Wisconsin Center for Education Research
SCHOOL OF EDUCATION
UNIVERSITY OF WISCONSIN–MADISON

A Look Behind the Curtain: Job Search Behaviors of Teachers After Year One

WCER Working Paper No. 2020-7

July 2020

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Keywords: teacher turnover, teacher mobility, job preference, first-year teachers, novice teachers, Wisconsin

Suggested citation: Goff, P., You, E., Gandy-Fastovich, L., Yang, M., Batt, L., Xie, X., & Yang, H. (2020). A Look Behind the Curtain: Job Search Behaviors of Teachers After Year One (WCER Working Paper No. 2020-7). University of Wisconsin–Madison, Wisconsin Center for Education Research. https://wcer.wisc.edu/publications/abstract/wcer-working-paper-no-2020-7

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Abstract

By coupling statewide vacancy/application records with administrative data, we find that activity on the teacher labor market is substantially greater than previously documented, with 53% of novice teachers searching for new positions after their first year and 27% changing schools or leaving the public system. The empirical evidence favors preference alignment theory, showing that first-year teachers are more likely to reenter the labor market after their first year when their preferences and their current employment context diverge. This finding is particularly true for the individuals with a preference for a suburban locale and for school and student characteristics, such as the proportion of students qualifying for free or reduced-price lunch. Once an individual has initiated a job search, preference alignment appears to be unrelated to subsequent mobility. The findings suggest that processes that can facilitate a stronger initial match of novice teachers to their desired employment situations may help mitigate turnover in the following year.

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When seeking initial positions as teachers, novice educators face a labor market that is difficult to navigate and fraught with uncertainty. They engage in their job searches armed with little information to facilitate these important, high-stakes decisions (Liu & Johnson, 2006). Given this landscape, it is not surprising that mobility and attrition rates tend to be highest within teachers' first few years in the profession (Hanushek et al., 2004; Ingersoll, 2001). Although not all forms of teacher mobility and attrition are detrimental, staff turnover is often expensive and disruptive for schools. The fiscal costs associated with replacing a teacher has been estimated to range from $4,600 to well over $15,000 (Watlington et al., 2010), and the churn of teachers often hinders student learning (Ronfeldt et al., 2013). Motivated by these and similar concerns, our paper examines job search behaviors of novice teachers, to understand how alignment between teachers' preferences and teachers' chosen schools relates to their labor market activity and subsequent mobility decisions.

To engage in this undertaking, we created a unique, nearly statewide data set of teaching vacancies, applications to these vacancies, and administrative staffing records for first-year teachers in Wisconsin's public schools. We focus our analysis on first-year teachers for three reasons. First, mobility and attrition rates among first-year teachers are notoriously high and represent well-established challenges (Redding & Henry, 2019). Second, first-year teachers are likely to have the least information about where they may fit best, owing to their inexperience and limited professional networks (Liu & Johnson, 2006). Third, first-year teachers present a uniform sample in which every teacher searched for a position in the prior year and all had the same amount of time to determine whether they would search again for a new position.

This last point is of analytic importance. Behind every accepted position lies a flurry of largely unseen labor market activity—searches, applications, interviews, offers, etc. Our integration of vacancy and application data allows us to illuminate this market activity in two important ways. First, we recognize that all first-year teachers engage in the job search process in the spring or summer immediately preceding their initial employment. We use teachers' activity on the labor market—particularly the vacancies to which they applied—to document their preferences for various school characteristics. Second, we return to teachers' job search behaviors, again via their submission of applications (or lack thereof), following their first year teaching. In so doing, we provide a look behind the proverbial curtain of the teacher labor market by using mobility and attrition analyses of administrative data to document the extent of "hidden mobility"—the unobserved job market activity that underlies the mobility we ultimately observe in the teacher labor market. Thus, our research establishes how teachers' revealed preferences for various types of schools (via their prior search activity) correspond to their labor market activity following their first year, namely (a) staying at their current school without applying for other positions; (b) staying at their current school after applying for other positions; (c) switching schools; (d) leaving teaching after applying for other vacancies; and (e) leaving teaching without applying for other positions.

The mobility literature often infers that mobility patterns are evidence of preferences—and to an extent this supposition is true—however, scholars seldom engage in an explicit examination of preferences. We present our theoretical framework of "preference alignment" and apply that framework to a sample of first-year teachers in Wisconsin. Ultimately, we find support for the concept of preference alignment, that teachers are less likely to leave schools when their preferences coincide with characteristics teachers sought during their initial job searches. We find preference alignment to be most useful when predicting which teachers are apt to apply for other positions following their first year, particularly among teachers with an alignment toward suburban districts and student economic status. We also find that the labor market activity of first-year teachers—hidden mobility—is substantial, with over half of all first-year teachers active on the labor market (i.e., submitting applications to other vacancies). We discuss the implications of these findings for policy via labor market reform, school leaders via teacher hiring and retention, and for educator preparation programs via facilitation of the job search process.

Patterns of Mobility

In exploring teacher retention and attrition, many studies have focused on three categories of teacher mobility—"stayers," "movers," and "leavers," or some variants thereof (Ingersoll & May, 2011; Feng & Sass, 2017; Hanushek et al., 2004; Stockard & Lehman, 2004). This categorization is natural, given that commonly available data to study teacher mobility only provide information on annual placements and year-to-year comparisons can only determine whether teachers stayed in the same school, moved to a different school or district, or left public teaching altogether. A few studies, however, have complexified the stayer, mover, and leaver paradigm. Johnson and Birkeland (2003) expanded the concept of teacher mobility to "voluntary" or "involuntary" movers and "settled" or "unsettled" stayers. Settled stayers are teachers who are expected to continue in their roles while unsettled stayers showed dissatisfaction in their positions and are likely to move. Johnson and Birkeland's (2003) depiction of teachers as settled and unsettled complicates the tidy paradigm of stayers, movers, and leavers, as they highlight the importance of studying teacher *intention* to stay, move, or leave the job market. White (2016) challenged the traditional view of teacher mobility that attributes turnover solely to voluntary transfers and quits. She broadened the conceptions of teacher turnover to include voluntary quits and involuntary departures due to school closures and policy changes. White (2016) demonstrated that below the surface of the canonical categories of teacher turnover lies important heterogeneity and that the exploration of this heterogeneity deepens our understanding of education labor dynamics.

Whereas this prior research has complexified the stayer, mover, leaver paradigm, few data sources allow researchers to scrutinize the motivation behind teacher turnover at scale (Ingersoll, 2001). Examining the labor market activity that precedes the labor market outcomes, such as transfer requests (Boyd et al., 2011) and application patterns, is one way to reveal nuances within the mobility dynamic. We build on these understandings of teacher mobility throughout this paper to uncover the hidden mobility of labor market activities that lie behind the traditional categories of stayers, movers, and leavers by investigating those who are active on the labor market.

Why Teachers Stay, Move, or Leave

In identifying the determinants of teacher mobility, much of the empirical research has focused on structural elements, such as compensation (i.e., salary), school characteristics (i.e., locale), and student demographics (i.e., racial composition). Previous literature has also studied the relationships between individual characteristics of teachers and mobility outcomes. For example, higher rates of mobility have been documented among female teachers (Ingersoll, 2001), younger teachers (Guarino et al., 2006), less experienced teachers (Grissom et al., 2016), and White teachers (Hanushek et al., 2004). More recent studies have examined the importance of matching in teacher mobility and retention, such as gender or race congruence between teachers and principals or among staff (Grissom et al., 2012; Elfers et al., 2006). Most of all, understanding why teachers stay, move, or leave requires a deeper knowledge of applicant motives and preferences (Hanushek et al., 2004).

The term "preference" has been used in research to better understand applicants' job search behaviors; however, definitions of preference and how it is operationalized varies. In labor economics, interpersonal differences in the "tastes for work" result in differences in labor supply across the population (Borjas, 2010). This perspective suggests that different people seek out different places of work, leading to nonrandom sorting of workers across firms. In education, this pattern is evidenced in part by the well-documented inequitable distribution of teachers across schools and districts (e.g., Goldhaber et al., 2016). Jackson (2013) provided evidence that teachers find better matches with schools throughout their careers and that these changes are associated with increased productivity. Teachers' perceived fit to their school and assigned subjects to teach, plus their level of commitment, is positively correlated with teachers' intention to continue in their role (Pogodzinski et al., 2013; Jones, et al., 2013).

When identifying teacher preferences related to mobility, studies have demonstrated that individual, school, and a combination of these two factors have roles to play. For example, schools that teachers see as having unsupportive leadership (Ingersoll, 2001; Kukla-Acevedo, 2009) and schools that engage in more disciplinary actions (Ingersoll, 2001; Feng, 2009) reported markedly higher rates of teacher mobility and/or attrition. Teachers with excessive caseloads, especially those in special education, reported higher levels of job dissatisfaction and more frequent class assignment turnover (Billingsley & Cross, 1991; Gonzalez, 1995). In addition, teacher staffing challenges have led to higher teacher assignment workloads and work expectations, which can cause teachers to leave the profession (Barmby, 2006).

Across job sectors, individuals' preferences for workplace conditions and job benefits (i.e., work hours, wages, and workplace conditions) inform their approach to the job search process. For teachers specifically, district- and neighborhood-level characteristics, such as student demographics and academic performance, influence teacher applicants' job market behavior and/or outcomes. Looking across the preferences literature, we identified six characteristics to be the most relevant: student academic performance, student economic status, student racial-ethnic demographics, suburban locale, geographic proximity, and salary.

