MORE THAN SHORTAGES: THE UNEQUAL DISTRIBUTION OF SUBSTITUTE TEACHING

Jing Liu
(corresponding author)
College of Education
University of Maryland
College Park, MD 20742
jliu28@umd.edu

Susanna Loeb
Annenberg Institute
Brown University
Providence, RI 02912
susanna_loeb@brown.edu

Ying Shi
Maxwell School of Citizenship and Public Affairs
Syracuse University
Syracuse, NY 13244
yshi78@maxwell.syr.edu

Abstract
Classroom teachers in the United States are absent on average approximately 6 percent of a school year. Despite the prevalence of teacher absences, surprisingly little research has assessed the key source of replacement instruction: substitute teachers. Using detailed administrative and survey data from a large urban school district, we document the prevalence, predictors, and distribution of substitute coverage across schools. Less advantaged schools systematically exhibit lower rates of substitute coverage compared with peer institutions. Observed school, teacher, and absence characteristics account for only part of this school variation. In contrast, substitute teachers' preferences for specific schools, mainly driven by student behavior and support from teachers and school administrators, explain a sizable share of the unequal distribution of coverage rates above and beyond standard measures in administrative data.

https://doi.org/10.1162/edfp_a_00329

1. INTRODUCTION

Teachers are absent from school for a variety of reasons, including illness, family emergencies, and in-service training requirements. According to the U.S. Department of Education, over 6.5 million students in 2013–14 attended a school where at least half of teachers missed ten or more days of school.[1] A related estimate using data from large U.S. metropolitan districts finds that, on average, teachers missed almost eleven days out of a 186-day school year, between 5 and 6 percent of the school year (Joseph, Waymack, and Zielaski 2014). This frequency translates to approximately two thirds of a school year for a child remaining in public schools throughout his K–12 education. In some contexts, schools serving a higher proportion of non-white and low-income students experience even more teacher absences (Clotfelter, Ladd, and Vigdor 2009).

Studies have consistently documented negative effects of teacher absences on student achievement (Miller, Murnane, and Willett 2008; Clotfelter, Ladd, and Vigdor 2009; Herrmann and Rockoff 2012). For example, Herrmann and Rockoff (2012) show that ten additional teacher absences led to 1.2 percent and 0.6 percent of a standard deviation decrease in math and English Language Arts test scores, respectively.[2] A question prompted by these findings is how the main source of replacement instruction for teacher absences—substitute teachers—can mediate such effects. The only study that incorporates information about substitute teachers into its assessment of teacher absence effects is Clotfelter, Ladd, and Vigdor (2009), and shows that certified substitute teachers can somewhat mitigate the negative impact of teacher absences.

Alongside concerns about how substitute teachers' quality might affect student learning, is a shortage of substitute teachers. One study surveyed a random sample of 500 U.S. school districts and found that the majority of districts expressed difficulty with hiring qualified substitute teachers (Dorward, Hawkins, and Smith 2000).[3] Strauss and Strauss (2003) show that school districts in southwest Pennsylvania covered between 80 and 85 percent of teacher absences, and substantially more systemic planning is necessary to meet the varying and outsized demand for substitute teachers. The inability to find a substitute teacher when the regular teacher is absent might not initially seem problematic. Another teacher or an administrator who has spare time can cover a classroom when a teacher is absent and a substitute teacher is not available. Yet repeated occurrences can quickly become burdensome for teachers and administrators who frequently cover a peer's classroom.

1. Absenteeism in K–12 education and other public sectors are generally higher than absenteeism in the private sector. In the United States, the absence rate—defined as the ratio of workers with absences to total full-time wage and salary employment—is 3.4 percent for public sector workers, compared to 2.7 percent for private sector workers (Bureau of Labor Statistics 2020).
2. The detrimental effects of teacher absences may materialize through several channels other than substitute teachers. Absences create disruptions in classroom instruction that can negatively impact student learning. They can also decrease the time students spend in classrooms by increasing student absences, as some students may deliberately miss class to avoid facing a substitute teacher. To our knowledge, little empirical research illuminates these mechanisms.
3. The Madison district in Ohio, for example, reports having less than a third of the substitute teachers needed to cover classes, the lowest number in eighteen years (https://www.aasa.org/SchoolAdministratorArticle.aspx?id=14662). In Michigan, districts have been using billboards to attract potential substitute teacher candidates, given shortages that are prevalent across the state (https://www.freep.com/story/news/education/2016/12/25/michigan-substitute-teachers-shortages/95622652/).

Understanding the substitute teacher workforce may help address the negative teacher absence effect and the shortage of substitute teachers. Yet only a few case studies have examined substitute teachers, with a focus on the factors that might drive their preferences and choices. Coverdill and Oulevey (2007) show that substitute teachers prefer getting jobs through personal relationships with regular teachers than through an automated call system. Strauss and Strauss (2003) provide some evidence that discipline in school, safety of school, and daily pay are among the most important factors for substitute teachers' decision making, and the attitudes of professional staff and whether a position can advance their professional career can also influence their decisions. Gershenson (2012) analyzes data from a Michigan school district that uses an automated calling system to find substitutes when teachers cannot fill their absences with personal arrangements. This system makes job offers to substitutes in a conditionally randomly order until a job is accepted. Using a sequential binary-choice model, the author concludes that a variety of nonmonetary factors affect substitutes' offer-acceptance decisions, including the job's timing, commute time, class subject, and school level. After controlling for average school achievement, student demographic characteristics have little influence on substitutes' job acceptance decisions. None of the papers to date comprehensively assesses the composition of the substitute teacher workforce, how schools vary in teacher absence coverage by substitutes, or what factors drive the observed patterns.

The current paper advances the literature by describing the distribution of absence coverage across schools, exploring the roles of school-, teacher-, and absence-level attributes in affecting coverage rates, and examining the factors driving substitute teachers' preferences for particular schools. In doing so it draws on research on disparities in the distribution of teachers, and extends the literature to include substitute teachers, a previously understudied source of access to instruction. Numerous studies have established that low-income, low-achieving, and minority students are systematically more likely to be taught by less qualified teachers (Lankford, Loeb, and Wyckoff 2002; Boyd et al. 2005; Kalogrides and Loeb 2013). Low-income students also experience more teacher absences compared with their high-income peers (Clotfelter, Ladd, and Vigdor 2009). We provide the first empirical evidence on the extent to which this holds for *access to* substitute teaching when regular teachers are absent. This paper also sheds light on potential policy avenues to mediate the negative effects of teacher absences and informs the tailoring of programs to specific schools that face the most onerous challenges in recruiting, supporting, and retaining substitute teachers.

Using novel administrative data on teacher absence coverage and survey data for teachers and substitute teachers, we investigate the substitute teaching workforce in a large urban school district in California. In particular, we ask the following research questions:

- **Research Question 1: Prevalence.** How prevalent are teacher absences, how often are absences not covered by substitute teachers, and what happens when a substitute cannot be found?
- **Research Question 2: Teacher and absence attributes.** How do teacher and absence characteristics predict the probability of absence coverage?

- **Research Question 3: Cross-school variation.** How do teacher absences and substitute teacher coverage vary across schools, and to what extent do teacher and absence characteristics explain this variation?
- **Research Question 4: Substitute teacher preferences.** Which factors drive substitute teachers' preferences for specific schools, and how do their preferences explain the distribution of non-covered absences across schools?

The remainder of this paper proceeds as follows. After briefly introducing the institutional context of the focal district, we describe both our administrative data and survey datasets. We then provide details on the incidence of teacher absences and substitute teacher coverage. We move on to examine predictors of substitute teacher coverage, how teacher absences and coverage rates very between schools, and whether observed teacher and absence attributes can explain such disparities. We use survey data to disentangle the factors affecting substitute teachers' preferences, and to determine how such preferences drive the observed distribution of substitute coverage. We conclude with a discussion of policy implications.

