Looking Back and Moving Forward: COVID-19's Impact on the Teacher Labor Market and Implications for the Future

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Throughout the COVID-19 pandemic teachers reported high levels of stress and burnout, raising concerns about a potential increase in teacher turnover and future teacher shortages. We use administrative data from the 2018 to 2019 through 2022 to 2023 school years to examine how the pandemic affected teacher turnover in Arkansas. We find relatively stable turnover entering the 2020 to 2021 and 2021 to 2022 school years but an increase of 5 percentage points (20%) over pre-pandemic levels entering the 2022 to 2023 school year, representing both higher rates of transitions out of the education sector but also more likely movements to other positions outside regular teaching within the education sector. Importantly, we also find significant heterogeneity in turnover by teacher and school characteristics suggesting a decline in aggregate teacher quality, diversity, and experience. These results suggest potential lasting effects on the composition and quality of the teacher labor force.

Keywords: *teacher turnover, teacher retention, COVID-19*

THE COVID-19 pandemic was a trying period for teachers. After nationwide school closures during the spring of 2020, schools reopened in the fall using combinations of in-person, hybrid, and remote learning models. Teachers had to adapt to unexpected working conditions, teaching in unprecedented ways, using synchronous and asynchronous instruction, while also being challenged to establish connections with students, families, and colleagues. Health concerns added to the mix as some teachers went back to in-person education despite the lack of a vaccine and uncertainty surrounding COVID-19 transmission in schools.

These significant changes in teacher working conditions during the 2020 to 2021 school year coincided with increased levels of burnout, stress, and considerations of leaving the profession among teachers (Diliberti et al., 2021; Pressley, 2021; Zamarro et al., 2021), leading to concerns about widespread increases in teacher turnover. While these concerns of increased turnover did not manifest into actual increases during the first pandemic school year (Bacher-Hicks et al., 2021; Bastian & Fuller, 2021; Camp et al., 2022; Goldhaber & Theobald, 2022a), two papers, studying data from North Carolina and Washington State, respectively, have found large (relative to pre-pandemic levels) increases in turnover entering the 2022 to 2023 school year (Bastian & Fuller, 2023; Goldhaber & Theobald, 2023), documenting the potential staffing challenges that school districts could face moving forward.

The uncertainty surrounding the stability of the teacher workforce is concerning, particularly in the context of COVID learning loss. American students experienced significant losses relative to

what they would have been expected to learn during the COVID-19 pandemic (Goldhaber et al., 2022). The estimated lifetime impact of these losses, if not addressed, is estimated to result in a 5.6% reduction in students' lifetime earnings and 100 billion dollars in lost GDP for Arkansas alone (Hanushek, 2023). While districts throughout the nation are working to address these learning losses with innovative and ambitious educational interventions, the implementation of these interventions has been marred by challenges including limited staff capacity (Carbonari et al., 2022). Not only are teachers the largest school-based factor contributing to students' academic success (Gershenson, 2021), but teachers are often the individuals responsible for implementing the interventions that will be needed to address COVID-related learning losses. As such, increased attrition from the profession or changes in the composition of the teacher workforce during the COVID-19 pandemic may have lasting impacts on both the teacher labor market and student's academic outcomes.

In this paper, we use administrative data from Arkansas to investigate teachers' mobility and attrition before and 3 years after the start of the pandemic. Our paper contributes to the emerging literature on teacher turnover in several important ways. First, we describe patterns of teacher turnover in a different context than other recent papers. Arkansas is a rural, southern state that shares many commonalities with its neighbors, but that is distinct from states studied in other COVID-19 era teacher turnover papers.

In contrast to other states where turnover has been documented, Arkansas required school districts to offer 5 days of in-person learning at the beginning of the 2020 to 2021 school year. As a result, in-person instruction was more prevalent than in many other states, although remote and hybrid options were offered by nearly all districts. Arkansas also differs from previously studied states because it had a robust system of alternative preparation programs and licensure waivers before the pandemic. In contrast, evidence from Massachusetts and New Jersey indicates that the creation of licensure waivers and alternative pathways into the teaching profession in response to the COVID-19 pandemic may have led to an increase in the diversity of the

teaching workforce (Bacher-Hicks, Chi, Tichnor-Wagner, & Baloch, 2023; Backes & Goldhaber, 2023). Arkansas offers a different and informative context in which to study the evolution of teacher labor markets following the pandemic.