Previous literature states teacher's individual preferences for student demographics, like Black and Latinx teachers being more likely to transfer to schools serving more racial minority students (Hanushek & Rivkin, 2007) or teachers of color preference to work with students of color more than White teachers (Cannata, 2010). Teacher labor market activities have also been

linked to student academic performance, as seen in schools with lower standardized test scores having higher teacher attrition (Elfers et al., 2016) and teachers favored work at higher-performing schools (Hanushek & Rivkin, 2007; Engel et al., 2014). Schools serving students in poverty (often measured through free and reduced-price lunch (FRPL) qualification) experienced markedly higher rates of teacher mobility and/or attrition (McDonald et al., 2004; Card & Giuliano, 2016; Scafidi et al., 2007). Another important teacher preference, is for school location, like specific school locales (city, suburb, town, and rural) (Boyd et al., 2005) or schools within close proximity to teachers' homes (Clark et al., 2003; Engel et al., 2014; Creasey et al., 2016). State-dependent and district-dependent compensation, such as teacher salary, benefits, and pensions, has been linked to teacher mobility, for example higher salaries were linked to lower turnover (Ingersoll, 2001; Imazeki, 2005; Chalmers et al., 2014; Frazis & Loewenstein, 2013; Goldhaber et al., 2015).

Our study constructs six preference indexes to measure these characteristics (student racial-ethnic demographics, student academic performance, student economic status, suburban locale, geographic proximity, and salary) by reflecting the important aspect of teacher preference in labor market studies, outlined above. Building from this literature on teacher preferences, our study expands on teacher mobility research in several important ways. We incorporate teacher job preferences, measured from application data and demonstrable action, to better predict mobility at an early career stage. As Cannata (2010) showed, preferences espoused in surveys do not necessarily match enacted preferences that guide teachers' job search and career decision-making. The former is captured by what teachers say they prefer, whereas the latter is reflected in the job market actions that teachers ultimately take. We construct a set of indicators to study teacher preference alignment. Boyd et al. (2005) and Engel and Cannata (2015) have noted the limitations of traditional measures of year-to-year mobility, which are a product of labor supply (teacher application) and labor demand (school hiring selection), making attribution to either side and related policy solutions problematic. In contrast, state-level application data allow us to construct indicators that isolate the preferences of teachers. Finally, this study's use of preference indexes to measure student demographics and affluence, student academic performance, suburban, geographic proximity, and teacher salary expands on other studies of teacher preferences. The work of Boyd et al. (2005), Cannata (2010), and Ronfeldt, Kwok, and Reininger (2016), while illuminating, is limited in terms of scope, minimizing the heterogeneous nature of teacher job preferences. Our study includes a rich set of preference indicators, created with the use of staffing and application data.

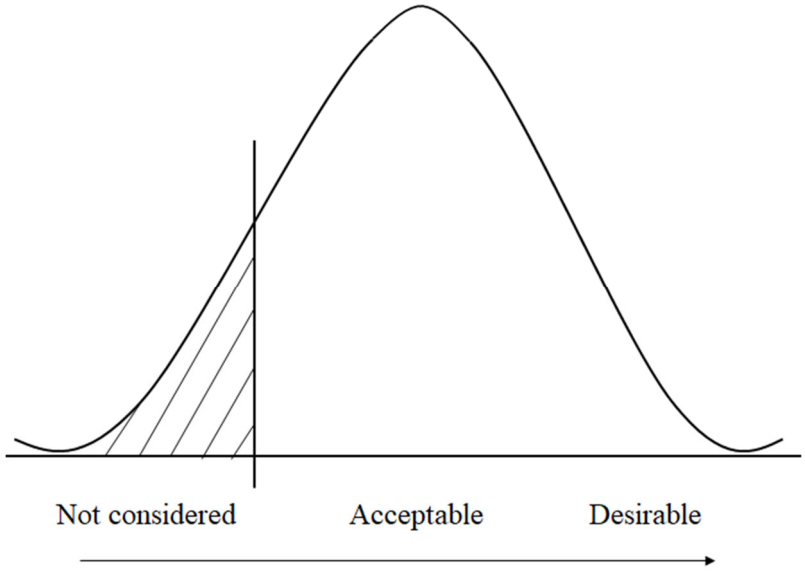
Theory of Action: Preference Alignment

This study's theory of action, which we entitle "preference alignment," integrates job search theory, from economics, with teacher preferences, as determined by the scholars highlighted above. The premise underlying job search theory is that "looking for a job is a dynamic sequential process and that individuals have to decide when to stop this process under conditions of uncertainty and imperfect information" (Faggian, 2014, p. 60). Candidates on the job market make career decisions based on the distribution of potential matches, dependent on their preferences and job availability, regardless of whether they know the actual working conditions of the job.

According to job search theory, those on the job market have a particular salary in mind, termed the reservation wage, that a potential job must satisfy before it can be considered, while they dismiss any position with a lower wage (Faggian, 2014; McCall, 1970). We expand the idea of the reservation wage by incorporating seminal measures of teacher preferences that have been established as additional compensatory factors, such as school and student characteristics. This addition allows us to explore multiple factors beyond salary that may shape teachers' job search behaviors. As with a reservation wage, each compensatory factor has a teacher-specific lower bound, below which the teacher will not accept a position, which we term the preference threshold.

The distribution of all possible vacancies to which a teacher applicant has access is illustrated in Figure 1. Individuals on the job market have preferences for jobs but are confronted with market availability, which often does not match their preferences perfectly. Since the job search process has direct and indirect costs, such as time, transportation, and lack of funds (e.g., unemployment subsidies run out), most applicants settle with an acceptable match rather than waiting indefinitely to find the perfect pairing (McCall, 1970; Oppenheimer, 1988). The positions that will satisfy a job seeker are represented above their preference threshold in the middle area in the distribution. Depending on the severity of cost and the potential benefits, applicants determine how long they will wait to find a suitable match and may be quick to accept the first offer above their preference threshold (McCall, 1970). Building on these ideas, we assume that teacher applications are an indication of positions that meet their preference threshold (applying the idea of the reservation wage), while their nonpreferred positions will be the vacancies to which they did not apply, the "not considered" positions in Figure 1. The job the candidate accepts must also meet their preference threshold, even if it is not considered a perfect match.

Figure 1. Diagram for conceptual framework



Scholars theorize that a person is likely to be more satisfied when a job supplies what a person wants or desires or where a person's ability meets the demands of the job (Daniels & De Jonge, 2010; Wilk & Sackett, 1996). While a match between cognitive ability and the

demands of teaching will be a predictor of staying in the profession (Wilk & Sackett, 1996), retention decisions are also a matter of teachers being assigned to teach in the content area they desire and in classes with students they prefer to teach (Stockard & Lehman, 2004). For example, teachers may graduate certified in multiple areas but prefer one content area over the other or, perhaps, teachers prefer to teach in a suburban school district but currently teach in a rural or urban district. Another important factor, as articulated by Watson (2011), is that teachers are happier when they work in schools with students who align with their predefined conceptions of optimal contexts. Therefore, preference alignment posits that teachers are more likely to stay in positions (and less likely to seek out others) when school characteristics coincide with the teachers' preferences, as were made known by their application choices in their initial search.

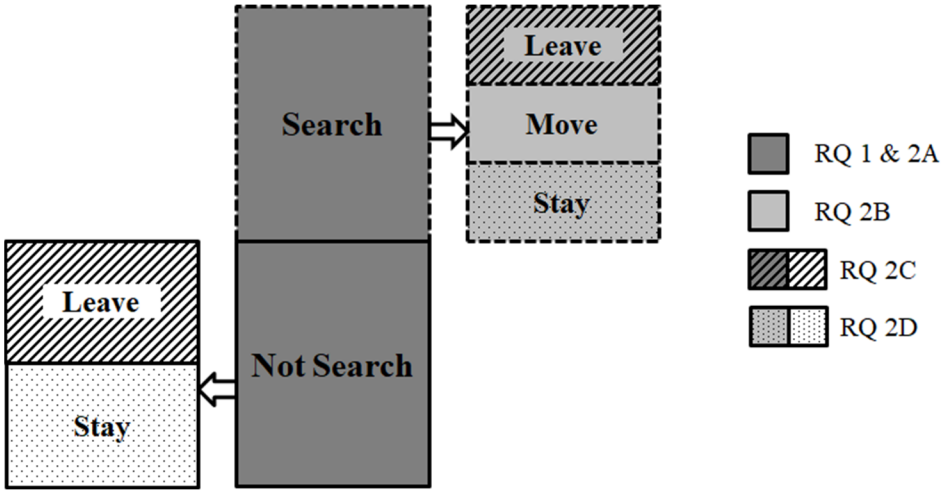
Research Questions

The focus of this research is to reveal the unobserved labor market engagement, we term "hidden mobility," among first-year teachers and examine how first-year teacher's preference alignment relates to their subsequent mobility decisions. For the second line of inquiry, we have sub-questions that focus on the multiple pathways novice teachers experience on the teacher labor market. We first examine first-year teachers' job search at the close of their first year in teaching and their subsequent mobility decisions once they searched. We then focus on the two subpopulations of first-year teachers—stayers and leavers—because we assume those who stay (or leave) without an effort to look for other positions differ from those who do search before staying (or leaving). For example, those who left without a job search were more definitive in their decision to quit teaching whereas those who left after a search were more reluctant to quitting and may have wanted to try teaching again, under different circumstances. Similarly, those whose preferences were better aligned with the schools where they taught were more satisfied and thus more likely to stay without seeking new teaching positions. More specifically, the following questions (visualized in Figure 2) outline our inquiry:

1. What is the magnitude of hidden mobility among first-year teachers?

2. Does preference alignment predict first-year teachers' job search and mobility?
    a. Does preference alignment predict first-year teachers' likelihood to seek new teaching positions after their first year in teaching?
    b. Does preference alignment predict first-year teachers' likelihood to move or leave, compared to their likelihood to stay, once they searched?
    c. Of those first-year teachers who leave teaching, does preference alignment predict if a teacher does or does not search for other positions before they exit?
    d. Of those first-year teachers who stay, does preference alignment predict if a teacher does or does not search for other positions?