2. DATA AND SAMPLE

Study context

Our study takes place in the context of a large urban school district with a diverse population of students. During the 2017–18 school year, a total of 122 schools at the K–12 level served roughly 53,000 students, slightly over half of whom were Asian. Hispanic, black, and white students made up 21 percent, 10 percent, and 8 percent, respectively.

Although no two districts are exactly the same, the district's recruiting and onboarding process for substitute teachers follows most other districts in exempting candidates from certification requirements expected of regular teachers. Candidates interested in joining the substitute teacher pool must hold at least a bachelor's degree and meet minimum skill thresholds on standardized tests of basic skills. Those who are accepted into the pool then obtain an emergency thirty-day substitute teaching permit, which authorizes them to serve as a day-to-day substitute teacher in any classroom.[4]

The process of finding substitute teachers varies across schools and even within schools. Based on interviews with several current substitute teachers and district leaders, schools use at least three ways to find a substitute teacher when a regular teacher is absent: (1) regular teachers or school administrators reach out to substitute teachers they know to arrange coverage; (2) substitute teachers log into a Web site that posts substitute teaching jobs and choose a job they prefer; and (3) schools use an automated system to call substitute teachers who they have on their list until they find one who accepts the offer.

District programs aim to incentivize substitutes to work more frequently and to work in high-needs schools. In order to remain active in the teaching pool, substitute teachers must work no fewer than thirty-six days per school year. Upon reaching seventy days of service in a calendar year, substitutes receive a raise in daily compensation. A small subset of substitute teachers exclusively serves hard-to-staff schools, schools

4. The holder of this permit cannot serve as a substitute for more than thirty days for any given regular teacher during the school year. The permit is valid for one year and is renewable.

that historically exhibited high staff turnover and are on the receiving end of funding targeted toward improving instructional quality. The district offers these substitutes additional compensation in the form of higher daily pay and health benefits. In return, these approximately twenty designated substitute teachers cannot turn down an offer if they are called to serve at one of the targeted schools.

Administrative Data

We use an unusually rich administrative dataset that links daily teacher absences to substitute teachers and their attributes. A novel feature of this dataset is that it provides a day-by-day account of each time a given teacher is away from the classroom. We use the term "job" to describe each period that a teacher is absent. Each job includes information on the reason for the absence, when it is initiated and accepted by a substitute teacher if covered, and unique identifiers for both the regular and substitute teacher. We observe teachers' and substitute teachers' demographic characteristics alongside time-varying attributes such as years of experience. Teacher identifiers permit linking the data to student files containing demographics and test performance.

The data cover all K–12 teacher absences in this district from the 2011–12 through 2017–18 school years. In total, we observe 5,264 unique teachers who accrued 19,000 absences of various length and a total of 1,873 unique substitute teachers during this period. Table 1 describes regular teachers and substitute teachers in the district. Sixty-eight percent of regular teachers are female, and nearly half are white. Five percent of teachers are black, and 14 percent are Hispanic, which is approximately half the percent of black and Hispanic students in the district. The demographics of substitute teachers are quite similar to those of regular teachers. Regular teachers have 8.5 years of teaching experience, on average. Because substitute teachers only work on occasions when regular teachers are absent, one way to characterize their experience is by the number of days they have substituted. On average, a substitute teacher works for 46 days per school year compared with 180 expected instructional days for a regular classroom teacher.

Survey Data

We supplement our administrative data with a survey of substitute teachers who served the district at least once during the 2017–18 school year. The goal of the survey is to gain an understanding of substitute teachers' preferences and how these preferences shape the distribution of substitute coverage in the district. The survey asked substitute teachers to identify the three schools they would most prefer to work in and the reasons for these preferences. Similarly, the survey asked respondents to identify three schools which they would least like to work in and the corresponding reasons. Of the 769 substitute teachers in the sample, 69 percent responded to the survey.[5]

We also administered a survey to regular teachers in the district to understand classroom coverage during teacher absences and how teachers perceive the shortages of substitute teachers. We administered this survey in the 2017–18 school year to nearly 2,500 teachers while providing the same financial incentive of $15 as we do for

5. We provided a financial incentive of a $15 gift card to those who completed the survey.

Table 1. Descriptive Statistics: Teachers and Substitutes

	Regular Teachers	Substitute Teachers
Teacher-level characteristics		
Female	0.68 (0.47)	0.64 (0.48)
White	0.47 (0.50)	0.50 (0.50)
Black	0.05 (0.22)	0.07 (0.25)
Hispanic	0.14 (0.35)	0.11 (0.31)
Asian	0.21 (0.41)	0.21 (0.40)
Other	0.04 (0.19)	0.01 (0.09)
Missing race	0.08 (0.28)	0.11 (0.31)
Age	40.14 (12.06)	43.12 (16.37)
Years of teaching experience	8.46 (7.80)	N/A
Observations	*5,264*	*1,873*
Teacher-year level characteristics		
Days substituted	—	45.81 (39.84)
Observations		*4,542*

Notes: Sample in top panel pools teacher level observations for school years 2012–18. Sample in bottom panel uses teacher-year level observations during the same time period.

substitute teachers. The response rate is slightly higher than, but quite similar to, that for the substitute teacher survey (73 percent).

3. RESULTS

Research Question 1: How prevalent are teacher absences, how often are absences not covered by substitute teachers, and what happens when a substitute cannot be found?

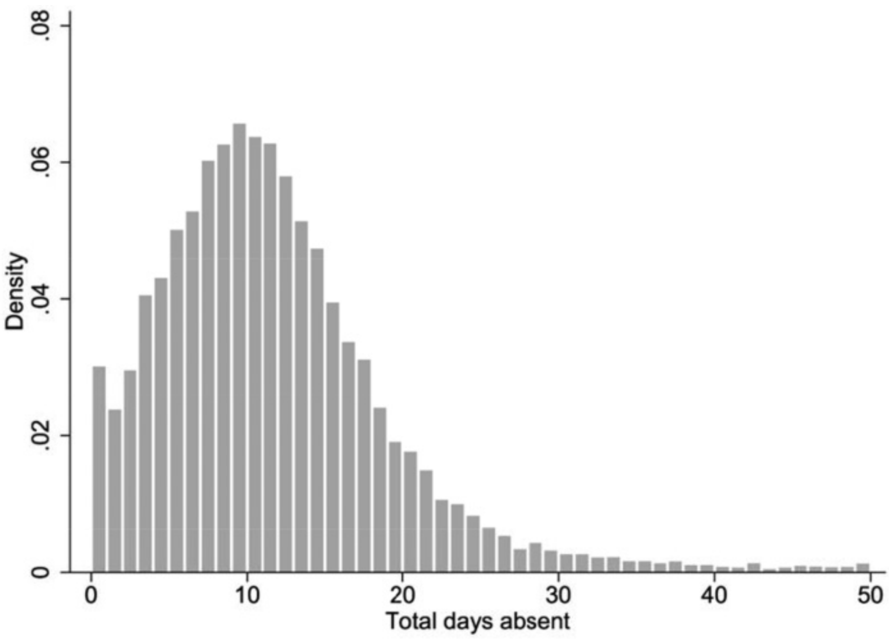
Table 2 provides summary statistics on the characteristics of teacher absences and associated substitute teacher coverage. Teachers are absent an average of 11.8 days per year, a count that is similar to previous studies (Miller, Murnane, and Willett 2008; Clotfelter, Ladd, and Vigdor 2009; Herrmann and Rockoff 2012). Translated to a 180-day school year, teachers are absent 6.6 percent of the time. Figure 1 plots the distribution of total annual teacher absences using the sample of teacher-by-year observations from 2012–18. Three percent of teachers have perfect attendance, which is similar to earlier findings on the share of teachers who are never absent in a given academic year (Herrmann and Rockoff 2012). The modal number of absences is nine days. The distribution skews to the right, with a small group of teachers absent for a substantial portion of the 180-day school year.