Second, we provide a more in-depth analysis of patterns of turnover and factors associated with it than previous studies. For example, we are among the first to examine mid-year turnover, which may be a proxy for teacher dissatisfaction or burnout. Our rich statewide administrative data also allow us to observe the specific roles that teachers take when they leave the classroom but remain employed within the public education sector. Being able to distinguish between exits from the public education sector and switches to non-teaching roles is important not only because it helps us more accurately capture transitions out of the classroom but also because teachers who are still working within the education sector might be more likely to return to the classroom in the future.

Additionally, nearly all prior studies examining teacher turnover during the COVID-19 pandemic provide only aggregated descriptive patterns of turnover. While these results offer valuable insights, they are unable to fully examine heterogeneous patterns of teacher turnover depending on teacher characteristics (e.g., minoritized teachers and teachers at different stages of their careers) and do not provide insights into which factors moderate teacher turnover and how their influence might have changed after the pandemic.

We add to the literature by more thoroughly investigating the factors associated with teacher turnover and how their influence changed during the pandemic, including both traditional factors identified in the pre-pandemic literature as well as transitory pandemic-specific drivers like the effects of instruction modality and changes in modality during the pandemic. While prior research has documented the consequences of remote and hybrid learning on student outcomes, less attention has been paid to understanding how these unexpected job demands affected teachers.

Finally, we also provide insights on potential long-lasting changes in the composition of the teacher labor force that could lead to challenges in the future such as how changes in teacher

turnover relate to teacher quality. Differential attrition of high-quality teachers during the pandemic could result in significant shifts in aggregate teacher quality that could hinder student recovery. Identifying changes in the retention rates across the teacher quality distribution is crucial to developing policy aimed at promoting access to effective teachers. Overall, our paper contributes a more in-depth analysis of teacher labor market transitions during the pandemic and factors associated with such transitions which could better help inform policy as states navigate the recovery.

Our results show that, despite the different contexts, patterns of turnover appear remarkably similar to those observed in Washington State and North Carolina. In Arkansas, we observe little evidence of increases in teacher turnover outside of normal levels entering the 2020 to 2021 or 2021 to 2022 school years, but an increase in teacher turnover of 5 percentage points entering the 2022 to 2023 school year.

However, our work offers additional insights as it shows that this increase can largely be explained by both an increase in those leaving the Arkansas education workforce entirely and an increase in the proportion of teachers switching to non-instructional roles. We also find that these increases are not uniformly distributed across teacher or school characteristics and that increased attrition from the education workforce may have lasting impacts on the teacher labor force and, consequentially, student's academic outcomes. Specifically, we find that more experienced teachers, Black teachers, and higher value-add teachers became more likely to exit the teacher workforce during the pandemic. We also find that increases in turnover can be partially explained by instructional mode during the 2020 to 2021 school year, indicating that job stressors during the pandemic may have contributed to teachers' decisions to leave. Together, our results highlight changes in the diversity and aggregate quality of the teacher workforce that previous papers have been unable to isolate.

Literature Review and Study Context

Teacher Turnover Before COVID-19

Research has demonstrated the adverse effects of teacher turnover on both student achievement (Ronfeldt et al., 2013), as well as schools' finances (Barnes et al., 2007; Birkeland & Curtis, 2006; Milanowski & Odden, 2007). Consequently, a substantial body of literature that predates the pandemic has delved into the factors associated with teacher turnover (see, e.g., Borman & Dowling, 2008; Nguyen et al., 2020 for meta-analytic syntheses of this literature). This body of work has extensively investigated three primary factors influencing turnover: teacher characteristics and qualifications, characteristics of schools' work environments, and external conditions such as local labor market opportunities or policy factors.