Figure 2. Diagrammed research questions



Methods

Data and Sample

This study employs multiple data resources: application/vacancy records from the Wisconsin Education Career Access Network (WECAN), administrative staffing data from the Wisconsin Department of Public Instruction (DPI), district information from the National Center for Education Statistics' Common Core of Data, and district-level student academic performance scores from DPI's Wisconsin Information System for Education. We include only public schools in our sample.

The WECAN application portal is an online system for administrators and teachers in Wisconsin K-12 schools. Given 354 (83%) districts use the system to post job vacancies, most teacher candidates use this system to search and apply for positions. Therefore, the WECAN dataset includes diverse teacher labor market traits (e.g., what and when positions were posted, how many applicants applied to the positions) and applicant characteristics (e.g., educational experience, certifications, number of applications each applicant submitted). The DPI staffing dataset contains a rich set of demographic characteristics, including a teacher's gender, ethnicity, and position(s) taught. Therefore, this DPI dataset outlines teacher characteristics and facilitates the identification of labor market outcomes, including whether teachers stay in their same position, move to another district to work, or leave the Wisconsin school system altogether. We compiled the teacher characteristics of gender, racial-ethnic demographics, college grade point average (GPA), number of subject fields assigned, and salaries using WECAN and DPI data, which also provides the information we use to calculate the geographic proximity index. The Common Core of Data provides student and school characteristics: student economic status and racial-ethnic demographics, and school locale. We also utilized math performance scores provided by DPI's Wisconsin Information System for Education.

In this study, we aim to reveal the hidden mobility in the teacher labor market by combining first-year teachers' job search activities and their subsequent mobility outcomes. We use WECAN data for the 2016-17 school year to identify novice teachers' job applications after their first year teaching and the DPI administrative staffing data for the 2016-17 school year to

identify their subsequent mobility. We also use WECAN data for the 2015-16 school year to identify first-year teachers' original job preferences based on districts to which they did and did not apply. We combine this information with the characteristics of the schools and students where teachers worked in the 2015-16 school year, as informed by the 2015-16 DPI staffing data and the Common Core of Data, to examine how preference alignment relates to first-year teachers' job search behaviors and final mobility decisions for each of our six indexes.

Our sample is first-year, public school teachers who were hired for the 2015-16 school year and who were active on the WECAN from April 1 to August 31 in 2015, the most active segment of the hiring season for the 2015-16 school year. Again, first-year teachers were selected primarily because all first-year teachers were on the labor market as they searched for their initial positions and therefore, we can identify job preferences for all of them. We used several criteria to identify first-year teachers instead of relying on the self-reported teaching experience in the DPI staffing data. We defined first-year or novice teachers as those who earned their first teaching license or certification in the previous five years (January 1, 2011, through August 31, 2015), were not in the DPI staffing data in the same five years, were active on the WECAN for their first time in the 2015-16 hiring season, and worked in a full-time teaching position in that school year. Through this process, we identified 2,871 first-year teachers.

Measurement

We first divided our sample into searchers and non-searchers. Searchers are those novices who applied for new positions for the 2016-17 school year through the WECAN. Non-searchers did not fill out an online application form on WECAN. Using the DPI staffing data, we then divided searchers and non-searchers into "stayers," "movers," and "leavers." Stayers are teachers who worked in the same district for the 2015-16 *and* 2016-17 school years; their human capital stayed within the district. Movers are teachers who changed from one Wisconsin district to another from 2015-16 to 2016-17. Last, leavers are individuals who were found in the DPI data system in 2015-16 but not in 2016-17. Leavers can be teachers who quit teaching altogether or who were still teaching but in private/charter schools or outside Wisconsin. We also considered any teachers who appeared in the 2016-17 DPI data as other types of public-school employees (e.g., administrative staff, leadership) to be leavers.

As outlined above, previous studies revealed that teachers have varying preferences related to student academic performance, student economic status, student racial-ethnic demographics, school locale, geographic proximity, and salary. Based on this literature, we utilized the median value and standard deviation of individual teachers' application distribution to develop our six preference indexes. The median reflects the direction of preference (i.e., whether a teacher prefers to serve low- or high-performing schools), whereas the standard deviation represents the intensity of preference (i.e., how strongly a teacher cares about their preference for student academic performance).

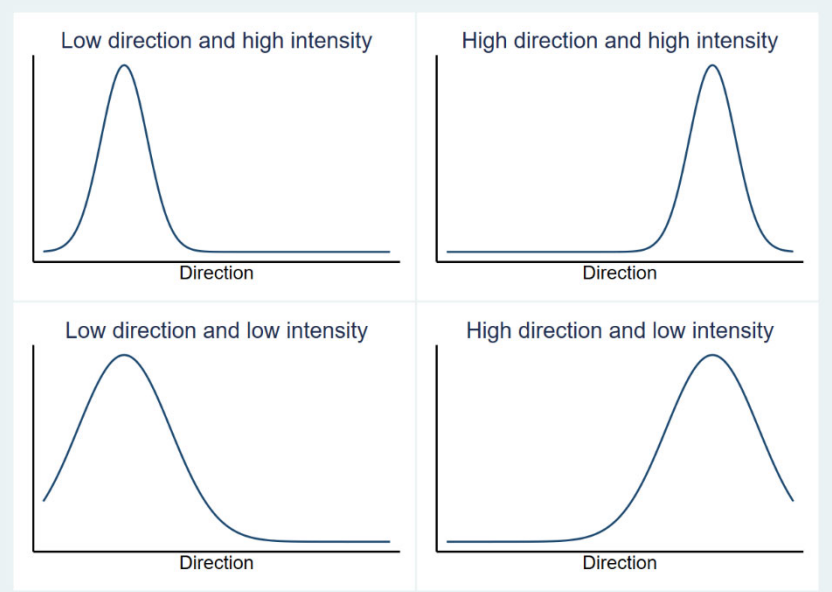
$$\frac{Median}{SD} = \frac{direction\ of\ preference}{intensity\ of\ preference}$$

Taking student academic performance as an example, we calculate the median value and standard deviation of the math scores for the schools to which a candidate applied in 2015. If a

job seeker applies to schools with a median math score of 80 and another candidate applies to a school with a median math score of 30, we assume that the former prefers to teach higher-performing schools and the latter relatively prefers lower-performing schools. We use the median rather than the mean value to avoid outlier bias. If one candidate's applications show a larger standard deviation across the performance scores than another applicant, we assume that the candidate with a larger standard deviation has a weaker preference whereas the latter has a stronger preference regarding student performance. The logic is that a teacher is likely to be more selective in deciding where to apply when that teacher has a stronger preference for a specific characteristic. Consequently, the positions to which this teacher applied will be clustered tightly across this measure, displaying a smaller standard deviation. By including standard deviation as a denominator, our indexes reflect the intensity of candidate preference.

Continuing the example of student performance as defined by math scores, Figure 3 illustrates archetypes of teachers according to direction (x-axis) and intensity (standard deviation) of student performance. These descriptions further depict how we measured preference. First, the top left graph represents a candidate with low direction and high intensity (i.e., highly intense preference for low-performing schools). In this graph, the teacher shows a preference to work in schools with low standardized test scores as demonstrated by their application primarily to schools with low scores. The range of schools to which the teacher applied strongly centered on similar scores. Second, the top right graph demonstrates high direction and high intensity. In this case, the teacher prefers to work in schools with high-performance scores and primarily prefers to do so, since the performance scores of schools to which they applied has a small standard deviation. Third, the bottom left graph demonstrates low direction and low intensity. While the teacher prefers to serve schools with lower scores overall, as indicated by the direction, they have less intensity and apply to schools with a wider range of performance scores. Finally, the bottom right graph illustrates a teacher with high direction and low intensity. The teacher prefers to work in schools with higher scores overall but appears willing to work in schools with a greater range of scores, as indicated by the wider standard deviation.

Figure 3. Combinations of direction and intensity of preference



To facilitate interpretation, we constructed our preference measures to align with mainstream preferences that have been demonstrated in prior work, namely a preference for schools with higher academic performance (e.g., Hanushek & Rivkin, 2007; Engel et al., 2014), schools serving fewer students in poverty (e.g., Scafidi et al., 2007; Hanushek & Rivkin, 2007) and fewer students of color (e.g., Watson, 2011; Cannata, 2010), suburban schools (e.g., Ingersoll, 2001; Baldassare, 1992), schools that are close to teachers' home or college they graduated (e.g., Reininger, 2012; Boyd et al., 2005), and schools with higher teacher salaries (e.g., Ingersoll, 2001; Imazeki, 2005). For example, we use district-level percentages of students *not* eligible for FRPL and White students to calculate numerators of the relevant indexes, such that higher indexes indicate preferences for districts serving fewer students in poverty and fewer students of color.