Teachers are absent for unforeseen reasons including illness, as well as for anticipated activities (such as district-wide or site-specific training and administrative activities). We distinguish between four reasons for teacher absences: (1) sick leave,

Table 2. Descriptive Statistics: Teacher Absences

	Count	Share
Total absences	11.83 (10.02)	
Leave reason		
Sick leave	4.87 (8.21)	36.89 (31.07)
Personal leave	2.93 (4.10)	27.48 (27.25)
PD/Permission day	3.44 (3.48)	31.65 (27.64)
Other administrative leave	0.59 (2.86)	3.97 (12.28)
Total absences not covered	0.87 (1.62)	7.48 (13.11)
Observations	18,988	18,988

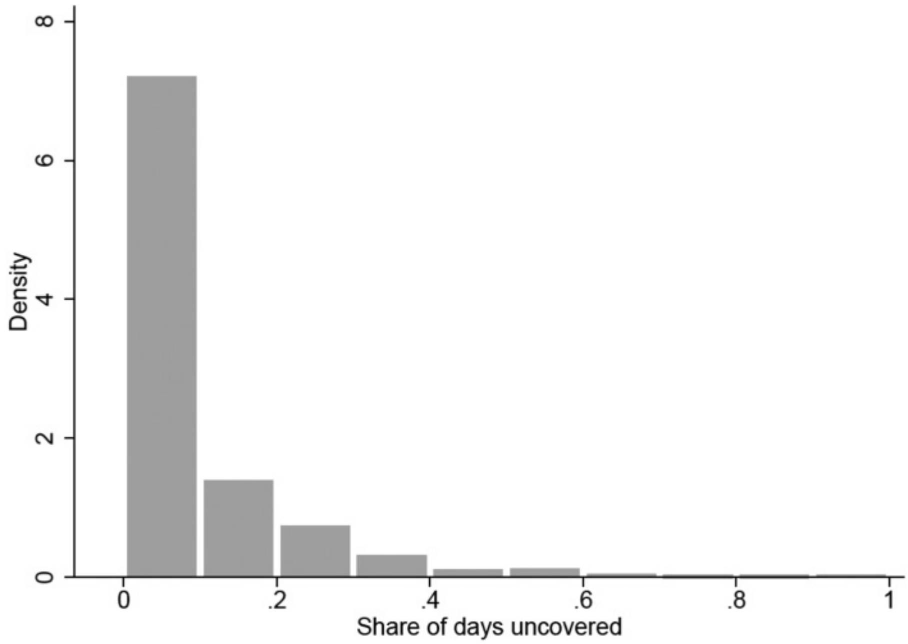
Notes: Standard deviations are in parentheses. Other administrative leave includes include bereavement, jury duty, administrative leave, legal purposes, and special assignment military. The difference in total observations between count and share is attributed to 566 teacher-year observations with zero absences.



Notes: Sample uses teacher-by-year observations for school years 2012–18. Observations are truncated at 50 absent days.

Figure 1. Distribution of Annual Teacher Absences

(2) personal leave, (3) professional development or permission days (PDs), and (4) other administrative leave. Under collectively bargained contracts, teachers are credited with ten days of paid sick leave per year for illnesses and injury. In addition to sick leave, seven days from this allowance may be used toward personal leave, defined as



Note: Sample uses teacher-by-year observations for school years 2012–18.

Figure 2. Distribution of the Share of Noncovered Absences

personal, legal, business, religious, household, family, or other tasks that require attention during school hours. Personal leave encompasses all personal circumstances involving the teacher, their immediate family, or property that require immediate attention. Teachers are also given paid release time to attend meetings and conferences for professional development purposes.[6] The last category of other administrative leave includes bereavement, jury duty, administrative leave, military leave, legal purposes, and special assignment. The largest component of absences is sick leave, with teachers averaging nearly 5 days per school year. Personal leaves accrue 2.9 days, on average. The average teacher also takes off an average of 3.4 days for professional development and 0.6 days for other administrative purposes.

Substitute teachers cover most but not all teacher absences. An average of 0.9 day per teacher is not covered by a substitute teacher out of the total 11.8 teacher absences per year. This means that for an average teacher, the classroom does not have replacement instruction from a substitute teacher 7.5 percent of the time the teacher is absent from the classroom. Even though few other studies provide this information, the finding is consistent with documented shortages of qualified substitute teachers across U.S. districts (Dorward, Hawkins, and Smith 2000). Figure 2 shows the distribution of the share of absences that are not covered by a substitute teacher at the teacher-by-year level. Approximately half of teachers have perfect absence coverage. The density is steadily

6. Related reasons filed under professional development absences include days spent visiting other programs and schools. A notable feature of the data we use is that it includes all circumstances when regular teachers are away from classrooms, including PD days. This is in contrast to select datasets used in existing research, such as data from New York City or North Carolina, which do not count PD days toward teacher absences.

decreasing, with approximately 24 percent of teachers having between 0 and 10 percent of noncovered absences in a given year. The distribution is again right-skewed, with fewer than 1 percent of teacher-year observations that have not found a substitute teacher for more than half of absences.

The teacher survey provides insights into what happens to classrooms when teachers are absent. One question asks for the most likely scenario when the school cannot find a substitute teacher, with the following four options: (1) students are split up into other classrooms with permanent teachers, (2) a teacher with a prep period covers the class, (3) a school administrator covers the class, or (4) other. The responses provide evidence that schools utilize a number of strategies to address absence coverage and rely on other school employees in the majority of cases. Of 2,131 respondents, 37 percent identified the first option, while 35 percent chose the second option. Another 12 percent of respondents said that a school administrator usually covers the class, while the remaining 16 percent either had perfect coverage or indicated another form of coverage. Overall, when a substitute does not cover an absent teacher's classroom, another teacher most often bears the burden by taking on additional students. As a result, a teacher's noncovered absence can affect both colleagues as well as students beyond those in the absent teacher's classroom.

Research Question 2: How do teacher and absence characteristics predict the probability of coverage?
The likelihood of coverage may vary by teacher attributes. For example, certain teachers might be more likely to reach out to substitutes they know to arrange coverage. To assess the relationship between absence coverage and teacher characteristics, we model coverage as a function of teacher gender, race, subject and grade levels taught, and experience. We start with a parsimonious linear probability model regressing whether an absence is covered by substitutes on teacher gender and race with controls for separate school and year fixed effects. We then gradually add in more teacher characteristics. To estimate the effect of increasing experience on coverage, we also include teacher fixed effects in the final model. This model does not provide insights into different coverage rates for teachers of different gender, race, or ethnicity, which are fixed characteristics, but it can inform how coverage increases for each teacher as they gain teaching experience.

Table 3 presents the results. Across models, we find consistent gender and racial and ethnic differences in coverage rates. Female teachers are more likely to have their absences covered. White and, particularly Asian, teachers are more likely to have their absences covered than are black and Hispanic teachers. Relative to K–5 elementary school teachers, those teaching math, special education, and bilingual education or foreign languages are significantly less likely to find substitute coverage. These estimates are consistent with supply shortages implied by the district's continuing efforts to hire more substitute teachers in these hard-to-staff subjects. Another notable pattern is the disparities in coverage rates by schooling level. Absences among teachers instructing high school are 2.8 percentage points less likely to be covered relative to absences for elementary school teachers.

