organizational communities.

Nonetheless, we draw on role-specificity below to sharpen our empirical predictions about the

observed effects of principal and teacher turnover.[5]

In sum, regardless of the direction or magnitude of the effects of staff turnover on school social resources, we expect the immediate effects of principal turnover to be limited to principal leadership and the effects of teacher turnover to be centered on teacher community. Other observed associations, especially an apparent effect of principal turnover on teacher social resources, likely indicate school-level confounding between staff turnover and social resources in general.

Data and Method

<u>Data</u>

Describing the relationship between staff turnover and social resources requires measures of relevant social conditions across a sizable sample of schools, and assessing the hypothesized role-specificity of these associations requires targeted measures that distinguish between principal and teacher social resources. Further, to make plausible causal interpretations of these associations from observational data, the ideal research setting would maximize variation in turnover while minimizing potentially confounding school variability, such as district governance, local labor market, and general organizational health.

This paper draws on data collected as part of the System-Wide Change (SWC) study, an experimental evaluation of a content-rich, systematic intervention in teacher professional development for 4th and 5th grade science teachers conducted in 80 elementary schools in Los

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[5] An important practical difference between principal and teacher turnover is that a principal exit represents the complete replacement of that role, while typically only a relatively small minority of all teachers leave a school in any given year. As a consequence, the observed variation in principal turnover is more drastic— between 0% when the principal stays and 100% when the principal leaves— than the range observed for teacher turnover, which is 0-40% in our sample. One implication is that the impact of principal turnover may be easier to detect in observational data, even if the intervening social mechanisms are comparable.

Angeles Unified School District (LAUSD). The SWC data is uniquely suited to assessing the

association between turnover and social resources for several reasons, detailed in the sample

section below: (1) they include reports about school organizational resources at two points in

time from teacher surveys with high response rates, (2) the survey instruments were designed to

measure school organizational social resources, including principal leadership and teacher

community, and (3) they represent a sizeable sample of schools from a single administrative

context, reducing extraneous (and potentially confounding) variation. In addition, although the

study was primarily a randomized field trial of science professional development, the effects of

the intervention were modest in the first year and negated by district shifts in policy in the

second (Geoffrey D Borman, Gamoran, & Bowdon, 2008; Grigg, Kelly, Gamoran, & Borman,

2013). This means that results of secondary observational analyses represent normal practice in

the sampled population.

We supplement the core organizational survey data with LAUSD administrative data and

publicly available data on schools and neighborhoods, as described in greater detail in the

measures section.

Sample
Of the nearly 500 elementary schools in LAUSD, 190 were nominated by district

officials for the SWC study in 2005-2006 on the basis of being "minimally prepared" to

implement curricular reform in science, and 80 of these were randomly selected to participate in

the SWC study. Given our focus on social resources, we limit analyses to 73 schools in which

teachers completed surveys (described in the next section) in both 2006 and 2008.[6] Descriptive

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[6] The unit of analysis for this paper is the school, which provides a fundamental formal boundary for both
organizational social resources and turnover. While we recognize that both phenomena can be fruitfully
conceptualized and operationalized at finer levels of aggregation, such as grade level team or specific social

characteristics of the schools are presented in Table 1. At baseline (2006), a typical school in the

sample was majority Hispanic, with almost 80% of just under 800 students eligible for free or

reduced price lunch. Average class sizes range from 20 to 25 students and 38% of schools failed

to meet Adequate Yearly Progress under the No Child Left Behind legislation for the previous

school year. Regarding staffing characteristics, two-thirds of schools had a stable principal for

three years prior to 2006 and the vast majority of the teaching force (94% on average) had at

least 3 years of teaching experience.

[Take in Table (1) here]

How different is the sample of nominated ("minimally prepared") schools from non-

nominated schools in the district? While we assume that nominated schools met a basic threshold

of perceived organizational health, we do not know the specific criteria used by district officials.

The distribution of observable characteristics, such as student demographics and aggregate test

scores, in the 190 nominated schools covers most of the range of values in the district overall.

However, mean differences imply that nominated schools were relatively advantaged compared

to non-nominated schools. In units of pooled standard deviations between groups (and p-values

for t-tests of the null hypothesis of equal means), the proportion of students eligible for free or

reduced price lunch were 0.36 lower (p<0.01), average teacher experience was 0.16 higher

(p=0.10), and teacher turnover was 0.26 lower (p=0.01). Nominated schools were much higher

performing than average on California's Academic Performance Index (API) rating in 2006

(0.76 standard deviations; p<0.01) but virtually equivalent in the API year to year growth

measure (less than 0.01 standard deviations difference; p>0.99). Depending on how the

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networks, we view the long-standing school-based approach we employ as complementary to these other
perspectives. We present evidence below that our school-based social resource measures indeed capture school-level
rather than grade-level variation in the measures section.

advantaged schools in this sample respond to turnover, our results may not fully reflect the

impacts in a large urban district setting. One reasonable assumption is that these advantaged

schools, who experience lower than average turnover, may respond to better to it. This would

imply that our estimates provide lower bounds of the overall association between turnover and

social resources instability.

<u>Measures</u>

Principal Leadership and Teacher Community

There are several fruitful approaches to measuring the complex features of social

resources in school. Our method focuses on teacher perceptions of specific qualities of principal

leadership and teacher community, aggregating individual teacher surveys to construct school-

level measures. Rooted in school climate research, a strength of this approach is that it prioritizes

the general qualities of relationships in the school that constitute social resources; the resulting

perspective provides a complement to approaches that focus on the structure of social

relationships or on specific supporting behaviors. One potential limitation of these measures is

that individual teacher perceptions tend to vary substantially within schools (Pallas, 1988); we

find, however, significant between-school variation to a degree consistent with or larger than

prior empirical analyses (see Table 2 and Appendix A).

As part of the design of the SWC study, anonymous teacher surveys were administered to

all 4th and 5th grade teachers in study schools in 2006 and 2008. The surveys assessed basic

demographic characteristics, perceptions of school climate, and specific experience related to

science professional development and instruction. Response rates were high (91% in 2006 and

88% in 2008), providing perceptions about organizational characteristics for the vast majority of

teachers in the two targeted grades. Our analyses are based on a subset of questions that pertain

to general school characteristics; valid information was provided by 555 and 517 teachers in the

2006 and 2008 administrations of the survey, respectively. The seven respondents per school in

this study compare favorably to organization-focused research based on the Schools and Staffing

Survey, which surveys approximately five teachers per school on average (Grodsky & Gamoran,

2003). In addition, the decompositions presented below suggest this sample size is sufficient in

this setting to identify consistent differences between schools. Because teacher surveys were de-

identified, it is impossible to compare individuals' responses in each year or to identify a set of

consistent responders. Therefore, we use aggregate measures to characterize school

characteristics and link across time at the school level.

Our key survey measures cover principal leadership and teacher community. We selected

specific items to create a scale for each based on prior measures of these constructs and

exploratory factor analyses of all items in the survey. Factor analyses highlighted a cluster of six

items relating to perceptions of the principals and a cluster of six items relating to teacher

community; these clusters were distinguishable from one another and from other related but

distinct domains, including professional development practices and science-specific instructional

practice.