The descriptive statistics for the six preference indexes are summarized in Table 1. We apply the median/standard deviation measure to calculate the indexes of student academic performance, student economic status, student racial-ethnic demographics, and salary. Roughly one-third of teachers applied to only one vacancy when they were initially on the job market and thus have zero standard deviation for denominators. To solve this issue, we create a categorical measure of intensity (using standard deviations), dividing our sample into thirds of high (1), medium (2), and low (3) intensity, and use this value as the denominators of the preference indexes. For example, teacher applicants having smaller standard deviations, including zero (i.e., highly intense preference), are given the categorical value of 1 whereas those having larger standard deviations are given larger values of 2 or 3. In addition, we standardize the numerators of these indexes. Student academic performance is measured by the district-level average math score for grades 3-8. For the academic performance index, the numerator is the median value of the standardized district-level math scores of the vacancies to which a teacher applied. For the student economic status index, the numerator is the median of the standardized district-level percentages of students *not* eligible for FRPL. For the student race/ethnicity index, the numerator is the median of the standardized district-level percentages of White students. Because we do not know the salary that a first-year teacher could receive from each position to which they applied, we use predicted district-level average salary. We first regress individual teacher salaries on years of experience, subject field, level of education, and gender with district-level fixed effects, then use the standardized marginal values of the fixed-effect terms as the district-level average salary. Thus, the salary index represents preference for the average salary that a first-year teacher is predicted to earn at the specific district based on their qualifications relevant to the salary schedule. Constant with other indexes, the numerator is the median of the standardized district-level salary. In this study, salary does not include benefits like retirement pension and health insurance.

Table 1. Descriptive statistics of preference indexes

		Percentile				
		5th	25th	50th	75th	95th
Student academic performance	Numerator	-1.779	-0.817	-0.409	0.063	0.904
	Denominator	1	1	2	3	3
	Preference indicator	-1.398	-0.46	-0.198	0.023	0.694
Student economic status	Numerator	-1.132	-0.183	0.212	0.712	1.343
	Denominator	1	1	2	3	3
	Preference indicator	-0.781	-0.111	0.092	0.353	1.122
Student racial/ethnic demographics	Numerator	-1.441	-0.345	-0.063	0.23	0.488
	Denominator	1	1	2	3	3
	Preference indicator	-1.347	-0.206	-0.036	0.112	0.443
Suburban locale	Numerator	0	0	27.3%	66.7%	100%
	Denominator	-	-	-	-	-
	Preference indicator	0	0	27.23%	66.7%	100%
Geographic proximity	Numerator	-	-	-	-	-
	Denominator	0	0	5.172	15.536	48.767
	Preference indicator (log-transformation)	-3.887	-2.743	-1.643	12.563	12.563
Salary	Numerator	-0.6	-0.129	0.247	0.6	1.251
	Denominator	1	1	2	3	3
	Preference indicator	-0.441	-0.056	0.113	0.294	1.016

For suburban locale and geographic proximity, we take a different approach because the median-standard deviation form is not applicable. District locale is measured by the National Center for Education Statistics locale codes of city, suburban, town, and rural. We construct an index only for the suburban locale because creating separate indexes for the other locales will add more analytic models while the literature (and our data, empirically) finds an overall preference for suburban locales. For the suburban locale index, we use the percentage of applications submitted to suburban districts as a measure to capture both direction and intensity of preference. For example, if a teacher submitted six out of 10 applications to schools in suburban districts, then their preference index for suburban locale is 60%, reflecting a greater preference for suburban contexts than rural, town, or city. Last, we construct an inverse distributional measure to represent the preference for geographic proximity. To create this measure, we first calculate the center of mass of all the school districts to which a teacher applied. The center of mass is calculated by taking all of the locations of the school districts the teacher applied and locating the average point, weighted by the number of applications at each site. Assuming that center of mass is close to the applicant's ideal job location, we calculate the standard deviation of the distances in miles each district is from the center point in miles because there is no meaningful median value. Then, we use an inverted distribution measure for the same reason that the standard deviations of the other measures are represented in the denominator: larger variances across choices correspond to weaker preferences. Again, roughly one-third of the teachers in our sample applied to only one district. For these cases, we use the value of the

smallest standard deviation in the total distribution (0.0004) and then convert the standard deviations for all teachers into a natural logarithm form to reduce outlier bias.[1]

Despite the care taken in creating these preference indexes, there are noteworthy limitations to consider. First, we represented preferences using district-level data instead of school-level data because vacancies in the WECAN dataset are aligned with districts—not schools—to which individual candidates applied. This approach is more appropriate for creating preference indexes, given that the school districts in Wisconsin are small (median number of schools per district is three in the 2015-16 academic year) and that vacancies are posted at the district level. Second, our geographic proximity index may conflate the preferences of a candidate who applies to multiple openings across the state with an individual who applies for openings clustered around two distant districts. For example, if a teacher living in southern Wisconsin has strong preferences for two small locales that are far apart geographically (e.g., where they went to college and where they grew up) and applies to vacancies in southern and northern Wisconsin, then the large standard deviation (geographic proximity) does not necessarily indicate a preference to work anywhere in a wide geographic area. Nonetheless, our approach to creating teacher preference indicators allows us to expand how we understand teacher preferences. By measuring preference for everyone based on their application data, we capture a fuller picture of teachers' job preferences.

Analytic Approach (Models)

For the first research question, to reveal hidden mobility in the teacher labor market, we used a frequency table to separate first-year teachers into six groups by the combination of their search behavior (i.e., those who do and do not search) and mobility outcomes (i.e., stay, move, or leave). For the research questions that address preference alignment, we utilize binomial logistic regression analysis. Our focus is on the preference alignment—whether novice teachers' preferences matched with what they actually encountered at the schools where they taught in the first year. To indicate preference alignment, we include an interaction term between the preference index and the relevant characteristic of the first-year position in our model. We construct separate models for each preference index. Taking student academic performance index as an example, the basic analytic model is as follows:

$$\ln\left[\frac{p(Y)}{1-p(Y)}\right] = \beta_0 + \beta_1[Preference\ Index_{Math}] + \beta_2[School\ Characteristic_{Math}]$$

$$+ \beta_3[Preference\ Index_{Math} * School\ Characteristic_{Math}] + \beta_k Z_k + \varepsilon$$

where the dependent variable represents the likelihood of first-year teachers applying to other positions compared to not applying after their first year in teaching (Question 2A); moving or leaving compared to staying, conditional on search (Question 2B); leaving after search compared to leaving without search (Question 2C); or staying after search as opposed to staying without search (Question 2D). β_1 is the estimate showing the relationship between the preference index and the dependent variable, while β_2 represents the relationship between the math performance

[1] Results are substantively congruent with and without this logarithmic correction.

at the school where a teacher taught and the dependent variable. We include an interaction term β_3 as the estimate of the relationship between preference alignment and the dependent variable. Z_k is a vector of covariates controlled in the model. We control for teacher applicant characteristics that include gender (female = 1), racial-ethnic demographics (Black, Hispanic = 1), GPA (on a scale of 4.0), number of subject fields taught, and salary earned (in 2016 dollars). We also control for the characteristics of the schools that teacher applicants taught in their first year in teaching, which include school-level average of math score, school-level percentage of students eligible for FRPL, school-level percentage of students of color, and locale (suburb, town, rural, compared to city). Standard errors are clustered at the district level to account for the nested data structure.

Models for the three other preference indexes—student economic status, student racial-ethnic demographics, and salary—take the same functional form as above. For the suburban index, we include a binary measure of suburban locale for β_2. As the preference index for suburban measures teachers' preference for suburban contexts, we dichotomize the condition for the current school into "1" if a teacher worked in a suburban school versus "0" if they did not. β_3 in this model is the interaction between a continuous variable (i.e., percentage of applications submitted to vacancies in suburban districts) and a binary variable (i.e., 1 or 0) representing preference alignment. Last, for the geographic proximity index, we include the distance in the unit of 10 miles from the center of mass to the school where a teacher taught in their first year as a continuous variable for β_2.

Preference alignment theory predicts that these interaction coefficients will be negative (or have odds ratios less than 1). The interaction term in each model represents the preference for a given measure when a teacher is working in a school that is also high on that measure. Returning to student math test scores, a negative β_3 coefficient (or odds ratio less than 1) would indicate that both teachers who preferred schools with higher test scores *and* are working in a high-performing school and those who preferred schools with lower test scores *and* are working in a low-performing school are less likely to search for new positions in the following year. In short, a negative interaction term indicates that teachers who are working where they want to be are less likely to search out other positions. For our measure of geographic proximity, a negative β_3 coefficient (or odds-ratio less than 1) indicates that teachers preferred vacancies within a small geographic area *and* are working in close proximity to districts where they submitted the majority of their applications are less likely to search.

Findings

Using novel teacher application data, we explored first-year teachers' intention to move and their final mobility outcomes. Of first-year teachers, 53% searched for new positions at the close of their first year, which is much greater than the magnitude of mobility that previous research has found. Of the first-year teachers who searched for new positions, 38% changed districts or left teaching. When first-year teachers' preferences did not align with their current school context, we find evidence that first-year teachers were more likely to reenter the labor market after their first year in teaching, suggesting preference alignment theory in education. After an individual has reentered the labor market, however, preference alignment is less predictive of job search outcomes.