Column 3 of Table 3 augments the model by including teacher experience. We code teacher experience using five categories—those with less than 2, 2–3, 4–5, 6–10, or 11

Table 3. Teacher Characteristics and Absence Coverage Rate

	(1)	(2)	(3)	(4)	(5)
			Not Covered		
Female teacher	−0.007***	−0.008***	−0.008***	−0.009***	
	(0.002)	(0.002)	(0.002)	(0.002)	
Black teacher	0.013**	0.014***	0.014***	0.012**	
	(0.005)	(0.005)	(0.005)	(0.005)	
Hispanic teacher	0.006*	0.008**	0.006**	0.007**	
	(0.003)	(0.003)	(0.003)	(0.003)	
Asian teacher	−0.010***	−0.007***	−0.007***	−0.004	
	(0.003)	(0.002)	(0.002)	(0.002)	
Subject: math		0.015**	0.012*	0.015**	0.006
		(0.007)	(0.007)	(0.007)	(0.009)
Subject: English		0.006	0.004	0.004	−0.002
		(0.008)	(0.008)	(0.008)	(0.008)
Subject: science or social science		0.004	0.002	0.002	−0.005
		(0.007)	(0.007)	(0.007)	(0.007)
Subject: special education		0.052***	0.046***	0.041***	0.018*
		(0.006)	(0.006)	(0.006)	(0.009)
Subject: bilingual education/ foreign languages		0.020***	0.018***	0.019***	0.020***
		(0.005)	(0.005)	(0.005)	(0.003)
Grades 6–8		0.021	0.020	0.022*	−0.002
		(0.013)	(0.013)	(0.013)	(0.010)
Grades 9–12		0.028***	0.028***	0.032***	0.028***
		(0.008)	(0.007)	(0.008)	(0.009)
Teacher experience					
2–3 years			−0.014**	−0.015***	−0.005
			(0.005)	(0.005)	(0.005)
4–5 years			−0.026***	−0.028***	−0.004
			(0.005)	(0.005)	(0.006)
6–10 years			−0.028***	−0.033***	0.002
			(0.005)	(0.005)	(0.007)
11+ years			−0.033***	−0.042***	0.005
			(0.005)	(0.005)	(0.009)
Reason of absence				X	X
Teacher fixed effects					X
Observations	225,030	225,030	225,030	225,030	225,030

Notes: The sample at the absence job level spans 2012–18. Omitted categories are male teachers, white teachers, those teaching K–5 subjects, elementary grades K–5, and teachers with less than two years of experience. Included variables not shown in the table are: teachers of other races, teachers in art or music or physical education, and teachers in other subjects. All models include separate school and year fixed effects. The first three specifications cluster standard errors at the school level, while the last clusters at the teacher level.

$^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.

or more years of experience. The omitted category of less than two years of experience encompasses untenured teachers under the current system. Relative to teachers with less than two years of experience, absences by teachers with 2–3 years of experience are 1.4 percentage points more likely to be covered, and this difference increases to 3.3 percentage points for teachers with 11 or more years of experience. These estimates represent sizable improvements relative to the baseline noncovered rate of 13 percent among the least experienced teachers. One possible confounding factor for years of experience is the reason for absences, as older teachers might have more sick days and fewer professional development events (see table A.1, which is available in a separate online appendix that may be accessed on *Education Finance and Policy*'s Web site at https://doi.org/10.1162/edfp_a_00329). As shown in column 4, the estimates are stable to the addition of the reason for absences as controls, suggesting that the observed associations are not driven by what induced an absence.

As teachers learn on the job and develop relationships with substitute teachers, they may find it easier to procure replacement instruction on short notice. Moreover, senior teachers may be absent for different reasons, which in turn can affect coverage rates. On the other hand, senior teachers may be different than less experienced teachers in other ways than experience and it may be these characteristics and not experience itself that lead to the observed differences. The final column of Table 3 investigates whether the variation across teachers with different experience levels has the same relationship with coverage as the variation within teachers as they gain experience. It does not. Coefficients on all categories of experience become statistically insignificant with the inclusion of teacher fixed effects. Thus, while more experienced teachers have greater coverage, teachers do not appear to develop skills at coverage with experience, such as what we might expect if they were developing relationships with individual substitutes that they could draw on for coverage.

Coverage rates may vary depending on the characteristic of the absence or job posting as well as by the characteristics of teachers. For example, if jobs are posted close to their starting time, fewer substitutes may be available. We categorize the time between listing and start time into four categories: 12 hours or less, 13–24 hours, 25–100 hours, or more than 100 hours. These categories distinguish among last-minute jobs that are announced after the end of one workday for an absence the following morning, jobs that provide up to a day of lead time, and jobs with more than one day's advanced notice. Table 4 presents these results, along with assessments of the relationship between coverage and other absence-level characteristics, such as spell length, the total number of substitute openings on a particular day as a proxy for substitute demand, and the day of the week and the month of the year in which the spell commences. All these factors can affect the supply and demand of substitute teachers. For example, jobs that last longer may be more (or less) attractive to substitutes, while proximity to the weekend may also affect the supply of substitute teachers.

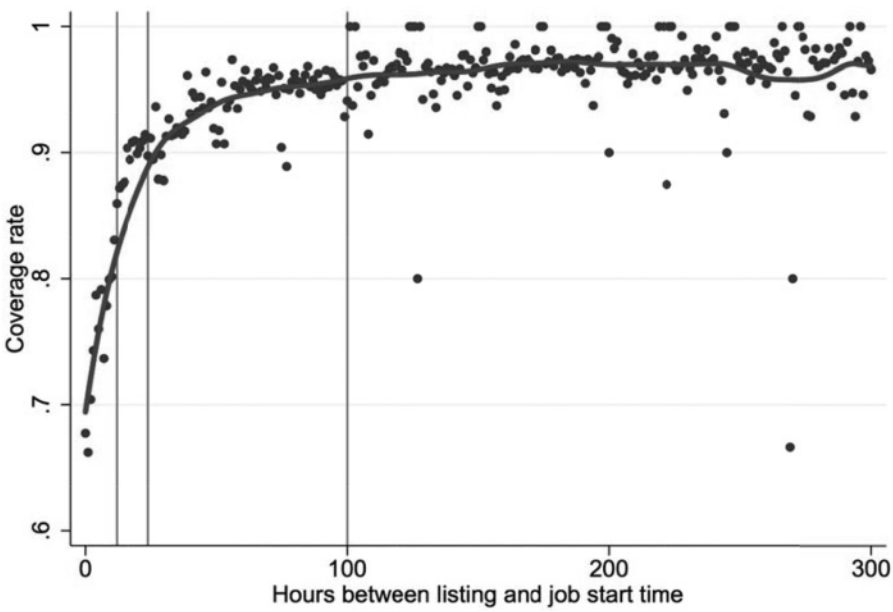
Column 1 of table 4 shows that relative to jobs posted with 100 or more hours before start time, absences beginning within a half day of posting are 22.7 percentage points *less* likely to be covered by a substitute teacher. The analogous estimates for 13–24 hours and 25–100 hours are 8.6 and 3.5 percentage points, respectively. As such, significant improvements in coverage rates are apparent for jobs that have only a few more hours of advanced notice relative to those advertising for replacement instruction within 12 hours. The marginal change in coverage rates tapers off for jobs with more lead time. Yet even jobs posted one to four days in advance are less likely to find substitutes relative to those posted with more lead time.

To illustrate how coverage evolves with lead time, figure 3 plots the coverage rate corresponding to the hours between listing and job start times. Vertical lines denote the 12, 24, and 100 hours thresholds. The rate of improvement in coverage rates associated with an additional hour is especially high through the first 24 hours. Jobs posted one or two hours before start time are filled about two thirds of the time, with coverage rates increasing steadily in lead time. No more than 80 percent of jobs posted with 12 or less hours are filled, suggesting that at least one out of every five jobs posted after the end of the school day for the next morning is not covered by a substitute teacher. With

Table 4. Absence Coverage and Absence Characteristics

	(1)	(2)	(3)	(4)	(5)	(6)
			Not Covered			
≤12 hours	0.227***				0.241***	0.237***
	(0.015)				(0.016)	(0.014)
13–24 hours	0.086***				0.091***	0.092***
	(0.006)				(0.007)	(0.007)
25–100 hours	0.035***				0.036***	0.036***
	(0.003)				(0.003)	(0.003)
Spell of 2 or more days		−0.054***			0.004**	0.005**
		(0.004)			(0.002)	(0.002)
Number of same-day openings			0.001***		0.001***	0.001***
			(0.000)		(0.000)	(0.000)
Spell starts on Tuesday				0.014***	0.007***	0.006**
				(0.003)	(0.002)	(0.002)
Spell starts on Wednesday				0.008***	0.001	0.001
				(0.003)	(0.003)	(0.003)
Spell starts on Thursday				0.020***	0.005*	0.004
				(0.003)	(0.002)	(0.002)
Spell starts on Friday				0.054***	0.016***	0.015***
				(0.005)	(0.004)	(0.003)
Grade fixed effects (FE)	X	X	X	X	X	X
Year FE	X	X	X	X	X	X
School FE	X	X	X	X	X	X
Month FE				X	X	X
Teacher FE						X
Observations	218,704	218,704	218,704	218,704	218,704	218,704

Notes: The sample at the absence job level spans 2012–18.
$^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.