The principal leadership items capture elements of collective vision, instructional

support, and teacher-principal trust (Bryk & Schneider, 2002; McLaughlin & Talbert, 2001;

Pallas, 1988). The teacher community items reflect cooperation, collegiality, professional

community, and teacher-teacher trust (Bryk & Schneider, 2002; Grodsky & Gamoran, 2003;

McLaughlin & Talbert, 2001; Pallas, 1988). We created each construct by standardizing and

averaging across items for each respondent, then calculating school means and standardizing the

final measure to have a mean of zero and standard deviation one in the school population within

each year. For teacher social resources, Cronbach's alpha was 0.82 in 2006 and 0.85 in 2008; for

principal social resources, the values were 0.90 and 0.89.[7]

[Take in Table (2) here]

An important feature of these aggregate measures of school social resources is that they

identify meaningful variation between schools, rather than solely amongst individual respondents

or between grade-levels. Table 2 presents results of a multilevel model partitioning the variance

in individual teachers' scale scores between grades and schools. Between 18% and 46% of the

variation is between schools for all cases, which suggests detectable differences across schools,

especially for principal leadership; in Appendix A we show that this between-school variation is

comparable to or higher than previous applications of the same items. In addition, we find little

evidence of systematic variation between grade levels; between-grade within-school variation

ranges from 0 to 9%, which supports our claim that the constructs reflect school-wide conditions.

The final key for testing our theoretical claims about role-specificity is meaningful

unique variation in principal and teacher school resources. As expected, these two measures are

moderately positively correlated with one another (2006: 0.54, 2008: 0.48), supporting the notion

that social resources related to principals overlap with those among teachers, but not completely.

The unique variation in each measure allows us to test for role-specific patterns in their

relationship with staff turnover.[8]

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[7] Given the potential pitfalls of assuming cross-level measurement invariance (Schweig, 2014), we also conducted two-level exploratory factor analyses, which resulted in substantively similar conclusions about the between-school distinction between principal and teacher social resources.

[8] One limitation of these measures of school social resources is that they are based on the reports of a subset of the staff at each school: 4th and 5th grade teachers. In other words, the selective grade sample may provide an unrepresentative picture of school-wide conditions. However, the fact that we do not find meaningful variation across grades suggests that these measures, the items of which explicitly address school-wide conditions, do not depend on grade level (see Table 2). If teacher perceptions vary by grade, these differences must be systematically related to turnover to bias the estimates of the association between social resources and turnover, such as if accountability pressures cause both unique pessimism in later grades and greater turnover overall. We partially

Staff Turnover

Employee turnover is a multi-faceted phenomenon (Price, 1977). Theoretically, we

expect instability over time to influence the character of staff relationships, and we therefore

focus on the attrition rate over the two-year period between the 2006-2007 and 2008-2009 school

years, the full time period between the survey measures of school conditions. Although most

previous research reports single-year attrition rates, staff consistency over a longer time period is

theoretically more closely related to the structure and quality of social relationships. At best

single-year measures offer imprecise indications of the theoretically relevant staff consistency,

and they may systematically misstate consistency at schools characterized by particular patterns

of staff churning over time.

To calculate teacher turnover, we collected staffing information from the district for each

year and calculated the share of teachers in a school in 2006-07 that we no longer active in the

school in 2008-09. School-wide turnover estimates are based on an average of 32.7 teachers per

school (standard deviation: 13.8, minimum: 12, maximum: 89).[9] The average two-year teacher

turnover rate was 18%, ranging from a school with no turnover in this period to one with 40%.

To calculate principal turnover, we collected the name of the principal for each school and year

in the study from the school district. We define principal turnover as a change in principal

between the 2006-2007 and 2008-2009 school years, which is the case for just over a third (26 of

73) of schools in the sample.

To provide broader context for the staff turnover in the sample, we also calculate yearly

teacher attrition rates in sampled schools comparable to nationally representative estimates

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address such potential confounding related to measurement by controlling for school conditions (such as Adequate Yearly Progress designation) in various specifications and by comparing principal and teacher resources.

[9] In sensitivity analyses we also calculate turnover specifically for 4th and 5th grade teachers, corresponding directly to the surveyed population. These calculations are based on an average of 8.3 (sd: 3.3, min: 4, max: 22) teachers per school.

collected by the National Center for Education Statistics. Teacher turnover in the sample was

12.2% in 2007 and 8.5% in 2008[10]; the figure for teachers nationally was 15.5% in 2008 (15.2%

in elementary schools, 15.5% in urban schools, and 15.6% in high-poverty schools) (Keigher,

2010). Principal turnover in our sample was 20.5% in both 2007 and 2008 (15 new principals in

each year); the figure for all public schools nationally was also 20.5% (19.6% in elementary

schools, 21.7% in urban schools, and 26.1% in high-poverty schools) (Battle & Gruber, 2010).

The principal turnover rates in our sample are also consistent with calculations from

administrative data; Béteille, Kalogrides, and Loeb (2012) collect 9 total principal turnover

calculations, which range from 19 to 26 percent in four urban districts and 14 to 36 percent in

five states. On balance, instability in this selective sample is within the range of typical observed

values, but towards the low end of that range.

In these data, there is no systematic relationship between principal and teacher turnover.

The Pearson correlation is -0.06, and there is virtually no difference between the average rate of

teacher turnover in schools with stable principals and in schools with principal turnover (18.0%

and 17.6% respectively; t=0.20, p=0.84 for the t-test of the null hypothesis that the two are

equal). This demonstrates that teacher and principal turnover are distinct phenomena in the

sample, allowing the observation of potentially distinct effects on social resources.[11]

Control Variables

We condition on a set of organizational school variables selected to parsimoniously

account for potential confounding causes of both turnover and social resources. Most

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[10] The drop in attrition rates between years in our sample is consistent with a comparable drop in all Los Angeles elementary schools.

[11] Note that teacher attrition may be related to principal turnover in other settings or other time scales. For instance, Béteille et al. (2012) estimate that principal turnover increases the odds of a teacher exit by 10% in the subsequent year.

importantly, school organizational conditions and working conditions in particular are known to

affect turnover (Ingersoll, 2001; Ladd, 2011; Susanna Loeb, Darling-Hammond, & Luczak,

2005; S. Loeb, Kalogrides, & Horng, 2010) and are likely to influence the quality of staff social

relationships. Therefore, we control for social resources at baseline (2006; see Table 2), which

provides a summary measure of differences across schools in related social conditions. Prior

research on turnover also consistently highlights student demographic characteristics as a strong

proxy for underlying working conditions that predict exit (G. D. Borman & Dowling, 2008;

Guarino, Santibanez, & Daley, 2006; S. Loeb et al., 2010). Because we observe limited variation

in race/ethnic and economic school composition in our sample, our preferred control for

demographic differences is a composite measure of neighborhood advantage (averaged and

scaled to have mean 0 and SD 1).[12] Average class sizes and school accountability designation

(Adequate Yearly Progess) provide two additional proxies for working conditions. Because

attrition and social relationships may be both caused by differences in the staff experience profile

of a school, we also control for the initial experience levels of principals (school tenure of at least

3 years) and teachers. Finally, we control for the experimental status of the school in the broader

SWC study.[13]

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[12] The neighborhood composition scale is based on four characteristics of the school's census tract in 2000: median income, percent with high school degrees, percent employed, and percent not in poverty. Items were standardized, averaged, and then the resulting scale was standardized to have a mean of 0 and standard deviation of 1.