Descriptive statistics of teacher and school characteristics controlled in our analysis are provided in Table 2, where we disaggregate the full sample by key conditions: (a) search or not; (b) stay, move, or leave, conditional on searching; (c) leave with or without searching; and (d) stay with or without searching. In Table 3, we disaggregate the full sample by search behavior and mobility outcome to answer the first research question. The logistic regression estimates for the remainder of the research questions are provided in Tables 4 to 7. To provide a more intuitive interpretation of the regression results, we plot the marginal effects of preference alignment (i.e., the interaction term between preference index and relevant school characteristic) in Figure 4. For the marginal effect plots, we present the model illustrating preferences for suburban locales as an example because its base and interaction terms were significant across most outcomes.

Descriptive Statistics

Table 2 summarizes teacher and school characteristics of our analytic sample for each research question. Research questions 1 and 2A analyze the full sample—all first-year teachers in Wisconsin for the 2015-16 school year—to examine the magnitude of hidden mobility in the teacher labor market and the relationship between preference alignment and first-year teachers' labor market activities. Research question 2B explores the final mobility decisions of those who searched for new positions after their first year in teaching, limiting the sample to 1,511 teachers. Research questions 2C and 2D focus on those who left a Wisconsin teaching position (372), and those who stayed in the same district (2,145).

As shown in the second and the third rows in Table 2, most of the first-year teachers in our sample are White and female. Those who applied to other positions after their first year in teaching tended to work for schools with lower math scores (0.1 compared to 0.17) and larger percentages of students eligible for FRPL (45.22 compared to 42.86) and students of color (30.21 compared to 28.18). Those who exited the profession were assigned more subject fields (1.58 compared to 1.28) and received lower wages (41,578 compared to 41,947) than the average. They were also more likely to teach at schools with larger percentages of students eligible for FRPL (45.12 compared to 42.86) and students of color (29.22 compared to 28.18) and in rural schools (0.29 compared to 0.24). Those who stayed at the same district, on the other hand, were found to have received higher salaries (42,285 compared to 41.947). In our analytic models, we present further empirical evidence that shows how preference alignment predicts specific job search and mobility.

Research Question 1: Hidden Mobility Among First-Year Teachers

Table 3 disaggregates the first-year teachers in our sample by job search activities and final mobility outcomes. Out of 2,871 first-year teachers, 2,145 (75%) remained in the schools where they taught the previous year, whereas 354 (12%) moved to a different district, and 372 (13%) left a Wisconsin teaching position. This finding is consistent with previous studies on teacher mobility. The attrition rate for first-year teachers has remained around 10% over the past two decades (Ingersoll et al., 2018); overall turnover rate (move or leave) for teachers with less than three years of experience is around 23% (Keighter, 2010).

What has been less known is the magnitude of the labor market activity underlying these mobility trends. More than half of novice teachers (1,511 out of 2,871 or 53%) applied for new teaching positions after their first year in teaching. Our analysis reveals roughly two times more

labor market activity taking place, as compared to the 25% (movers and leavers) captured by traditional administrative staffing data.

Such disaggregation of the data also offers a more nuanced picture of teacher mobility. We found that 38% (580) of the 1,511 searchers ended up moving or leaving while 62% stayed (Figure 3). This group of teachers who searched but stayed account for 43% of the 2,145 total stayers, suggesting first-year teacher mobility may be of a much bigger concern than previously documented (Darling-Hammond, 2003; Ingersoll, 2001). We also found that 65% of the leavers looked for other positions before eventually quitting.

Table 2. Descriptive statistics of sample by research question

	Research Question			
	1/2A	2B	2C	2D
Teacher applicant characteristics				
Female	0.74	0.72	0.73	0.74
Person of color	0.04	0.05	0.05	0.04
GPA	3.63	3.61	3.66	3.63
	-0.34	-0.36	-0.32	-0.34
Number of subject fields	1.28	1.29	1.58	1.23
	-0.72	-0.73	-1.08	-0.64
Salary	41,947	41,786	41,578	42,285
	-7,274	-7,237	-7,917	-7,193
2016-17 school characteristics				
Math score	0.17	0.1	0.18	0.18
	-1.04	-1.05	-1.06	-1.04
Percentage of students eligible for FRPL[a]	42.86/0.04 (21.38/0.99)	45.22/0.15 (21.64/1.00)	45.12/0.15 (21.81/1.01)	42.06/0.01 (21.23/0.98)
Percentage of students of color[a]	28.18/0.08 (24.46/0.92)	30.21/0.15 (26.38/1.00)	29.22/0.12 (27.88/1.05)	28.28/0.08 (23.65/0.89)
Suburban				
City	0.29	0.32	0.3	0.31
Suburban	0.27	0.24	0.21	0.28
Town	0.2	0.19	0.21	0.19
Rural	0.24	0.25	0.29	0.22
Observations	2,871	1,511	372	2,145

Note. Standard deviations in parentheses.

[a] For percentage of students eligible for FRPL and percentage of students of color, raw and standardized statistics are presented (raw values/standardized values). We use standardized values of these two measures in the analytic models.

Table 3. Disaggregation of the full sample by search behavior and final mobility

	Stay	Move	Leave	Total
Search	931	337	243	1,511
No search	1,214	17[a]	129	1,360
Total	2,145	354	372	2,871

[a] Seventeen teachers moved without searching on WECAN. As 17% of Wisconsin school districts do not use WECAN, these data will not capture some job searches, but the DPI administrative data capture moving portion of job market behavior. Although WECAN data do not capture the applications directly submitted to schools, the marginality of those who moved without searching (0.59%) supports WECAN data reliability and further corroborates that any finding from this study is a lower bound.

Research Question 2A: Preference Alignment and Intention to Move

Overall, we found that the alignment of specific preferences, notably student economic status and suburban, significantly predicts whether a first-year teacher will search again. Table 4 presents the binomial logit regression results for each of the six preference indexes. Since the results are presented as odds ratios, a coefficient lower than 1 is interpreted as a teacher being less likely to search again. Table 4 shows that first-year teachers were less likely to search for other teaching jobs when their original preferences for student economic status (odds ratio: 0.886) or suburban (odds ratio: 0.991) were better aligned with the conditions at the schools where they taught. For example, if a teacher who had preferred a less affluent school (i.e., one with a higher portion of students qualifying for FRPL) ended up working for such a school, they were significantly less likely to apply for other positions for the following academic year. Preference alignment for student academic performance, student racial-ethnic demographics, geographic range, and salaries are not significant in predicting first-year teachers' job searches. One aspect worth noting, aside from preference alignment, is that first-year teachers were more likely to search when they worked for schools farther away from the geographic area they had initially preferred (odds ratio: 1.065). This relationship corroborates previous studies that found teacher labor markets are localized (Engel & Cannata, 2015; Reininger, 2012; Boyd et al., 2005).

In addition to preference alignment, several control variables are found to significantly predict first-year teachers' job search behavior. First, female teachers were less likely than males to search for other positions across all six models. Second, teachers with higher GPAs are less likely to search for other positions. Last, we found first-year teachers were more likely to search for other positions when they taught at schools with a high percentage of students eligible for FRPL and rural schools.

In Panel A of Figure 4, we present the average marginal effect of preference alignment for suburban locale to facilitate the interpretation of our findings. The y-axis represents the predicted probability of searching for new positions, and the x-axis represents the strength of the original preference for a suburban area with each line representing the locale (suburban or not) of the school in which the teacher was employed. The solid line represents the teachers who taught in non-suburban schools, and the dotted line represents those who taught in suburban schools. The

slopes then represent how the search probability changes by the level of preference for two groups of first-year teachers.

Table 4. Logistic regression estimates of the relationship between preference alignment and job search in odds ratios (dependent variable=1 if searched)

	Student academic performance	Student economic status	Student racial-ethnic demographics	Suburban locale	Geographic proximity (10 miles)	Salary
Preference	1.100	1.057	1.132	1.008***	0.956***	1.113
	(0.075)	(0.082)	(0.104)	(0.002)	(0.007)	(0.145)
Current school	0.932	0.877	0.898	1.214	1.065***	0.942
	(0.040)	(0.087)	(0.090)	(0.221)	(0.013)	(0.067)
Preference alignment	0.944	0.886*	1.084	0.991***	1.000	1.038
	(0.047)	(0.058)	(0.068)	(0.003)	(0.001)	(0.111)
Teacher applicant characteristics						
Female	0.797**	0.797**	0.798**	0.780***	0.832*	0.796**
	(0.075)	(0.075)	(0.074)	(0.074)	(0.080)	(0.074)
Person of color	1.303	1.307	1.287	1.294	1.334	1.283
	(0.307)	(0.310)	(0.303)	(0.301)	(0.318)	(0.298)
GPA	0.769**	0.775**	0.765**	0.767**	0.817*	0.771**
	(0.088)	(0.088)	(0.088)	(0.085)	(0.092)	(0.088)
Number of subject fields	0.985	0.986	0.988	1.009	0.989	0.990
	(0.055)	(0.056)	(0.056)	(0.060)	(0.056)	(0.056)
Salary	0.952	0.953	0.955	0.935	1.050	-
	(0.063)	(0.064)	(0.063)	(0.062)	(0.076)	-
School characteristics						
Math score	-	0.943	0.950	0.942	0.932	0.948
	-	(0.040)	(0.041)	(0.040)	(0.041)	(0.040)
Percentage of students eligible for FRPL	1.162	-	1.135	1.239**	1.112	1.151
	(0.106)	-	(0.104)	(0.115)	(0.105)	(0.105)
Percentage of students of color	1.114	1.122	-	0.963	1.147	1.103
	(0.112)	(0.113)	-	(0.087)	(0.122)	(0.110)
City	1.047	1.021	1.042	-	1.037	1.059
	(0.169)	(0.162)	(0.164)	-	(0.197)	(0.162)
Town	1.086	1.080	1.077	-	0.984	1.106
	(0.152)	(0.148)	(0.151)	-	(0.150)	(0.154)
Rural	1.271*	1.278*	1.256*	-	1.118	1.299*
	(0.175)	(0.173)	(0.173)	-	(0.165)	(0.182)
Wald	38.97	52.79	35.96	56.03	145.13	38.17
Observations	2,871	2,871	2,871	2,871	2,871	2,871