Note: The sample includes job-level observations from 2012–18.

Figure 3. Correspondence between Listing Time and Coverage Rates

a lead time of one day, the coverage rate is approximately 90 percent. This increases to around 95 percent at 100 hours of lead time. The benefits of increasing lead time are less apparent when the job has already been posted for 5 days or a school week. These findings suggest that decreasing the incidence of job postings that provide little advanced notice, such as with less than 24 hours of lead time, may yield a significant improvement in coverage rates.

The remaining specifications in table 4 relate coverage rates to the length of absence spells, the number of substitute job openings on the same day, and the day of the week and the month of the year in which spells begin. Coverage rates are lower when there are more substitute job openings on the same day, suggesting that substitute demand plays a role. Days of the week are also predictive. Jobs beginning on Mondays have the highest coverage rates, while those that begin on Friday are the least likely to find a substitute teacher. When the model incorporates all dimensions of absence characteristics, the coefficients for lead time and days of the week remain significant with similar magnitudes, but spell length now becomes positive, implying that it is harder to find substitute coverage for longer jobs. Most of the coefficients on those day of the week variables shrink considerably and only Tuesday and Friday remain significant, suggesting it is the demand for substitute teachers that drives the day of the week effects we observe in column 4. Column 6 examines how within-teacher variation in absence characteristics relate to coverage outcomes. The estimates are almost identical, such that these absence characteristics have a similar effect even after accounting for time-invariant teacher characteristics. Jobs posted as far in advance as possible and those posted earlier in the week have a greater likelihood of having replacement instructors.

Research Question 3: How do teacher absences and substitute teacher coverage vary across schools, and to what extent do teacher and absence characteristics explain the school variation?

We use four dimensions to classify schools: (1) achievement level, (2) proportion of black and Hispanic students, (3) average poverty rates of students' residential census tracts, and (4) the school district's classification of hard-to-staff institutions, which have the greatest difficulty recruiting and retaining teachers. These four aspects complement each other by covering multiple measures of student need and staffing challenges faced by schools.

The first column of table 5 describes the distribution of teacher absences across different types of schools. Although we find that teacher absences are higher in schools with greater concentrations of black and Hispanic students, schools with the highest average poverty levels, and hard-to-staff schools, the differences are generally small. We do not find significant differences in average teacher absences between higher-achieving and lower-achieving schools. Schools with the highest quartile of black and Hispanic students average one additional day (11 percent of a standard deviation) of teacher absence relative to the lowest quartile, while teachers in schools with the highest quartile of residential tract poverty levels are absent for about half a day more (6 percent of a standard deviation) than teachers in other schools. The difference for hard-to-staff schools and the rest of the schools is even smaller (0.36 days). When disaggregating by absence type as shown in online Appendix table A.2, differences are largely driven by

Table 5. Cross-School Disparities in Absences and Coverage

	(1) Total Absences	(2) Absences Not Covered	(3) Perceived Difficulty of Finding Subs	(4) N (admin data)	(5) N (survey data)
All schools	11.83	0.87	0.22	18,988	1,897
Average achievement in math					
Top quartile	11.67	0.33	0.10	4,714	481
Middle quartiles	11.94	0.89***	0.22***	10,106	983
Bottom quartile	11.67	1.31***	0.35***	3,708	340
Percentage minority					
Bottom quartile	11.36	0.34	0.09	5,616	518
Middle quartiles	11.89***	0.87***	0.20***	9,715	1,054
Top quartile	12.43***	1.59***	0.49***	3,197	255
Percentage below poverty level					
Bottom quartile	11.89	0.34	0.1	4,632	497
Middle quartiles	11.61*	0.87***	0.25***	10,733	927
Top quartile	12.45*	1.43***	0.27***	3,163	403
Hard-to-staff schools					
No	11.74	0.67	0.17	14,713	1,463
Yes	12.10*	1.53***	0.39***	4,275	364

Notes: Middle quartiles include the second and third quartiles for each measure. Percentage minority is the share of the school's student population that is black or Hispanic. The percentage below poverty level measure is the school-level average of the percent of all those 18 and under in students' census tracts who are below the poverty level. The survey question asks teachers whether their school is able to find a substitute teacher when they are away. A response of "no" or "probably not" is coded as 1, and a response of "probably" and "yes" is coded as 0. Asterisks indicate significance levels of the *t*-test measuring differences between the bottom quartile and remaining quartiles.

$^{*}p < 0.1$; $^{***}p < 0.01$.

more absences due to professional development days at the higher-needs schools. For example, for schools with the highest and lowest concentrations of black and Hispanic students, the difference of absences due to professional development is 1.39 days, a magnitude even bigger than the difference of total absences. The uneven distribution of absences due to professional development suggests that the small differences in teacher absences are mainly explained by teachers requiring (or being assigned) more training at disadvantaged schools.

Columns 2 and 3 in table 5 show greater and more consistent disparities across schools in both absence coverage rates and teachers' perceptions of how likely their schools can find substitute teachers when they are absent. Schools in the lowest-achievement quartile, schools with the highest shares of minorities or students from lower-income census tracts, and hard-to-staff schools have between 0.9 to 1.3 more non-covered annual absences per teacher than do schools in the most advantaged categories. While lower-needs schools often have 0.3 to 0.7 noncovered absences, the analogous number for higher-needs schools ranges from 1.3 to 1.6. These differences represent 53 percent to 77 percent of a standard deviation in noncovered days, a magnitude much bigger than the differences of teacher absences. Teacher perceptions are consistent with this finding. Specifically, teachers in higher-needs schools are much more likely to expect noncovered absences than their peers in other schools. Nearly half of teachers in schools with the highest share of black and Hispanic students reported that their

Table 6. Contributions to Cross-School Disparities in Coverage Rates

	(1)	(2)	(3)	(4)
	Not Covered			
	Bottom Quartile Achievement	Top Quartile Percent Minority	Top Quartile Percent Poverty	Hard-to-Staff
Baseline model	0.097***	0.098***	0.088***	0.063***
	(0.012)	(0.012)	(0.013)	(0.010)
Full set of controls	0.074***	0.073***	0.065***	0.038***
	(0.009)	(0.011)	(0.011)	(0.009)
Gelbach decomposition				
School characteristics	0.009	0.009	0.013***	0.010**
	(0.006)	(0.006)	(0.005)	(0.004)
	[9.4%]	[9.5%]	[14.2%]	[15.7%]
Teacher demographics	0.004***	0.003***	0.003***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)
	[3.7%]	[2.7%]	[3.7%]	[5.0%]
Teacher credentials and experience	0.007***	0.007***	0.005***	0.006***
	(0.001)	(0.001)	(0.001)	(0.001)
	[7.1%]	[7.1%]	[5.7%]	[9.1%]
Absence characteristics	0.003	0.006*	0.002	0.006***
	(0.003)	(0.003)	(0.003)	(0.002)
	[3.5%]	[6.1%]	[2.7%]	[9.6%]
Observations	213,475	213,475	213,475	213,475

Notes: The sample includes absence-level data from 2012–18. Each coefficient in the top panel corresponds to a separate model that regresses whether an absence is covered on school subgroup indicators, with the omitted category as the most advantaged group (top quartile achievement, lowest quartile minority, lowest quartile percent below poverty level, non-hard-to-staff school). The baseline model includes only year, grade, and subject fixed effects. The full set of controls includes school characteristics, teacher demographics, teacher credentials and experience, and absence characteristics. School characteristics include type (elementary, middle, or high) and a quadratic of school enrollment. Teacher characteristics include gender, race/ethnicity, teacher credentials (single vs. multiple subjects, English language learner, special education, English, math, and science), and a quadratic of teacher experience. Absence characteristics include indicators for the job being listed 12 hours before start time, between 13 and 24 hours, and between 25 and 100 hours, spell length of two or more days, and the day of week in which the spell began. Explained contributions in the Gelbach decomposition section are in brackets. All models cluster standard errors at the school level.