In terms of teacher characteristics, the literature indicates that older teachers appear to have a higher likelihood of leaving teaching (Nguyen et al., 2020). However, findings regarding the relationship between turnover and gender are less conclusive. While the meta-analysis by Borman and Dowling (2008) found a positive association between being female and leaving the teaching profession, a more recent meta-analysis by Nguyen et al. (2020) reports null results. Concerning teachers' race and ethnicity, earlier research suggested that white teachers generally experience higher turnover rates (Borman & Dowling, 2008). However, Nguyen et al. (2020) challenge this notion, showing that, conditional on other factors, Black teachers appear no more or less likely to turnover than white teachers. Regarding teacher qualifications, those teachers with higher scores in university entrance exams or those teaching in STEM or special education fields seem to have higher rates of turnover (Nguyen et al., 2020).

The existing research has also underscored the relationship between teacher turnover and school demographics and work environments, emphasizing the relative importance of school working conditions, independently of student body characteristics (see., e.g., Allensworth et al., 2009; Johnson et al., 2012; Kraft et al., 2016; Ladd, 2011). In this respect, principal quality and administrative support have also been identified as important predictors of teacher retention (see, e.g., Boyd et al., 2011; Grissom, 2011; Kraft et al., 2016; Ladd, 2011; Marinell & Coca, 2013).

Finally, an emerging literature sheds light on the potential impact of local labor market

conditions on teachers' hiring, retention, and quality of the teacher labor force. Nagler et al. (2020), for instance, leverage variation in business cycle conditions in Florida at the start of teachers' careers as a source of exogenous variation in the outside labor options. Their study then explores the causal effect of local labor market conditions on the quality of teachers entering and leaving the profession. Their findings reveal that teachers with higher contributions to students' test scores (i.e., higher value-added teachers) were more likely to be hired during recessions but were also more likely to leave the profession in subsequent years.

Teacher Turnover Since COVID-19

The COVID-19 pandemic affected many of the same factors that researchers have long found to be associated with teacher turnover such as working conditions and local labor markets. Additionally, individual teacher characteristics, such as age, were also correlated with COVID-19 health risks. Given the potential for the pandemic to impact teacher turnover, researchers began to monitor the teacher workforce using surveys. Unsurprisingly, teachers' levels of stress and burnout were high at the beginning of the pandemic, raising concerns about a potential increase in teacher turnover and future teacher shortages (Goldberg, 2021; Lavery, 2020). Kraft et al. (2021) document how teachers' sense of success dramatically declined in the initial months of the pandemic, especially for teachers in schools with less supportive working environments. Diliberti et al. (2021) use nationally representative data from the RAND American Teacher Panel and note that most teachers who left the profession after March 2020 and before their scheduled retirement cited COVID-19 as a major reason why.

Similarly, Zamarro et al. (2021) use data from the RAND American Teacher Panel and document how teachers' considerations of leaving the profession increased during the first year of the pandemic. Zamarro and coauthors find that approaching retirement age (i.e., being 55 or more years old), having to change instructional modes, COVID-19-related health concerns, and high levels of job-related burnout all were significantly associated with a higher probability of considering leaving or retiring. Hybrid teaching was also associated with increased consideration of leaving because of COVID. While teacher considerations to leave may be only weakly predictive of actual teacher turnover in the following year (Nguyen et al., 2022), considerations of leaving the teaching profession may manifest into turnover 2 and 3 years later (Harbatkin et al., 2023).

As state-level administrative data became available, an emerging literature began to document actual teacher turnover changes during the pandemic. Analyses of statewide data from Arkansas, Massachusetts, North Carolina, South Carolina, and Washington State indicate that teacher turnover was slightly lower entering the 2020 to 2021 school year than in previous years (Bacher-Hicks, Chi, & Orellana, 2023; Bastian & Fuller, 2023; Camp et al., 2022; CERRA, 2022; Goldhaber & Theobald, 2022a). This decrease in teacher turnover during the early pandemic period is consistent with the research finding that teacher turnover tends to be lower when unemployment is high (Goldhaber & Theobald, 2022b). As the national economy began to recover, however, teacher turnover began to increase. Entering the 2021 to 2022 school year, overall teacher turnover increased by 2 percentage points (10%) in Arkansas, 2.7 percentage points (18%) in Massachusetts, 2.3 percentage points (23%) in North Carolina, and 2.5 percentage points (16%) in Washington State relative to the previous school year (Bacher-Hicks, Chi, & Orellana, 2023; Bastian & Fuller, 2023; Camp et al., 2022; Goldhaber & Theobald, 2022a).