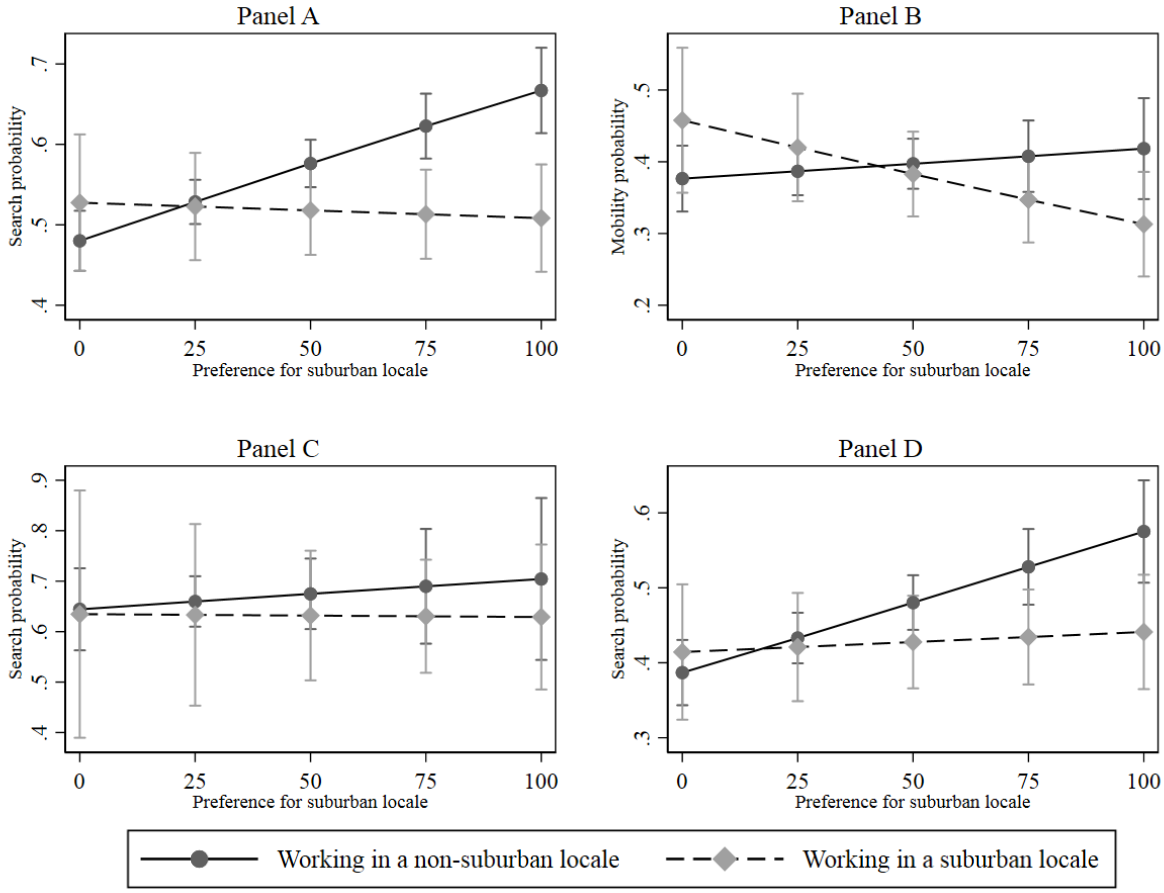
Note. Standard errors in parentheses are clustered at school district level.
*** p<0.01, ** p<0.05, * p<0.1

In Panel A of Figure 4, the right-most dot of the dashed line represents preference alignment for a suburban locale: teachers who strongly preferred and were employed in suburban schools. In contrast, the rightmost dot of the solid line represents preference misalignment: those who preferred to work in suburban schools but did not teach there. Of the teachers who had a strong preference for a suburban locale, those whose preferences were aligned had a predicted search probability of 50% whereas those whose preferences were not aligned had a predicted search probability of 65%. In other words, teachers whose preferences were aligned were less likely to reenter the job market. Similarly, teachers whose preferences aligned with non-suburban schools (the leftmost dot of the solid line: teachers who had a weak preference for working in a suburban locale and worked in a non-suburban locale) had a similar search probability (48%) with those

who preferred and were employed in a suburban locale (50%). Although teachers in non-suburban schools may have a higher search probability on average, those who did not have a strong preference for a suburban locale are as likely to search as those working in suburban schools. Importantly, even when interests do align, nearly half of all teachers are on the market applying for other positions.

Overall, the results provide strong evidence to support our hypothesis that first-year teachers are more likely to search for other positions depending on whether their preferences for a particular school and student characteristics align with the schools where they taught in their first year.

Figure 4. Marginal effects of preference alignment for suburban locale



Research Question 2B: Preference Alignment and Final Mobility after Job Search

For the first-year teachers who searched for other teaching positions at the close of their first year in teaching, we found that the alignment of preference for suburban locale significantly predicts their subsequent mobility decisions. Table 5 indicates that the first-year teachers who applied for other positions were less likely to subsequently exit the district (i.e., move to a different district or leave a Wisconsin teaching position) when their original preferences for the suburban locale were better aligned to the schools where they taught (odds ratio: 0.992). Preference alignment for student characteristics and salary are not significant in predicting first-year teachers' mobility outcomes, conditional on searching.

Table 5. Logistic regression estimates of the relationship between preference alignment and mobility in odds ratio (dependent variable=1 if exit the district; =0 if stay)

	Student academic performance	Student economic status	Student racial-ethnic demographics	Suburban locale	Geographic proximity (10 miles)	Salary
Preference	1.309***	1.332**	1.360	1.002	0.977**	0.979
	(0.106)	(0.157)	(0.265)	(0.002)	(0.011)	(0.156)
Current school	1.020	0.786**	0.947	1.412	1.040**	0.714***
	(0.060)	(0.082)	(0.110)	(0.336)	(0.017)	(0.071)
Preference alignment	1.053	1.070	1.055	0.992**	1.003	1.033
	(0.099)	(0.106)	(0.106)	(0.004)	(0.002)	(0.154)
Teacher applicant characteristics						
Female	1.036	1.024	1.047	1.043	1.091	1.052
	(0.130)	(0.130)	(0.132)	(0.132)	(0.139)	(0.133)
Person of color	1.399	1.359	1.377	1.313	1.367	1.325
	(0.331)	(0.320)	(0.325)	(0.323)	(0.323)	(0.321)
GPA	1.567***	1.562***	1.561***	1.600***	1.604***	1.565***
	(0.254)	(0.251)	(0.252)	(0.256)	(0.265)	(0.254)
Number of subject fields	1.181**	1.178*	1.182**	1.201**	1.184**	1.183*
	(0.098)	(0.101)	(0.099)	(0.100)	(0.101)	(0.102)
Salary	0.695***	0.701***	0.715***	0.681***	0.738***	-
	(0.065)	(0.065)	(0.065)	(0.064)	(0.070)	-
School characteristics						
Math score	-	1.023	1.020	1.010	1.011	1.022
	-	(0.058)	(0.058)	(0.059)	(0.057)	(0.058)
Percentage of students eligible for FRPL	1.241**	-	1.170	1.259**	1.165	1.187*
	(0.122)	-	(0.115)	(0.133)	(0.116)	(0.118)
Percentage of students of color	0.983	0.980	-	0.805**	1.032	1.009
	(0.113)	(0.114)	-	(0.082)	(0.123)	(0.120)
City	0.802	0.799	0.783	-	0.799	0.789
	(0.134)	(0.138)	(0.137)	-	(0.134)	(0.143)
Town	1.321	1.366	1.315	-	1.288	1.361
	(0.245)	(0.260)	(0.257)	-	(0.237)	(0.264)
Rural	1.514**	1.581**	1.499**	-	1.425*	1.553**
	(0.286)	(0.308)	(0.301)	-	(0.269)	(0.308)
Wald	78.81	74.08	72.38	51.91	78.59	61.12
Observations	1,511	1,511	1,511	1,511	1,511	1,511

Note. Standard errors in parentheses are clustered at school district level.
*** p<0.01, ** p<0.05, * p<0.1

Independent of preference alignment, we found that first-year teachers were less likely to exit their current districts when they worked for schools offering higher salaries (odds ratio 0.714) or worked for schools closer to the geographic area they initially preferred (odds ratio 1.040).