[13] Our results are robust to a variety of different measures of student demographic variables, including race and eligibility for free/reduced price lunch, which are recognized as proxies for important working conditions in the teacher turnover literature (Susanna Loeb et al., 2005; Scafidi, Sjoquist, & Stinebrickner, 2007). This is not surprising given than our neighborhood composition measure is highly correlated with school non-white and free-lunch composition (0.93 and 0.73, respectively) and with the school's Academic Performance Index score (0.79).

<u>Analytic Models and Strategies to Address Confounding</u>

We model the level of social resources in 2008 as a function of staff turnover in the preceding two years.[14] The model is:

$$SR_i = \beta_0 + \beta_1(SR_{i,2006}) + \beta_2(Turnover) + \boldsymbol{\beta X} + \varepsilon_i \ (1)$$

where SR_i is the social resources measure of school i in 2008, $SR_{i,2006}$ is the prior social resources measure (2006), $\boldsymbol{X}$ is a vector of control variables (student demographic advantage, average class size, Adequate Yearly Progress designation, initial staff experience indicators, and experimental group), and ε_i is the school disturbance term. In Equation 1, β_1 is informative as an indication of how consistent social resources are over two years in the average school. Our primary interest is the value of β_2, which represents the predictive effect of staff turnover on social resources in 2008 net of resources in 2006. $\beta_2 < 0$ would be consistent with negative consequences of turnover on social resources, while $\beta_2 > 0$ would be consistent with benefits.

We also ask whether the predictive effects of turnover vary across school characteristics, most notably across initial levels of social resources, by introducing interaction terms into the model. For example:

$$SR_i = \beta_0 + \beta_1(SR_{i,2006}) + \beta_2(Turnover) + \beta_3(SR_{i,2006})(Turnover) + \boldsymbol{\beta X} + \varepsilon_i \ (2)$$

We mean center all variables so that β_1 in Equation 2 represents the effect of prior resources for a school with average turnover during the period, while β_2 represents the predictive effect of turnover on social resources for a school with average prior social resources. The interaction term β_3 has two equivalent interpretations: First, β_3 represents how the consistency of social resources over time changes with staff turnover: $\beta_3 < 0$ implies less consistency in social

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[14] For simplicity, we report Ordinary Least Squares estimates for the sample of 73 schools. See Appendix C for results from multi-level models of individual teacher responses in 2008 nested within schools, which are substantively similar.

relationships over time in higher turnover settings, which would support the hypothesis that

turnover is fundamentally destabilizing to social relationships. Second, β_3 represents how the

effects of turnover differ across initial social conditions. $\beta_3 < 0$ suggests that initially-high

schools have more to lose from relational instability, while $\beta_3 > 0$ suggests greater resiliency of

schools with higher initial social resources.

The estimated associations between turnover and social resources in observational data

are likely to be confounded by reciprocal influence and shared causes (represented by C1 and C2

in Figure 1). We address potential confounding influences in three ways. First, to isolate the

influence of turnover on social resources on turnover from the reverse, we rely on the specific

temporal order of the measures in the longitudinal data. Because the social resources outcomes

are measured strictly after turnover, the direct influence of these conditions cannot contribute to

the associations we observe.

Second, we condition on a set of observable variables to address the most fundamental

potential confounders of the relationship between turnover and social resources. The SWC data

provide unique opportunities to consider otherwise comparable schools with different levels of

turnover. One of the most important potential confounders is general organizational

characteristics. We condition both on an overall indicator of organizational health—by the study

selection criteria, which required schools to be "minimally qualified" for a science professional

development initiative—and on specific measures of the focal social resources measured at

baseline. In addition, we control for proxies of two primary predictors of turnover: staff

characteristics (principal and teacher experience) and working conditions (demographic

advantages, class size, and accountability status).

Third, we conduct falsification tests in which we use the same models to assess the associations between turnover and social resources across roles. Because we do not theorize immediate consequences of principal turnover on teacher social resources or vice versa, an apparent cross-role effect would indicate a spurious unmeasured confounding school characteristic. Conversely, observed associations that are role-specific are not the result of general school-level processes.

Results

Unconditional Associations

[Take in Table (3) here]

Bivariate correlations among turnover, social resources, and school characteristics (Table 3), and between social resources measures over time (Table 4) reveal four notable patterns. First, not surprisingly, more advantaged schools have lower turnover and higher levels of principal leadership (correlation = 0.25) and teacher community (correlation = 0.52). From the perspective of equity, these latter relationships imply troubling disadvantages in school social resources faced by poor and minority students. From an analytic perspective, these correlations imply specific challenges for separating the effects of turnover on social resources from underlying school conditions.

Second, the correlations between turnover and social resources are small but differ in direction for social resources levels and gains. Teacher turnover tends to be lower in schools with greater initial principal leadership and teacher community, perhaps reflecting organizational determinants of attrition (Ingersoll, 2001). However, contrary to the hypothesis that turnover is a detrimental influence, the two-year trends in social resources do not tend to be worse in higher turnover schools.

[Take in Table (4) here]

Third, the two-year stability of social resources is associated with role-specific staff

turnover (Table 4). Moderate overall principal leadership stability (0.49) is the result of high

stability (0.70) in the absence of principal turnover and almost no consistency among schools

that experienced principal turnover (0.06). The patterns are similar but less pronounced for

teacher community and teacher turnover; consistency is equally high in low turnover schools

(0.71 and 0.78 in the bottom two terciles), but lower in schools with highest turnover (0.45).

Multivariate Models

The main unconditional associations—ambiguous relationships between turnover and

overall trends in social resources but a striking association between turnover and the consistency

of social relationships over time—also hold in our multivariate models (Table 5), but only the

results for principals are statistically significant.

[Take in Table (5) here]

Controlling for initial principal leadership and the set of potential confounders, we find

no evidence of an effect of principal turnover on principal social resources. Though negative, the

magnitude of the estimate (Model 1: -0.004) is less than 1% of cross-sectional standard

deviations in the outcome. However, Model 2 shows that the estimated effects of principal

turnover are inversely related to the level of initial conditions. Among schools with principal

leadership one standard deviation below the mean, the estimated effect of turnover is more than

three-quarters of a standard deviation gain ($.804 = 0.028 + (-1)(-0.776)$); the losses are

comparable for schools one standard deviation above the mean ($-0.748 = 0.028 + (1)(-0.776)$).

Net of school characteristics, the results show principal turnover "resetting" the quality of

relationships with school leadership. Therefore, average negligible effects mask the substantial

benefits for schools with initially poor leadership and the negative consequences for schools with

relatively successful leadership. A corollary, echoing the unconditional consistency results, is

that principal social resources in 2006 were only predictive of resources in 2008 in schools

without turnover.