$^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.

schools are not able or probably not able to find a substitute teacher when they are absent, while only 9 percent of teachers in schools with the lowest shares of black and Hispanic students expressed such concerns.

In sum, table 5 demonstrates that cross-school disparities in absence coverage are sizable, and that differences in average teacher absences are small and cannot explain these gaps. This finding prompts the question of whether attributes, such as those at the teacher and absence levels examined earlier, can explain cross-school differences in absence coverage rates. Table 6 investigates to what extent the differences across schools decrease when accounting for observable differences in school, teacher, and absence characteristics.

The first row shows four separate regressions of cross-school disparities in substitute coverage rates, controlling for subject, grade, and year fixed effects. The coefficients correspond to the gap between the least well-off category relative to the most well-off category. For instance, absences in schools in the bottom quartile for math achievement are 9.7 percentage points less likely to find replacement instruction relative to schools in the highest-achieving quartile. Analogous estimates are quite similar when categorizing schools by share of minority students and students living in poor neighborhoods. Absences in hard-to-staff schools are 6.3 percentage points less likely to be covered relative to other schools.

We augment these baseline models with a rich set of covariates and report the adjusted cross-school disparities in the second row. Covariates include school characteristics that can affect the appeal of a substitute job, such as grade level (elementary, middle, and high) and school enrollment. We then include teacher attributes such as gender, race, as well as the type of teacher credentials and a quadratic for years of experience. Finally, we control for absence characteristics spanning from the amount of lead time, spell duration, and day of the week in which the absence took place to determine whether cross-school variation along these dimensions matters for coverage rates. When all of these covariates are included, the magnitudes of disparities attenuate by approximately one quarter among schools defined by achievement, diversity, and poverty quartiles, and more than one third among schools categorized as hard-to-staff or not.

To understand the contribution of individual covariates, we conduct Gelbach decompositions (Gelbach 2016)[7] to determine the relative importance of each set and present the results in the rest of table 6. The Gelbach decomposition has the advantage of being order-invariant, such that estimates are robust to the sequence in which covariates are added. We first quantify the part of the difference between coefficients derived from the baseline model and the fully controlled model that is accounted for by each set of covariates, such as school characteristics or teacher demographics.[8] To provide a more intuitive understanding of how much additional explanatory power each set of covariates contributes, we then report the share of the cross-school disparities in the baseline model that is accounted for by each set of controls in the decomposition (in brackets below estimated coefficients).[9] Although school grade span and enrollment characteristics contribute the largest proportion (between one seventh and one sixth) of the overall disparity, they are only significant for explaining coverage differences across schools defined by neighborhood poverty and hard-to-staff status. In contrast, teacher demographics consistently and significantly account for 3–5 percent of the overall disparity across all the comparisons, while teacher credentials and experience explain a further 6–9 percent. These contributions are statistically significantly different from zero at conventional levels. Absence characteristics make a statistically significant contribution in select cases only, with magnitudes up to 10 percent.

The substantial variation that remains even after accounting for school, teacher, and absence characteristics underscores the limitations of relying on administrative data alone. Substitute teachers might choose jobs based on factors that we do not commonly observe. The remaining differences across schools could be due to differences

7. This decomposition approach uses the omitted variables bias formula to provide consistent estimates of the conditional contribution of each covariate (Gelbach 2016).
8. For example, the cross-school coverage gap is 0.097 in the unadjusted baseline model, compared to 0.074 in the model with a full set of control variables in column 1 of table 6. School characteristics contribute 0.009 to the difference in coefficients of 0.023.
9. For example, the 9.4 percent in column 1 for school characteristics is obtained after dividing 0.009 by 0.097, the magnitude of cross-school disparities in the baseline model.

in schools' approach to recruiting substitutes or to substitutes' preferences for schools based on features not captured by measures in the administrative data. We next turn to complementary survey data to explore how substitute teachers' preferences might drive observed disparities in absence coverage.

Research Question 4: Which factors drive substitute teachers' preferences for or against specific schools, and how do their preferences explain the distribution of noncovered absences across schools?

The evidence in table 6 suggests that unexplained differences in coverage rates across schools likely contain unobserved factors shaping substitute teachers' decisions, such as a school's specific practices in managing teacher absences and supporting replacement instructors. To probe substitute teachers' preferences and how they might explain the unequal distribution of coverage rates, we collected detailed survey data soliciting their most and least preferred schools alongside reasons for their choice.

Our survey data show that substitute teachers consistently prefer one subset of schools while avoiding another subset. The survey elicited these responses by asking substitute teachers to name three district schools for which they most prefer to work (or avoid working for). Online appendix tables A.3 and A.4 show the number of times each school was nominated either as the most or least favorite among substitute teachers. While the majority of schools received no more than a handful of nominations, eight schools received ten or more nominations as the preferred substitute teacher choice, with one school reaching thirty-three nominations. Similarly, seven schools received ten or more nominations as the least preferred institution, with one school accumulating forty-nine nominations. We see no overlap among schools nominated with high frequency for most and least preferred schools, suggesting that substitute teachers are largely in agreement about what constitutes a preferred or disfavored school.

To better understand the relationship between observable school-level characteristics between the most and least preferred schools, in table 7 we compare some common school attributes. These two types of schools do not have statistically significant differences in the number of teacher absences, consistent with our findings when comparing advantaged and disadvantaged schools. Despite comparable teacher absences, the least preferred schools have 2.2 more absences not covered by substitute teachers. They also have significantly lower average achievement, a higher concentration of black and Hispanic students, higher suspension rates, and are mainly composed of middle schools. Although these results indicate an association among school desirability and student achievement, demographics, and other attributes, survey data enable us to probe hard-to-observe factors not present in administrative data.

To investigate whether the number of nominations for most and least preferred schools contain useful information about the school learning environment not previously captured using school-, teacher-, and job-level attributes, we return to the specification in table 6. Table 8 begins by replicating the base model using only 2018 job-level data. Disparities in coverage rates across less and more disadvantaged schools defined in terms of academic achievement, student composition, and staffing needs are comparable, if not larger, in magnitude for this set of observations relative to the full sample. For example, the lowest-quartile achievement schools are 12.2 percentage points less

Table 7. Comparing Least Favorite and Favorite Schools

	Least Favorite Schools		Favorite Schools		
	(1)		(2)		
	Mean	SD	Mean	SD	*p*
Teacher absences	11.02	0.93	12.17	4.84	0.55
Noncovered absences	2.64	0.71	0.46	0.33	0.00
Math scores	−0.70	0.30	0.32	0.24	0.00
English Language Arts scores	−0.59	0.22	0.32	0.25	0.00
White	0.04	0.04	0.26	0.18	0.01
Black	0.14	0.13	0.05	0.03	0.06
Hispanic	0.58	0.24	0.23	0.13	0.00
Asian	0.20	0.19	0.42	0.24	0.07
Suspension	0.17	0.15	0.05	0.05	0.04
Hard-to-staff	0.86	0.38	0.00	0.00	0.00
Middle school	0.71	0.49	0.00	0.00	0.00
High School	0.00	0.00	0.63	0.52	0.01