Consistent with the discussion about research question 2A (RQ 2A), covariates such as teacher GPA, schools' percentage of students eligible for FRPL, and rural locale significantly predicted teacher mobility. First-year teachers who searched for new teaching positions were more likely to change districts or leave teaching in Wisconsin if they had taught in districts with more students eligible for FRPL or in rural areas. Although teachers with higher GPAs were less likely to search for other positions (RQ 2A), we see from Table 5 that once they initiated the

search process, they were more likely to move or leave. Additionally, we observed that working conditions significantly predict first-year teachers' final mobility after searching. Teachers who were assigned multiple subject fields or received lower salaries were more likely to move or leave if they applied for other positions.

Panel B of Figure 4 plots the marginal effect for the preference alignment for suburban locale. Again, the rightmost dot of the dashed line and the leftmost dot of the solid line represent first-year teachers whose preference for suburban locale was better aligned at the schools where they taught. Teachers with preference alignment were less likely to exit the district after searching for new positions. Of the teachers who had a strong preference to work in suburban schools, those whose preferences were aligned had a predicted mobility probability of 30% whereas those whose preferences were not aligned (rightmost dot on the solid line) had a mobility probability of 42%. Similarly, preference misalignment for non-suburban schools (the leftmost dot of the dashed line: teachers who did not have a strong preference for suburban locale and worked in suburban schools) had a slightly higher mobility probability (45%).

Research Question 2C: Preference Alignment and Search Likelihood Among Teachers Who Leave

For the first-year teachers who left teaching in Wisconsin, we found that preference alignment does not predict their search activity: Whether they left after applying for new positions or without searching at all. The third row in Table 6 indicates that for leavers, the association between preference alignment and search behavior was null. Had we seen significantly positive coefficients, we would conclude that preference alignment was a good measure for predicting the job market activity of novice teachers who ended up quitting teaching. However, our null findings leave us without much more insight into what preference alignment means for individuals who have already decided to leave the teaching profession. The close-to-flat slopes in Panel C of Figure 4 is an example illustrating the null findings. There is marginal variation in the likelihood to search by preference alignment.

In terms of student and school characteristics (Table 6), first-year teachers were more likely to leave without searching when they had more subject fields assigned and taught at schools with higher student academic performance. It seems natural that first-year teachers assigned to more positions, thus having greater responsibilities and workload, are more susceptible to burnout and exit without a second thought (Mont & Rees, 1996; Santoro, 2011). It seems less intuitive that teachers exiting appear more likely to exit districts whose students have higher academic performance without applying for other positions. One explanation may be that teachers who did not like their positions at higher-achieving schools might have seen these schools as the most desirable teaching contexts. If they were dissatisfied at a school they perceived to be among the most desirable, they likely realized they would be dissatisfied at any other school as well. As a result, they exited teaching without seeking other positions. Another possible explanation may be schools with high-performance students were more stressful work environments and consequently not ideal workplaces for all teachers. An increase in accountability on student academic performance and an increase in learning programs and initiatives could tire teachers, leading to burnout and attrition (Sartain & Steinberg, 2016). More qualitative work on this phenomenon would help untangle the interaction found in this study.

Table 6. Logistic regression estimates of the relationship between preference alignment and search behavior among leavers (dependent variable=1 if searched)

	Student academic performance	Student economic status	Student racial-ethnic demographics	Suburban locale	Geographic proximity (10 miles)	Salary
Preference	1.316	1.395	1.028	1.003	0.953**	1.100
	(0.310)	(0.339)	(0.366)	(0.006)	(0.020)	(0.426)
Current school	0.709**	1.313	0.600**	0.957	1.041	0.820
	(0.110)	(0.330)	(0.150)	(0.603)	(0.036)	(0.203)
Preference alignment	1.257	0.934	0.894	0.997	1.006	1.163
	(0.235)	(0.182)	(0.179)	(0.009)	(0.004)	(0.451)
Teacher applicant characteristics						
Female	0.774	0.748	0.746	0.740	0.812	0.748
	(0.231)	(0.220)	(0.218)	(0.216)	(0.242)	(0.221)
Teachers of color	1.033	0.926	0.877	0.889	0.894	0.857
	(0.590)	(0.510)	(0.473)	(0.481)	(0.466)	(0.461)
GPA	0.758	0.750	0.769	0.820	0.875	0.789
	(0.232)	(0.227)	(0.237)	(0.248)	(0.263)	(0.251)
Number of subject fields	0.750***	0.738***	0.750***	0.758**	0.751***	0.748***
	(0.080)	(0.078)	(0.080)	(0.086)	(0.083)	(0.080)
Salary	0.842	0.843	0.864	0.859	0.896	-
	(0.150)	(0.153)	(0.152)	(0.154)	(0.155)	-
School characteristics						
Math score	-	0.686***	0.672***	0.700***	0.656***	0.671***
	-	(0.095)	(0.092)	(0.094)	(0.094)	(0.094)
Percentage of students eligible for FRPL	0.763	-	0.720	0.741	0.707	0.715
	(0.192)	-	(0.177)	(0.186)	(0.181)	(0.174)
Percentage of students of color	1.499	1.591*	-	1.502	1.560	1.587*
	(0.401)	(0.426)	-	(0.397)	(0.461)	(0.433)
City	1.142	1.039	1.043	-	1.025	1.060
	(0.335)	(0.305)	(0.307)	-	(0.318)	(0.306)
Town	1.763	1.781	1.830	-	1.627	1.810
	(0.719)	(0.724)	(0.768)	-	(0.682)	(0.724)
Rural	0.875	0.921	0.901	-	0.776	0.879
	(0.346)	(0.359)	(0.363)	-	(0.330)	(0.347)
Wald	37.67	35.82	33.38	29.26	38.17	29.98
Observations	372	372	372	372	372	372

Note. Standard errors in parentheses are clustered at school district level.
*** p<0.01, ** p<0.05, * p<0.1

Research Question 2D: Preference Alignment and Search Likelihood Among Teachers Who Stay

We found that first-year teachers were more likely to stay without search when their preferences for student economic status and suburban locale were better aligned at the schools where they taught. Table 7 shows that preference alignment for student economic status (odds ratio: 0.872) or suburban (odds ratio: 0.993) significantly predicted search behavior. Similar to the findings from RQ 2A, that female teachers and teachers with higher GPAs are less likely to search, we found that teachers with such characteristics were significantly more likely to stay without searching.

Table 7. Logistic regression estimates of the relationship between preference alignment and search behavior among stayers (dependent variable=1 if searched)

	Student academic performance	Student economic status	Student racial-ethnic demographics	Suburban locale	Geographic proximity (10 miles)	Salary
Preference	1.006	0.951	1.081	1.008***	0.964***	1.154
	(0.078)	(0.082)	(0.114)	(0.002)	(0.008)	(0.171)
Current school	0.948	0.936	0.910	1.124	1.061***	1.032
	(0.047)	(0.100)	(0.111)	(0.233)	(0.017)	(0.082)
Preference alignment	0.928	0.872*	1.119	0.993**	0.998	1.048
	(0.055)	(0.070)	(0.079)	(0.003)	(0.002)	(0.122)
Teacher applicant characteristics						
Female	0.796**	0.802**	0.794**	0.772**	0.817*	0.795**
	(0.086)	(0.087)	(0.086)	(0.085)	(0.090)	(0.085)
Teachers of color	1.221	1.231	1.198	1.249	1.252	1.220
	(0.300)	(0.305)	(0.293)	(0.305)	(0.317)	(0.300)
GPA	0.677***	0.684***	0.675***	0.664***	0.696***	0.678***
	(0.093)	(0.093)	(0.093)	(0.090)	(0.096)	(0.093)
Number of subject fields	1.023	1.025	1.026	1.044	1.035	1.029
	(0.072)	(0.073)	(0.072)	(0.077)	(0.075)	(0.073)
Salary	1.048	1.053	1.048	1.042	1.155	-
	(0.081)	(0.082)	(0.083)	(0.084)	(0.102)	-
School characteristics						
Math score	-	0.959	0.969	0.957	0.947	0.965
	-	(0.047)	(0.048)	(0.047)	(0.047)	(0.047)
Percentage of students eligible for FRPL	1.101	-	1.092	1.185*	1.081	1.110
	(0.108)	-	(0.109)	(0.119)	(0.114)	(0.112)
Percentage of students of color	1.132	1.140	-	1.030	1.148	1.108
	(0.137)	(0.135)	-	(0.107)	(0.149)	(0.134)
City	1.107	1.081	1.117	-	1.096	1.133
	(0.219)	(0.212)	(0.220)	-	(0.258)	(0.221)
Town	0.970	0.948	0.957	-	0.876	0.979
	(0.160)	(0.155)	(0.160)	-	(0.160)	(0.164)
Rural	1.133	1.118	1.114	-	0.997	1.156
	(0.185)	(0.182)	(0.185)	-	(0.176)	(0.195)
Wald	30.76	43.18	30.63	43.89	97.52	29.29
Observations	2,145	2,145	2,145	2,145	2,145	2,145

Note. Standard errors in parentheses are clustered at school district level.
*** p<0.01, ** p<0.05, * p<0.1

Panel D of Figure 4 plots the marginal effect for the preference alignment for suburban locale. The gap between the rightmost dots on the dashed and solid lines indicates that first-year teachers whose preference for suburban was better aligned with the school where they taught were more likely to stay without searching for new positions. Of the teachers who had a strong preference to work in suburban schools, those whose preferences were better aligned had a predicted search probability of 40%, the rightmost dot on the dashed line, whereas those whose preferences were not aligned had a search probability of about 58%, the rightmost dot on the solid line.