For teacher turnover, we similarly find no evidence of an effect on the overall trend in

teacher community. The estimated effect of a standard deviation change in teacher turnover is

also less than 1% of a standard deviation (Model 4). The interaction between teacher turnover

and initial teacher community is negative but not statistically different than zero. Therefore,

while there is some suggestive evidence for some resetting of teacher-teacher social resources by

turnover, features of the teacher community may be more robust to turnover than principal

leadership. This makes sense, given that teacher community resources are distributed throughout

the population, of which no more than 40% of individuals changed during the sample time

period.

[Take in Figure (2) here]

To compare the magnitude of the principal and teacher effects implied by these estimates,

the black points and lines in Figure 2 summarize the estimates of Models 2 and 5 in Table 5. This

figure plots marginal predictions of the estimated effects of the maximum range of variation in

each turnover measure—no vs. yes for principals and 0% vs. 40% for teachers—for schools one

standard deviation below and above the initial mean. Estimated principal turnover effects on

principal leadership are substantially larger than the estimates for teacher turnover effects on

teacher community (even though they have been scaled to the represent the effect of the full

observed variation in turnover). The slope of the lines represents the key turnover-by-initial

resources interaction estimates. Both principal and teacher turnover estimated interactions are

negative, representing a destabilizing effect on social resources, but the principal turnover

interaction (solid black line, left panel) is substantially larger than the non-significant teacher turnover interaction (dashed black line, right panel), implying greater robustness over time of teacher community social resources.

We highlight two general features of these findings. First, it is important to emphasize that regression to the mean does not explain the principal leadership results, for it is not simply the case that trends are negatively correlated with initial levels. The apparent instability is present only in schools experiencing principal turnover. If this were an artifact of initial measurement error, it would have to be the result of *selective* measurement error in 2006 based on future principal turnover. One testable implication of this scenario is poorer measurement properties of principal leadership in 2006 for schools that experienced a principal exit in the following two years; we find no evidence of a difference between this group and the stable-principal schools in terms of scale reliability, discrediting the selective measurement error interpretation of the results.

It is also important to note the uncertainty associated with these estimates. This is especially pertinent for the interaction between principal turnover and principal leadership, which implies a drastic destabilizing effect of turnover. The 95% confidence interval for the interaction (-1.18, -0.372) means that we cannot reject an instability effect almost half as large as the point estimate. In other words, results are consistent with a true association that is meaningful but substantially smaller than as observed. Conversely, our null estimate of the main effect of principal turnover on principal leadership is not precisely estimated. We cannot reject a negative or positive overall effect of more than 40 percent of a standard deviation (confidence interval from Model 1: (-0.441, 0.433)). Similarly, null estimates for the associations for teacher turnover

are not precisely estimated, and we cannot reject modest impacts of teacher turnover on either teacher community or stability over time.

Robustness Checks and Potential Confounding

Several features of our regression analyses mitigate potential confounding influences of the relationships of interest. The sample itself is drawn from a relatively homogeneous population of schools, we control for initial levels of social resources, and we are additionally able to control for proxy measures of the main confounding pathway: underlying staff working conditions that influence both exits and social relationships. Our results are also robust to alternate specifications (see Appendices B and C): omitting covariates, controlling for student achievement instead of demographic composition (as the two are highly correlated), controlling for the prior alternate social resource measure, non-linear specification of prior social resources, an alternate measure of teacher turnover (whole school vs. 4th and 5th grade only), and multi-level models. However, we cannot definitively rule out the possibility that an unobserved factor explains the critical interaction between the predictive effects of turnover and initial social resources. Does some other characteristic promote both turnover and the "resetting" of social relationships, especially for principals?

The hypothesized causal differences between principal and teacher turnover provide some leverage on this question. Theoretically, we expect the true short-term effects of principal turnover on teacher social resources (and vice versa) to be negligible. Therefore, if we did observe cross-role effects, these would suggest a spurious unobserved school characteristic.

The cross-role estimates (Models 3 and 6 in Table 5; also represented by grey symbols in Figure 2) bolster the causal interpretation of the original principal turnover results. There are no effects of teacher turnover on principal social resources, nor does the focal interaction term suggest a meaningful "destabilizing" influence of teacher turnover on resources related to

leadership (compare the grey line to the black one in Figure 2, left panel).[15] The effects on

teacher social resources are less clearly unique to teacher turnover; as the magnitude of the

estimated negative, statistically insignificant interaction between principal turnover and initial

teacher resources is non-trivial compared to the estimated teacher turnover interaction (compare

the grey line to the black one in Figure 2, right panel). Therefore, while principal turnover

estimates are role-specific, general school characteristics may account for a portion of the

suggestive teacher turnover instability effects described above.

Discussion

Given the scope and persistence of turnover in U.S. schools, the effect of principal and

teacher attrition on school organizational resources has implications for educational quality,

improvement, and equity. By shifting attention to the organizational consequences of staff

turnover, we add to a more nuanced account of these effects. We find no evidence of an overall

negative (or positive) effect on social resources; this challenges broad worries about destructive

organizational consequences of turnover. On the other hand, our results reveal that social

resources play a role in the consequences of staff turnover.

Our results imply that principal turnover has clear consequences for some general social

conditions. It is fundamentally destabilizing for the quality of principal-teacher relationships in

the school (as perceived by teachers), consistent with the underlying hypothesis that relational

instability "resets" the development of social resources. An important aspect of this finding is

that principal leadership levels were reset in schools experiencing turnover to average levels in

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[15] Note that principal social resources do inhere in relationships with teachers and may be affected by teacher turnover, especially at more drastic levels. Our argument is that teacher effects should be substantially less pronounced than principal effects on measures of principal social resources.

the sample, rather than to the lowest levels. This implies that the development of social resources over time is not universally positive, and therefore that resetting can be a strategy to improve school conditions in the short term. A corollary is that principal turnover is a serious threat to the long-term development of positive principal-teacher social resources.

We find relatively little evidence of destabilizing effects of teacher turnover on measures of teacher community, suggesting that overall features of teacher community are more robust to underlying changes in personnel. This probably reflects the greater diffusion of meaningful teacher-teacher relationships throughout the teacher population (compared to principal leadership, which is centralized on the principal), as well as the fact that teacher turnover replaces only a minority of the individual members (maximum of 40% in our sample). As a result, general teacher community characteristics are unlikely to account for the spillover effects of teacher turnover on student achievement (Ronfeldt et al., 2013).[16] More generally, these school climate conditions may be particularly difficult to influence at all, for good or for bad, at least in the short term. Ultimately, our conclusions signal the need for research on teacher turnover and complementary measures of social resources that focus on localized social structures (such as within grade level teams) and peer interactions (such as help-seeking).

Limitations

The results of this study must be interpreted in light of four limiting features. First, despite the considerable empirical leverage we apply to isolating the effects of turnover on social resources (targeted sample, controls for theorized confounders, robustness checks, and role-specific specification), causal interpretation of our estimates are fundamentally based on the

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[16] Note that similar survey measures directed at smaller units of teacher practice, such as grade level teams, may still account for spillover effects. We expect individual teacher exits to have clearer consequences for these more limited social networks.

assumption that there is no unobserved confounding variable that accounts for the observed associations. Given the practical difficulty in implementing a random assignment study of the effects of staff turnover, building evidence for the effects of turnover will require the accretion of careful observational studies with varied contexts and methods. This paper provides a necessary, though not sufficient, contribution to that broader effort.