Notes: The comparisons are made at the school-year level. Least favorite schools include seven schools that were nominated by substitute teachers for at least ten times as schools they would avoid to work at. Favorite schools include eight schools that were nominated for at least times as schools they prefer to work at. These two types of schools do not overlap. SD = standard deviation.

likely to find replacement instruction for their teacher absences relative to schools in the highest-achieving quartile. Next, we control for a rich set of school-, teacher-, and absence-specific attributes as in table 6, as well as the number of nominations for the most or least preferred school taken from the substitute teacher survey. Cross-school disparities adjusted for this full set of covariates are less than half of the original coefficients. The sizable decrease in cross-school gaps suggests that substitute teacher nominations for most or least favorite school are capturing some unobserved characteristics about the school and classroom environment that we are not accounting for using the original set of observable attributes. When we use the Gelbach decomposition to quantify their contributions, we find that stated substitute teacher preferences as measured by school nominations account for 40–50 percent of the cross-school variation in coverage rates. Notably, their inclusion renders the contribution of school-level characteristics insignificant across all specifications, suggesting some correlation between school nominations and school attributes captured in administrative data. In contrast, teacher demographics, teacher credentials and experiences, and absence characteristics still account for similar contributions as before, explaining approximately 15–20 percent of the overall disparity.

The strikingly large influence of school nominations prompts the question of whether these stated preferences in part reflect substitute teachers' responses to demand-side school factors, such as school administration preparedness and effort in matching substitutes to jobs. Table A.5 in the online appendix conducts the analyses using two subsamples that limit the scope of administrator effort: absences due to sick leave and last-minute absences posted with less than twenty-four hours of lead time. We find that the relative contribution of school nominations is robust to the choice of

Table 8. Contributions to Cross-School Disparities in Coverage Rates: 2018 Only

	(1)	(2)	(3)	(4)
	Not Covered			
	Bottom Quartile Achievement	Top Quartile Percent Minority	Top Quartile Percent Poverty	Hard-to-Staff
Baseline model	0.122***	0.118***	0.107***	0.087***
	(0.017)	(0.016)	(0.020)	(0.015)
Full set of controls	0.058***	0.051***	0.051***	0.026**
	(0.014)	(0.015)	(0.013)	(0.011)
Gelbach decomposition				
School characteristics	−0.015	−0.006	−0.004	−0.001
	(0.016)	(0.010)	(0.011)	(0.007)
	[−12.5%]	[−4.8%]	[−3.8%]	[−1.5%]
Teacher demographics	0.005**	0.005*	0.004**	0.004**
	(0.002)	(0.002)	(0.002)	(0.002)
	[4.0%]	[4.1%]	[3.6%]	[4.4%]
Teacher credentials and experience	0.008***	0.008***	0.006***	0.007***
	(0.002)	(0.002)	(0.002)	(0.002)
	[6.6%]	[6.6%]	[5.3%]	[7.5%]
Absence characteristics	0.010*	0.007	0.006	0.008**
	(0.005)	(0.005)	(0.005)	(0.004)
	[8.5%]	[6.4%]	[5.7%]	[9.1%]
No. of times nominated as most/least favorite school	0.056***	0.052***	0.044***	0.044***
	(0.014)	(0.011)	(0.012)	(0.008)
	[45.6%]	[44.5%]	[41.7%]	[50.9%]
Observations	31,278	31,278	31,278	31,278

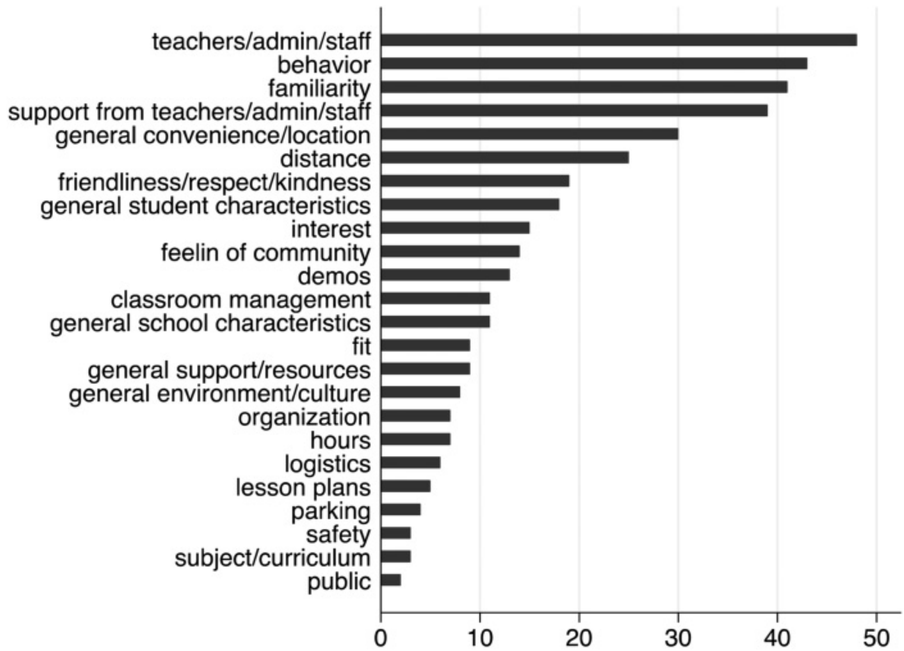
Notes: The sample includes absence-level data from 2018. Each coefficient in the top panel corresponds to a separate model that regresses whether an absence is covered on school subgroup indicators, with the omitted category as the most advantaged group (top quartile achievement, lowest quartile minority, lowest quartile percent below poverty level, non-hard-to-staff school). The baseline model includes only year, grade, and subject fixed effects. The full set of controls includes school characteristics, teacher demographics, teacher credentials and experience, absence characteristics, and the number of school nominations. School characteristics include type and a quadratic of school enrollment. Teacher characteristics include gender, race/ethnicity, teacher credentials, and a quadratic of teacher experience. Absence characteristics include indicators for the job being listed 12 hours before start time, between 13 and 24 hours, and between 25 and 100 hours, spell length of two or more days, and the day of week in which the spell began. Explained contributions in the Gelbach decomposition section are in brackets. All models cluster standard errors at the school level.

$^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.

sample, suggesting school nominations capture substitute teacher preferences beyond the school-level attributes considered.[10]

To investigate the substance of these nominations above and beyond characteristics in administrative data, we turn to qualitative comments in the substitute teacher survey. The survey asks respondents what they like best about the school in which they would most like to work, and what they do not like about the school in which they would least like to work. We code responses according to a common rubric covering multiple dimensions of the school context that substitute teachers may take into consideration as they decide whether to fill a particular absence. These include: (1) how accessible the school is for substitute teachers in terms of convenience and location; (2) student characteristics, such as demographic composition and behavior; (3) school characteristics, such as safety and attitudes from teachers, administrators, and staff; (4) resources in

10. The contribution of school nominations is nearly 70 percent for the sample of last-minute absences. This may be artificially inflated due to lead time being removed as a job-level covariate.