Discussion

Novice teachers face multiple challenges throughout their first year, some of which motivate them to consider changing schools or leaving the profession. This study is the first to examine

how the preferences of first-year teachers relate to their subsequent labor market behaviors. Using a unique statewide sample of vacancy, application, and hiring data we investigate the role of preference alignment—the congruence between a first-year teacher's preferences and current teaching context—on novice teachers' propensity to seek other teaching opportunities and to make mobility decisions.

Concerns over the mobility rates of novice teachers are longstanding (Ingersoll, 2001; Ingersoll et al., 2018), and the findings presented here suggest that the magnitude of the problem has been largely understated. At the close of the first year in teaching, we find that 53% of all first-year teachers return to the job market to explore alternative employment, a term we refer to as "hidden mobility" to highlight the typically unobserved nature of this job search behavior, which is a precursor to subsequent mobility. Twelve percent of novice teachers change districts, and 8% of those who apply to another district end up leaving teaching in Wisconsin public schools.

In addition to mobility rates, we find that when teacher candidates enter the labor market to seek their first teaching positions, they are not leaping indiscriminately at any available vacancy. Rather, most have clear preferences for potential employment. Our results suggest that first-year teacher mobility may result in part from information asymmetries that arise in the initial job search and hiring process between labor supply (teachers) and labor demand (schools) resulting in a mismatch between a teacher's preferences and the school in which they begin their teaching career. We also find that preference alignment to be predictive of this hidden mobility and that some preferences (e.g., locale) are more predictive than others (e.g., salary).

We find that preference alignment predicts whether a teacher will search for other positions, which is consistent with the theoretical framework we developed. However, once a teacher has decided to search, preference alignment appears to have little to no ability to predict whether they will remain in their position or leave. In part, we see this lack of prognostication as a measurement phenomenon: there is more variability and uncertainty in the two-sided outcome because the decision to search or not is one-sided, belonging entirely to teachers, whereas decisions to move are two-sided, belonging to both teachers and prospective employers. The inability of preference alignment to predict a first-year teacher's employment may also arise if misalignment with a particular preference motivates a teacher to seek alternatives; however, the decision to take another position is holistic in that the teacher must balance multiple competing (and perhaps offsetting) preferences. This balancing act requires teachers to not only compare a prospective school against their a priori preferences but also against how well their preferences align overall with their current school's characteristics. In short, with respect to preference alignment, whether to search is a fairly simple, low-stakes, low-cost decision. In contrast, the decision to stay or move is substantially more complex and costly.

Preference alignment appears to have the greatest merit when applied to the labor market decisions of teachers who are going to stay in the profession (RQ 2D) and of those who may be uncertain (RQ 2A). For those who leave teaching (RQ 2C), preference alignment has comparatively little value. When committed teachers are active on the labor market, preference alignment can guide and facilitate their search for an optimal context to continue their professional journey. When teachers are exiting the field, they are likely doing so for reasons beyond the scope of this research and our preference alignment framework. That is, when an

individual is grappling with whether they identify with a profession in teaching, they are likely facing issues that a change in school locale or student demographics are not likely to influence.

Building from prior research, we developed six preference indexes: student academic performance, student economic status, student racial-ethnic demographics, suburban, geographic proximity, and salary. Our findings show that some preferences carry greater importance than others when predicting labor market behaviors. Preference alignment is most consistently predictive for locale, specifically a teacher's preference to teach in a suburban locale.

A teacher's preference for a specific geographic area was also predictive of labor market activity. Teachers who initially searched over a smaller, more constrained geographic area were less likely to reenter the labor market and less likely to move. The greater the geographic proximity of their current school was from the center of mass of their search area, the more likely teachers were to search and/or move. The nonsignificant interaction term—the preference alignment component—indicates that teachers with large or small initial search radii are equally likely to reenter the labor market when they work far from the center of mass of their initial search area. The significant role of proximity and place shown here are emblematic of the geographically constrained teacher labor market that has been underscored in prior research (Boyd et al., 2005; Engel et al., 2014).

Teachers' preferences for working with affluent students are also linked to their subsequent labor market behaviors. Preference alignment manifests here too, where we find that teachers who initially sought out schools with fewer students eligible for FRPL are more likely to search when they are working in schools serving higher proportions of students in poverty. Similarly, teachers who initially sought schools serving more students in poverty are less likely to search when they are serving in such schools.

In contrast, preference alignment with salary appears universally unrelated to labor market behaviors. The nuance here is that salaries are related to labor market behaviors, namely that lower salaries are related to higher search and mobility rates, but preference *alignment* is not. That is, teachers who sought schools with higher salaries but ended up teaching in schools with lower salaries were just as likely to search or to make a mobility decision (i.e., move or leave) as those who demonstrated little to no preference for salary in their initial position. Importantly, we find that while salary alone will not push a teacher to search for another position, if a teacher is searching, then salary becomes an important predictor of whether they will stay at or leave their current school. We interpret this result to be largely a function of the urgent need to be employed initially coupled with the emergent realization of the challenges associated with living off a low salary that teachers encounter during their first year. Salary then appears to function more as a retention tool than as a recruitment strategy for new teachers. Low salaries and multiple subject field assignments are key drivers that accelerate mobility trends among first-year teachers.

In sum, our empirical findings help us to better understand for whom preference alignment is likely to govern labor market activity (e.g., for teachers invested in the profession with moderate levels of satisfaction with their current context) and for whom it will not (for those intending on leaving the profession).

In addition to our six preference and preference alignment indexes, we identified notable trends in teacher (e.g., GPA) and school characteristics (e.g., number of assigned subject fields and locale) that predicted labor market behaviors across our analyses and merit further attention. We find that teachers with higher GPAs are less likely to search. However, of those teachers who do search, we find that teachers with higher GPAs are more likely to exit their current district. This finding suggests that teachers with higher GPAs may hold some labor market advantage over their colleagues with lower GPAs. If higher GPAs translate into a competitive advantage on the labor market, high GPA teachers may have been more successful in their initial job search, are more likely to have their preferences align with the characteristics of their current school, and therefore are less likely to search for other positions. Similarly, if high GPA teachers are more competitive on the job market, it would follow that they would be more likely to be successful in their search for another position if they were to reenter the labor market. This too is borne out by our empirical findings. It is unclear why GPA manifests in this manner. One possibility is that the GPA of candidates is explicitly known (via transcript requests) and sought after by employers. Another alternative is that GPA is a proxy for an individuals' organization and preparation, leading to more strategic searches, more successful interviews, and more job offers. These mechanisms are not mutually exclusive, and both are consistent with teachers with higher GPAs having more agency and decision-making power on the teacher labor market.

The greater the number of subject fields assigned that a teacher is required to prepare for, the more likely that teacher is to search and exit the school or profession. The endogenous elements at play make understanding the practical impacts of this finding challenging, as untangling whether a teacher self-selects to take on more subject fields in hopes of accumulating a full-time job because they are a weaker teacher who wasn't able to procure a full-time position. The number of subject fields allotted to a teacher may also be a proxy for the leadership support novice teachers encounter in a school (or the lack thereof); principals who saddle novice teachers with a variety of fields to teach may also fail to provide these teachers other important supports to ensure their success early in their career (Holmes et al., 2019).

Last, teachers working in rural locales appear to be consistently more likely to seek out other positions and to move to other schools. Ostensibly, this finding results from a combination of the social challenges that may arise for young professionals living in a remote locale as well as the professional challenges associated with teaching in a rural school.

We see information deficits and asymmetries lying at the heart of the turbulent labor market activity at the close of novice teacher's first year in the classroom. First and foremost, the initial fit between teacher and school leaves lots of room for improvement, namely in closing the information gaps that exist in the job search process. Currently, novice teachers struggle to find information on schools and districts, relying on limited student-teacher experiences and a small professional network (Cannata, 2010). To remedy this problem, schools can better inform potential teachers about who/what they are (i.e., describe work culture, mission statements and visions in action, neighborhood and community culture, etc.). In addition, educator preparation programs would better prepare students by teaching them about different types of schools and labor market strategies. As it stands today, systems are in place for employers to learn about teacher candidates (e.g., TeacherMatch, Gallup Insight, Haberman, application forms) but there are not similar systems for teachers to learn about districts and principals. Another way in which initial teacher-school fit may be improved is with teacher candidates taking intentional time to

reflect on what they want in a position and to do their own research on the schools and principals where they plan to apply.

The limitations of this research include information that was not accessible (i.e., specific types of labor market groups and qualitative data on teacher's motives). Our study was not able to capture involuntary movers (e.g., teacher surplus, teacher employment termination) or teachers leaving their professions for personal reasons (e.g., unable to work professionally with principal, spousal job relocation). Another type of teacher applicant we were unable to identify, but suspect is in our data, are individuals who applied to teaching positions as a "back-up" job, while they searched for a position outside of education. These types of applicants would not be committed to or interested in teaching, even though they would reenter the teacher labor market and continue to search for positions. Any applicants in this scenario would corroborate the notion that preference alignment is not predictive of final job search behavior if an applicant has already decided to quit the profession. Overall, our findings provide valuable understandings and insights for school leaders and novice teachers, adding nuance to our understanding of the nature of the teacher labor market.

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