Second, given the timing of the measures in this study, our results apply specifically to the short-term effects of turnover. We find that principal turnover causes immediate instability in teachers' perception of principal leadership, rather than average gains or losses, but we cannot directly track the subsequent relational processes as they play out over time. The stability we observe among schools with stable leadership suggests that effects may be confined to short-term "resetting," but the long term organizational effects of turnover and the consequences of persistent turnover remain important theoretical and practical questions for future research.

A third limitation of this study is that the results may not generalize beyond the types of schools under consideration. The sample was drawn randomly from a subset of Los Angeles elementary schools. We expect that our results represent the experiences of "minimally qualified" elementary schools in large urban school districts. However, if the effects of turnover are heterogeneous across broader contexts, grade levels, and regions, then our results may not generalize to different settings.

Fourth, this study cannot explain exactly how the organizational consequences of turnover play out on the ground. Such information would be especially useful to interpret our result that teacher turnover has relatively little destabilizing effect on teacher community. We do not know if this is due to relatively small variation in teacher turnover (only a fraction of individuals in the role in each year), greater robustness of more distributed teacher resources,

longer-term processes for teacher effects, or some other explanation. One way for future research

to get at these distinctions would be to test for patterns among attrition of different types of

teachers, such as those from different network positions or those with greater or less school

tenure. Another to elaborate the processes that link turnover and social resources is to delve into

the organizational differences between schools with different social resources measures. For

instance, to understand apparent benefits of principal turnover for schools with low principal

leadership, we need to know more about the distinguishing features of these school contexts.

Broader Implications

      This paper provides a unique systematic treatment of the short-term association between

staff turnover and school social resources. We conclude by outlining the implications of these

results in three arenas: the quantitative measurement of school social resources, the effects of

staff turnover on school effectiveness, and the prospects for developing social resources.

      From the perspective of basic educational research, these results contribute to the long-

standing attempt to measure elements of school climate, including the characteristics of school

social relationships, with quantitative survey measures of individual staff members. Since most

of the variation in teacher responses is within rather than between schools, researchers have long

worried, that "climate, as measured by teacher reports, does not exist" (Pallas, 1988, p. 553).

While our measures of school social resources have similar multi-level variance properties, the

results of this paper indicate that they capture meaningful distinctions between schools. First, we

find that the measures are moderately reliable across time on average, in terms of test-retest

correlations, especially given that the surveys were a full two years apart.[17] More importantly,

we demonstrate that these average correlations conceal strong reliability in schools with stable

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[17] For reference, Bryk and Schneider (2002) report slightly higher correlations over 3 years for both teacher-teacher trust (0.80) and teacher-principal trust (0.62).

staff and lower consistency over time in schools with staff turnover. Third, the role-specific

destabilizing effects observed for principal turnover support the construct validity of the

principal leadership climate measure by demonstrating that it relates to relevant underlying

school conditions. The suggestive effects of teacher turnover on teacher community are not

conclusive, but do suggest the value in this domain of more specific, complementary measures of

teacher-teacher social resources.

With respect to the impacts of staff turnover, our findings imply that social consequences

are real but complex. One implication is that we cannot simply evaluate teacher and

administrator exits only through the lens of human capital. Focusing solely on individual teacher

effectiveness, for instance, can promote staffing policies designed around very high levels of

yearly attrition (e.g. Staiger & Rockoff, 2010). These policies are also likely to affect social

resources, which need to be factored into their total consequences. Another implication is that

calls to universally reduce turnover, or even policies that target retention at hard to staff schools,

may be misplaced. In particular, our results suggest that turnover may have positive

organizational benefits (in the short term) for schools with low social resources, and that

turnover seems to be most detrimental for schools with strong leadership and teaching

community. Termination and retention both may provide viable strategies for school

improvement, provided they are deployed strategically with an awareness of existing social

conditions.

Finally, this study provides insight into the processes of social capital formation within

schools. Our focus on trends in teachers' perceptions of school conditions complements recent

socio-metric research in this area; the role-specific patterns for staff turnover resonate with the

importance of school organizational features (such as grade level) for social tie formation (J. P.

Spillane et al., 2012). Practically, our results suggest that the prospects of building positive relationships within schools facing staff turnover depend on the existing level of social resources, especially for leadership. Principal turnover may provide short-term benefits for low-resource schools, but it seems to be destructive for the existing social conditions in high-resource schools. Therefore, from the perspective of valuable social resources, turnover may be most troubling in schools that "have the most to lose," especially as it disrupts schools in the critical transition from basic levels of social trust to deep interactions around improving instructional practice (Kochanek, 2005; McLaughlin & Talbert, 2006). Qualities of teacher community, in contrast, seem to be more robust in the face of teacher turnover, which might reflect greater difficulty in changing these features in either direction.

Acknowledgements

Appendix A. School Social Resources Measures

<u>Item Wording</u>

Principal Leadership[a]

The principal is an effective manager who makes the school run smoothly.[c]
It's okay in this school to discuss feelings, worries, and frustrations with the principal.[c]
The principal takes personal interest in the professional development of the teachers.[c]
The principal does a poor job of getting resources for this school (reverse coded).[d]
The principal knows what kind of school he/she wants and has communicated this to the staff.[d]
To what extent have each of the following people helped you improve your teaching or helped
   you solve an instructional or class management problem? Principal or head of this school[b]

Teacher Community[a]

Most of my colleagues share my beliefs and values about what the central mission of the school
   should be.[ef]
There is a great deal of cooperative effort among the staff members.[ef]

I make a conscious effort to coordinate the content of my courses with that of other teachers.[f]
Teachers in this school trust each other.[g]
It's okay in this school to discuss feelings, worries, and frustrations with other teachers.[g]
Teachers respect other teachers who take the lead in school improvement efforts.[g]

Notes:

[a] Response categories are strongly agree, agree, disagree, strongly disagree (coded 0 – 3) unless
   otherwise noted.
[b] Response categories range from no help (0) to extremely helpful (5)
[c] Source: Bryk & Schneider 2002, teacher-principal trust
[d] Source: Pallas 1988, principal leadership
[e] Source: Pallas 1988, staff cooperation
[f] Source: Grodsky and Gamoran 2003, professional community
[g] Source: Bryk & Schneider 2002, teacher-teacher trust

Comparison to Properties in Prior Studies

Comparing Table 2 (Main Text) to the first three columns in Table A1 (below), we see

that between-school variability in our social resources measures are as high or higher than

similar measures employed previously. The school-level intraclass correlations (ICCs) in the

System-wide Change data ranged from 0.18 to 0.46, while the comparable figures in the previous

literature range from 0.15 to 0.25. Principal leadership in 2006 is exceptional, in that 46% of the

variation in teachers' responses was between schools.

To assess whether high between-school variation was due to the setting or the specific

measures, we created reduced versions of the school resources scales, using only items directly

overlapping with prior implementations. The original scales could only be imperfectly recreated,

for they included six to fourteen items, and concerns with the demand on teachers' time and

attention limited us to only three items in each reduced form scale reproduction. We compare the

reliability and intraclass correlation statistics for these reduced form scales at baseline with the

published equivalents for the original scales (Table A1).