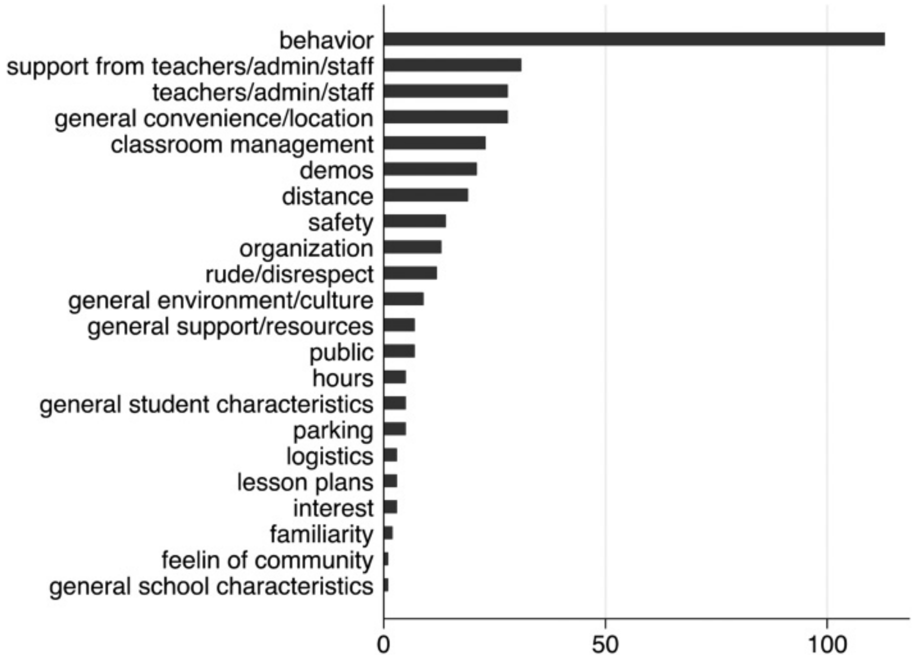
Notes: Using substitute teacher-by-year observations for school years 2012–18. $N = 395$.

Figure 4. Substitute Teacher Reasons for Designating a Favorite School

the form of lesson plans and logistical support; and (5) the school's environment and culture.

Table A.6 in the online appendix shows these five broad categories alongside subcategories contained under each. For example, the convenience and location grouping include distance to the substitute teacher's home, parking, public transportation, and other general considerations, such as ease of commute. We map each qualitative answer to these subcategories, using up to eight subcategories to code all aspects of the response. Figure 4 displays the relative frequency of each reason in the qualitative responses to the question of what substitute teachers like best about their most preferred school. The most common subcategory is teachers, administrators, and staff at nearly 30 percent of respondents, while the third most common is support from these same individuals. While these two groups likely overlap, the former captures any comments on the dedication, collegiality, friendliness, professionalism, preparation, and general quality of relationship with school administration and staff. The third subcategory codes more explicit mentions of support and help from school staff. In addition to the quality of interactions with school administration and staff, another common response was student behavior. Substitute teachers prefer certain schools because students are well behaved, manageable, respectable, and there are few disciplinary problems.

On the flip side, substitute teachers overwhelmingly cited student behavior as an important factor in their determination of certain schools as least preferable (figure 5). Nearly half of all respondents in our sample mentioned student misbehavior in their open-ended comments, which is more than twice the next most common subcategory. While the descriptions of positive student behavior when listing preferred



Notes: Using substitute teacher-by-year observations for school years 2012–18. $N = 354$.

Figure 5. Substitute Teacher Reasons for Designating a Least Favorite School

schools mostly relied on general terms such as "students are well-behaved" to characterize this phenomenon, respondents often went into more detail when describing the types of student misbehavior that render a school least preferable. For example, one substitute teacher described "vulgar and violent language directed at peers and at me, throwing objects around room and out window." Another said "None of them listened to anything I said. They were extremely loud all day." Others described disruptive and disrespectful students who made classroom management highly challenging.

The second most common response to what makes a school least preferred is the lack of support from other teachers, administrators, and staff. Multiple substitute teachers mentioned not feeling welcomed, a general lack of professionalism, and having to work in isolation to address student misbehavior and classroom management. Substitutes often mentioned student behavioral problems in conjunction with lack of support, in part because support is especially needed when substitute teachers are compelled to deal with disruptive behaviors. Taken together, these results suggest that the student behavior, coupled with presence of support services from the school's staff and administration, are important determinants of whether substitute teachers favor working in a particular school.

4. CONCLUSION AND DISCUSSION

Substitute teachers are a common yet understudied resource in schools. On average, regular teachers in the United States are absent around 6 percent of a school year, which translates to two thirds of an academic year for children over the course of their K–12 education (Joseph, Waymack, and Zielaski 2014). Research consistently demonstrates that teacher absences are detrimental to student learning (Miller, Murnane, and Willett 2008; Clotfelter, Ladd, and Vigdor 2009; Herrmann and Rockoff 2012). However, researchers know surprisingly little about what happens when teachers are absent from the classroom—and the substitute teachers that often take their place—limiting our understanding of how to temper the negative effects of teacher absences. Moreover, qualitative evidence and survey data document severe shortages of substitute teachers across school districts nationwide. This underscores the need for empirical evidence on teacher absences and the substitute teacher workforce to better understand disparities in educational inputs and outcomes.

This paper uses a novel administrative dataset from a large urban school district to address these gaps. We begin by focusing on the prevalence and distribution of absence coverage by substitute teachers and factors accounting for the observed patterns. Of the 11.8 days an average teacher is absent during a school year, over 7 percent were not covered by a substitute teacher. Nearly three quarters of surveyed teachers described students in noncovered classrooms as either being split up into other classrooms or assigned a regular teacher with a prep period. This suggests the burden of substitute teacher shortages falls disproportionately on regular teachers.

In addition to documenting the prevalence of noncovered absences, we show large disparities in the distribution of noncovered teacher absences across schools. Disadvantaged schools with low average achievement, a high concentration of black and Hispanic students, a large share of students from poor neighborhoods, or are identified by the district as having difficulty with staffing, show much lower coverage rates compared with other, more advantaged schools (0.9 to 1.3 more noncovered absences per school year). These are not explained away by differences in the total number of teacher absences, since disadvantaged schools only have a slightly higher incidence of teacher absence. Consistently, teachers in disadvantaged schools are much more likely to express concerns that their school is not able or probably not able to find a substitute teacher for them. For example, nearly 50 percent of teachers in schools with the highest concentration of black and Hispanic students reported that their schools cannot or are probably not able to find a substitute teacher when they are absent. We examine the extent to which school-, teacher-, and absence-level characteristics contribute to these disparities in coverage rates. The latter two categories collectively explain 15–20 percent of cross-school differences and include teacher attributes such as demographics, credentials, and experience, alongside absence-level characteristics, such as lead time of a job posting and the day of the week an absence starts.

We also examine the contributions of stated substitute teacher preferences for particular schools under the hypothesis that they contain hard-to-observe factors outside the scope of administrative data. The Gelbach decomposition shows that the number of times substitute teachers nominate a school as their most or least preferred option explains 40–50 percent of the unconditional absence coverage gap between advantaged and disadvantaged schools. The magnitude of this factor prompts a closer look at the content of these stated substitute teacher preferences. Scrutiny of qualitative survey responses shows that student behavior and support from other teachers, administrators, and staff are the two most commonly cited reasons for favoring or avoiding specific schools. While the reasons for preferring a school are relatively diverse, student misbehavior far exceeds the other reasons and is the most important factor for substitute teachers to avoid certain schools. Our research suggests that institutional efforts to provide more support for substitute teachers, such as initiatives that curb misbehavior and provide substitutes with more classroom management tools, merit closer attention.

When substitute teachers are unavailable, regular teachers are most likely to step in for their colleagues. To the extent that these expanded job responsibilities take a toll, the teachers most likely to be affected are those in disadvantaged schools. In addition to a greater concentration of less qualified teachers, the higher rates of noncovered absences at these institutions can further exacerbate existing inequalities. Our research thus highlights the importance of developing policies to close these disparities. Evidence that coverage rates increase in lead time, with 24 hours of advanced notice associated with a significant jump in coverage, suggests that gains are possible by planning around the posting of absences and their allocation across classrooms and time. Future research is needed to investigate the consequences of noncovered teacher absences for teacher and staff turnover, and explore whether concentrated under coverage exacerbates existing achievement gaps.

ACKNOWLEDGMENTS

The authors' names are listed in alphabetical order. We thank personnel in the anonymous district for providing us data and institutional knowledge that made this paper possible.

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