Comparing the alpha coefficients to those available for the published prior scales

suggests that the original scales and the reduced form reproductions possess similar degrees of

internal consistency, even though our scales included fewer items.[18] Furthermore, in three of the

cases (Teacher-Teacher Trust, Staff Cooperation, and Professional Community) the intraclass

correlations computed for our reduced form scales correspond closely with the published figures

for the original scales. These three scales evaluate a similar construct: the relations between

teachers, and suggest that the sample of schools available to us is similar in this respect to those

reported on previously.

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[18] Bryk and Schneider (2002) computed the reliability of their scales using a different method, but they suggest that their reported alpha statistic is comparable to Cronbach's alpha.

The intraclass correlations for two of the reduced-form scales—Teacher-Principal Trust and Principal Leadership—deviated substantially from the comparison scales, however. These two scales, which evaluate teacher perceptions of their principal, were substantially higher in their reduced form reproduction using this sample of teachers than was reported for the original scales (we found an ICC of 0.453 vs. 0.25 and of 0.428 vs. 0.182). These values approach the ICC of our full six-item Principal Leadership scale (0.493), which is not especially surprising, since five of the six items in our scale are included in the two reduced-form scales (three for Teacher-Principal Trust and two for Pallas's (1998) Principal Leadership scale).

We conclude from this exercise that the sample of Los Angeles schools on which we report here is comparable in terms of relations between teachers but exceptional in regard to the variation of teacher perceptions of their principal. This may be due to our focus on a specific local context. We note that Bryk and Schneider (2002) report somewhat higher intraclass correlations specifically in Chicago than Pallas (1988) or Grodsky and Gamoran (2003), who employed national survey data.

Table A1. Measurement Properties for Source Measures of School Social Resources and for Overlapping Items in System-wide Change (SWC) Study in 2006

	Source Scales			Los Angeles Elementary Schools (subscales using available items in SWC Study, 2006)		
	Survey Items	Published Alphas	Published ICC	Survey Items	Computed Alpha	Computed ICC
Teacher-Principal Trust (Bryk & Schneider 2002)	9	.92 [a]	.25 [b]	3	.884	.453
Teacher-Teacher Trust (Bryk & Schneider 2002)	6	.82 [b]	.21 [d]	3	.809	.218
Principal Leadership (Pallas 1988)	.14	.92 [h]	.182 [e]	3	.696	.428
Staff Cooperation (Pallas 1988)	8	.84 [h]	.147 [e]	3	.723	.172
Professional Community (Grodsky & Gamoran 2003)	7	.74 [f]	.194 [g]	3	.680	.176

[a] Bryk & Schneider 2002, Table B.1 (p. 156)
[b] Bryk & Schneider 2002, Table C.2 (p. 169)
[c] Bryk & Schneider 2002, Table B.2 (p. 157)
[d] Bryk & Schneider 2002, Table C.3 (p. 170)
[e] Pallas 1988, Table 1 (p. 544)
[f] Grodsky & Gamoran 2003 (p. 12)
[g] Grodsky & Gamoran 2003 (p. 18)
[h] *The Condition of Education 1986* (p. 242) [available at http://eric.ed.gov/?id=ED277162]

Notes: Bryk and Schneider (2002) computed the reliability of their scales using a different method than we did, but they suggest that their reported alpha statistic is comparable to Cronbach's alpha. Bryk and Schneider (2002) reported on Chicago elementary schools, whereas Pallas (1988) and Grodsky and Gamoran (2003) employed nationally representative samples.

Appendix B. Selected Predictors of Principal Leadership and Teacher Community from Alternate Multivariate Specifications (N= 73 Schools)

1. Principal Leadership Specification	Prior Principal Leadership (PL)		Principal Turnover		Interaction	
	Estimate	(SE)	Estimate	(SE)	Estimate	(SE)
A. Main	0.780*	(0.130)	0.028	(0.203)	-0.776*	(0.206)
B. No covariates	0.757*	(0.123)	0.019	(0.200)	-0.704*	(0.199)
C. Academic Performance Index control	0.803*	(0.131)	-0.010	(0.204)	-0.770*	(0.204)
D. Prior teacher community control	0.563*	(0.161)	0.023	(0.202)	-0.503*	(0.235)
E. Categorical prior principal leadership (terciles, middle category omitted)						
Low PL	-0.730*	(0.294)	-0.082	(0.400)	1.015+	(0.529)
High PL	1.158*	(0.315)			-0.857	(0.535)

2. Teacher Community Specification	Prior Teacher Community (TC)		Teacher Turnover		Interaction	
	Estimate	(SE)	Estimate	(SE)	Estimate	(SE)
A. Main	0.759*	(0.107)	-0.002	(0.098)	-0.081	(0.107)
B. No covariates	0.674*	(0.089)	0.044	(0.088)	-0.099	(0.103)
C. Academic Performance Index control	0.758*	(0.109)	-0.020	(0.102)	-0.121	(0.112)
D. Prior principal leadership control	0.719*	(0.128)	0.049	(0.099)	-0.125	(0.122)
E. Categorical prior teacher community (terciles, middle category omitted)						
Low TC	-0.846*	0.633*	-0.237	(0.205)	0.469+	(0.274)
High TC	-0.252	(0.292)			0.196	(0.251)
F. Grade 4 and 5 Turnover Only	0.720*	(0.107)	-0.110	(0.100)	-0.178+	(0.098)

+ $p<0.1$; * $p<0.05$

Each specification represents a different specification of a regression model predicting 2008 social resources:

Specification A corresponds to the preferred specifications reported in the Table 5 of the main text (Model 2 for principal leadership; Model 5 for teacher community).

Specification B omits all covariates.

Specification C replaces the student demographic index control with a measure of student achievement, the Academic Performance Index for 2005-2006 calculated by the California Department of Education. (High correlation precludes including both together.)

Specification D includes an additional control for the alternate social resources measure (prior teacher community for the model of principal leadership, and vice versa), as well as the interaction between this measure and turnover.

Specification E replaces the values of prior social resources measures with categorical indicators for the top third and bottom third. The parameterization of the turnover variable is unchanged.

Specification F, which only applies to models of teacher community, uses teacher turnover from grades 4 and 5 (those targeted by the teacher survey) rather than overall.

Appendix C. Multi-level Multivariate Models of Principal Leadership and Teacher Community

Outcome	Principal Social Resources			Teacher Social Resources		
	(1)	(2)	(3)	(4)	(5)	(6)
Principal Focal Variables						
PSR, 2006(a)	0.347*	0.522*	0.319*			
	(0.0764)	(0.091)	(0.077)			
Principal Turnover	-0.0125	-0.000				-0.053
	(0.161)	(0.144)				(0.105)
PSR(a) * Principal Turnover		-0.521*				
		(0.148)				
PSR(a) * Teacher Turnover(a)			-0.037			
			(0.073)			
Teacher Focal Variables						
TSR, 2006(a)				0.438*	0.437*	0.474*
				(0.066)	(0.065)	(0.078)
Teacher Turnover(a)			0.0379	-0.032	-0.032	
			(0.083)	(0.059)	(0.058)	
TSR(a) * Teacher Turnover(a)					-0.074	
					(0.064)	
TSR(a) * Principal Turnover						-0.090
						(0.118)
School Covariates, 2006						
Demographic Advantage Scale(a)	-0.044	-0.039	-0.056	-0.121	-0.125	-0.102
	(0.101)	(0.094)	(0.105)	(0.082)	(0.082)	(0.082)
Average Class Size(a)	-0.124	-0.102	-0.120	-0.026	-0.019	-0.010
	(0.077)	(0.073)	(0.083)	(0.058)	(0.058)	(0.058)
Failed Adequate Yearly Progress	0.026	0.163	0.0180	-0.163	-0.129	-0.142
	(0.206)	(0.195)	(0.204)	(0.147)	(0.147)	(0.145)
Principal with at least 3 Years Experience	0.171	0.175	0.177	-0.170	-0.179	-0.136
	(0.156)	(0.145)	(0.160)	(0.116)	(0.115)	(0.116)
Teachers with at least 3 Years Experience(a)	-0.067	-0.059	-0.043	0.0236	0.032	0.055
	(0.072)	(0.067)	(0.078)	(0.058)	(0.058)	(0.056)
Treatment	0.081	0.113	0.063	0.125	0.132	0.105
	(0.146)	(0.136)	(0.148)	(0.107)	(0.107)	(0.104)
Individual Covariates, 2008						
Male	0.0825	0.077	0.090	-0.067	-0.070	-0.055
	(0.091)	(0.090)	(0.091)	(0.096)	(0.096)	(0.095)

Nonwhite	-0.010	-0.006	-0.012	0.007	0.005	-0.0204
	(0.089)	(0.088)	(0.089)	(0.100)	(0.095)	(0.095)
Advantaged Degree	-0.171*	-0.152+	-0.174*	-0.011	-0.011	-0.015
	(0.081)	(0.081)	(0.082)	(0.087)	(0.087)	(0.087)
Less than 3 Years Experience	0.148	0.147	0.148	0.0726	0.078	0.067
	(0.119)	(0.119)	(0.119)	(0.128)	(0.128)	(0.128)
Constant	-0.118	-0.205	-0.115	0.162	0.146	0.176
	(0.169)	(0.163)	(0.161)	(0.128)	(0.129)	(0.138)
Variance Components						
School-level: High turnover(b)	0.342*	0.221*	0.221*	0.037*	0.020+	0.007
	(0.152)	(0.105)	(0.122)	(0.051)	(0.047)	(0.039)
School-level: Low turnover(c)	0.201*	0.179*	0.262*	0.072*	0.082*	0.092*
	(0.074)	(0.064)	(0.082)	(0.043)	(0.045)	(0.047)
Individual-level	0.675*	0.675*	0.676*	0.823*	0.823*	0.823*
	(0.046)	(0.046)	(0.047)	(0.056)	(0.056)	(0.056)
Log Likelihood	-666.3	-661.8	-668.7	-689.7	-690.9	-689.3
AIC	1364.7	1357.5	1371.5	1411.3	1415.8	1412.6
BIC	1432.1	1429.2	1443.1	1478.8	1487.5	1484.3
School-level Heterogeneity Test(d)	0.389	<0.001	<0.001	0.621	0.0293	0.0137

(a) Variable standardized to have mean 0 and standard deviation 1 among the 73 schools.

(b) High turnover is defined as principal exit or teacher turnover greater than 21%

(b) High turnover is defined as no principal exit or teacher turnover less than or equal to 21%

(d) P-value for the likelihood ratio test of the null hypothesis that the school level variance components are equal.

Standard errors in parentheses.

PL = Principal Leadership, TC = Teacher Community

* p<0.05

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Figures

Figure 1. Conceptual Framework
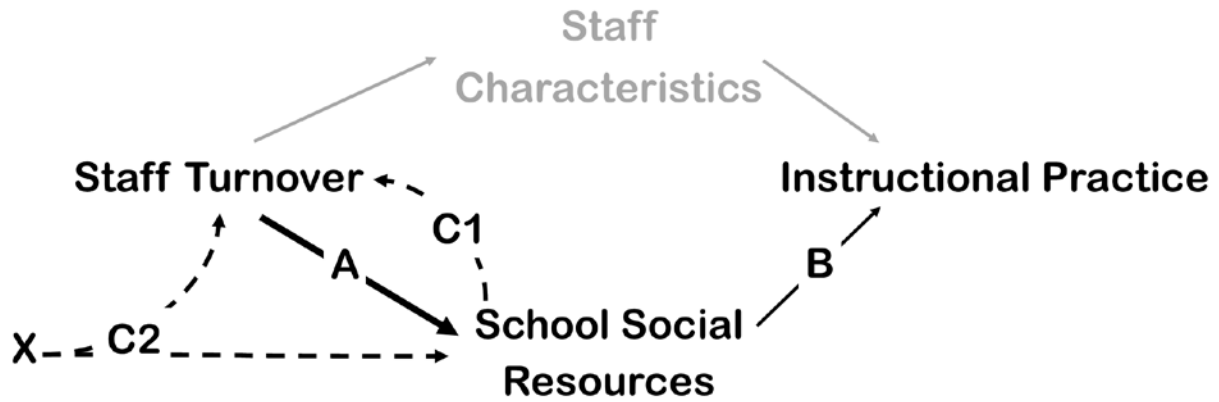
School social resources represent one pathway through which staff turnover may impact instructional practice. Path A represents the primary focus of this paper, which is motivated by the context of recent research on Path B. Dashed, curved arrows (C1 and C2) represent potential confounding relationships for the observed association between turnover and social resources. (Gray elements have generated substantial previous research but are not considered in this paper.)

Figure 2. Summary of Estimates of the Effect of Principal and Teacher Turnover on School Social Resources for Schools with High and Low Initial Social Resources
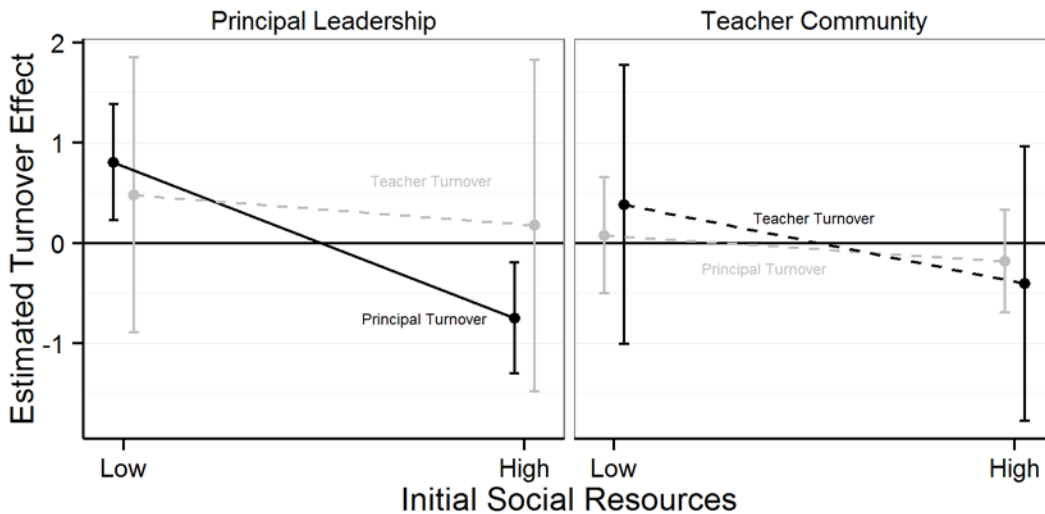
Notes: Values based on Models 2, 3, 5, and 6 reported in Table 5. Points (and error bars) represent estimates of the marginal effect (and 95% confidence intervals) of turnover on social resources for specific values of initial social resources. All effects are presented in standardized units. Principal turnover effects represent the estimated effect of principal exit (versus stability). Teacher turnover effects represent the estimated effect of 40% 2-year attrition (versus 0%), which is the full range of variation in the sample. Low (high) initial social resources are defined as 1 standard deviation below (above) the mean. Lines represent the estimated interaction between initial social resources and turnover. The solid line signifies an interaction that is significantly different from 0 ($p < 0.05$); dashed lines are non-significant interactions.

Tables

Table 1. Characteristics of Study Schools (N = 73)

	Mean	SD	Min	Max
Student Characteristics, 2006				
Enrollment	787	414	267	2599
Proportion free/reduced lunch	0.79	0.25	0.08	1.00
Proportion African American	0.08	0.11	0.00	0.75
Proportion Hispanic	0.72	0.26	0.10	1.00
Proportion White	0.12	0.19	0.00	0.80
School Characteristics, 2006				
Average Class Size	23.1	0.9	20.3	25.4
Did not meet Adequate Yearly Progress	0.38	--	0.00	1.00
Principal with at least 3 years tenure	0.63	--	0.00	1.00
Proportion teachers with at least 3 years experience	0.93	0.06	0.73	1.00
Staff Turnover, 2006-2008				
Principal	0.36	--	0.00	1.00
Teacher	0.18	0.08	0.00	0.40
Number of Teacher Surveys				
2006	7.61	3.16	2	19
2008	7.08	3.26	2	17

Table 2. Properties of School Social Resources Measures

| | Items | Alpha | 3-Level Variance Components | | | Correlation Matrix | | | |
			Between Schools	Between Grades 4 and 5	Within Grade	(A)	(B)	(C)	(D)
2006									
(A) Principal Leadership	6	0.90	45.7%	3.4%	50.9%	1			
(B) Teacher Community	6	0.82	19.2%	9.0%	71.8%	0.54	1		
2008									
(C) Principal Leadership	6	0.89	31.5%	0.0%	68.5%	0.49	0.35	1	
(C) Teacher Community	6	0.85	18.3%	1.7%	80.0%	0.50	0.68	0.48	1

Notes: Variance decompositions omit teachers with responsibilities teaching both 4th and 5th grade, and are based on 514 teacher responses in 144 grades in 73 schools in 2006 and 463 teacher responses in 142 grades in 73 schools in 2008. Correlations across domain and time are calculated from average scores at the school level (N=73), based on all available teacher surveys (555 responses in 2006 and 517 in 2008). See Appendix A for specific items, sources, and comparisons of measurement properties to previous studies.

Table 3. Unconditional Correlations between School Characteristics (73 schools)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Staff Turnover										
(1) Principal Turnover	1									
(2) Teacher Turnover	-0.02	1								
Social Resources										
(3) PL, 2006	0.01	-0.17	1							
(4) PL gain, 2006-2008	0.00	0.18	-0.50	1						
(5) TC, 2006	0.08	-0.14	0.54	-0.18	1					
(6) TC gain, 2006-2008	-0.06	0.11	-0.05	0.20	-0.40	1				
Staff Characteristics, 2006										
(7) Principal 3 years experience	0.10	-0.21	0.03	0.15	0.05	-0.21	1			
(8) Proportion teachers with 3 years experience	0.12	-0.26	-0.07	-0.06	-0.21	0.15	-0.03	1		
School Conditions, 2006										
(10) Demographic advantage scale	-0.07	-0.26	0.25	-0.20	0.52	-0.29	0.11	-0.05	1	
(11) Average class size	-0.04	-0.08	-0.16	-0.11	-0.05	-0.04	-0.10	0.03	0.04	1

PL = Principal Leadership, TC = Teacher Community

Table 4. Correlations between School Social Resources in 2006 and 2008

	All Schools	Same Principal	New Principal	Low Teacher Turnover 0-14%	Medium Teacher Turnover 14-21%	High Teacher Turnover 22-40%
Principal Leadership	0.49	0.70	0.06	0.54	0.57	0.46
Teacher Community	0.68	0.69	0.65	0.71	0.78	0.45
N	73	47	26	26	24	23

Table 5. Estimates from OLS Models Predicting School Social Resources in 2008 (N=73)

Outcome	Principal Leadership			Teacher Community		
Model	(1)	(2)	(3)	(4)	(5)	(6)
Principal Focal Variables						
PL, 2006(a)	0.467*	0.780*	0.479*			
	(0.110)	(0.130)	(0.112)			
Principal Turnover	-0.004	0.028				-0.052
	(0.223)	(0.203)				(0.192)
PL(a) * Principal Turnover		-0.776*				
		(0.206)				
PL(a) * Teacher Turnover(a)			-0.031			
			(0.106)			
Teacher Focal Variables						
TC, 2006(a)				0.762*	0.759*	0.802*
				(0.107)	(0.107)	(0.120)
Teacher Turnover(a)			0.067	-0.003	-0.002	
			(0.120)	(0.097)	(0.098)	
TC(a) * Teacher Turnover(a)					-0.081	
					(0.107)	
TC(a) * Principal Turnover						-0.129
						(0.200)
Covariates, 2006						
Demographic Advantage Scale(a)	-0.095	-0.073	-0.086	-0.176	-0.176	-0.174
	(0.147)	(0.134)	(0.151)	(0.137)	(0.137)	(0.139)
Average Class Size(a)	-0.177	-0.133	-0.157	-0.045	-0.039	-0.042
	(0.112)	(0.103)	(0.118)	(0.093)	(0.094)	(0.093)
Failed Adequate Yearly Progress	-0.015	0.227	-0.015	-0.245	-0.209	-0.242
	(0.301)	(0.281)	(0.299)	(0.251)	(0.256)	(0.257)
Principal with at least 3 Years Experience	0.320	0.328	0.346	-0.258	-0.248	-0.273
	(0.229)	(0.208)	(0.232)	(0.195)	(0.196)	(0.199)
Teachers with at least 3 Years Experience(a)	-0.085	-0.084	-0.061	0.081	0.086	0.084
	(0.106)	(0.097)	(0.111)	(0.095)	(0.096)	(0.093)
Treatment	0.114	0.174	0.100	0.226	0.231	0.224
	(0.214)	(0.196)	(0.216)	(0.182)	(0.183)	(0.183)
Constant	1.050	0.898	0.667	-1.108	-1.208	-1.115
	(1.651)	(1.504)	(1.745)	(1.494)	(1.505)	(1.449)
R^2	0.316	0.442	0.322	0.514	0.518	0.518

(a) Variable standardized to have mean 0 and standard deviation 1.

Standard errors in parentheses.

PL = Principal Leadership, TC = Teacher Community

* p<0.05