Analyses of administrative data for the 2022 to 2023 school year raise concerns of looming increases in teacher turnover. In North Carolina, teacher turnover increased by 4.4 percentage points (39%) relative to the 2019 to 2020 school year, and much of this increase appears to be driven by teachers leaving mid-year (Bastian & Fuller, 2023), potentially due to high levels of job-related stress (Diliberti et al., 2021; Zamarro et al., 2021). Similarly, entering the 2022 to 2023 school year, teacher turnover in Washington State reached its highest level in nearly 40 years with turnover most pronounced in high-poverty schools (Goldhaber & Theobald, 2023). Using a nationally representative survey of district leaders, Diliberti and Schwartz (2023) find that

principals' reported levels of teacher turnover have increased by approximately 4 percentage points relative to pre-pandemic levels and that leaders in high-poverty districts, urban districts, and districts serving a high proportion of minoritized students reported the highest levels of turnover.

These changes in teacher turnover, however, did not affect all schools, and all students, equally. Turnover in high-poverty schools decreased more than in affluent schools entering the 2020 to 2021 school year before returning to levels in line with (Bastian & Fuller, 2021; Goldhaber & Theobald, 2022a) or slightly lower than (Bacher-Hicks, Chi, & Orellana, 2023) pre-pandemic turnover. Similarly, turnover in schools serving high proportions of minoritized students initially declined entering the 2020 to 2021 school year before rebounding to pre-pandemic levels at the beginning of the 2021 to 2022 school year in Massachusetts and North Carolina (Bacher-Hicks, Chi, & Orellana, 2023; Bastian & Fuller, 2021). These changes appear to be driven both by teachers moving between schools within states and by teachers leaving state teacher workforces.

Turnover also varied by teacher characteristics. In both Massachusetts and North Carolina, the turnover rate among minoritized teachers decreased entering the 2020 to 2021 school year before increasing to levels higher than pre-pandemic at the start of the 2021 to 2022 school year (Bacher-Hicks, Chi, & Orellana, 2023; Bastian & Fuller, 2021). In contrast, turnover for Black teachers increased entering both the 2020 to 2021 and 2021 to 2022 school years in Arkansas (Camp et al., 2022). These increases, if continued, could lead to a loss of diversity in the teaching workforce which, given the evidence supporting teacher–student race match effects (Gershenson et al., 2022), would disproportionately harm minoritized students. Similarly, in Massachusetts and Washington State, turnover among early career teachers rebounded to levels higher than pre-pandemic entering the 2021 to 2022 school year after modest first declines entering the 2020 to 2021 school year (Bacher-Hicks, Chi, & Orellana, 2023; Goldhaber & Theobald, 2022a), raising concerns about the long-term stability of the teacher workforce.

The Arkansas Context

Located in the south central United States and with a population of just over 3 million, Arkansas is a mid-size state in the country. From 2017 to 2018 through 2022 to 2023, there were approximately 31,500 teachers and 490,000 students in the state's public school system each year. Like the national teacher workforce, most teachers in the state are female (77%) and white (87%). The proportion of teachers using some form of licensure waiver[1] increased from 6% in 2017 to 2018 to 8% during the 2021 to 2022 academic year. The Arkansas Department of Education identifies teacher shortage areas based on the number of teachers who are either unlicensed or not licensed for the courses that they teach working in Arkansas public schools. According to this classification, most geographical teacher shortage areas in the state are in the Lower Delta region (southeast), followed by the Southwest and Upper Delta regions (northeast) (Arkansas Department of Education, 2020).

As in most other states across the United States, in March 2020, schools in Arkansas closed for in-person attendance, and students moved to remote learning for the rest of the academic year with the hope of containing the pandemic. Schools started to reopen in the fall of 2020 using different combinations of in-person, remote learning, and hybrid models. In contrast with many other states in the country, Arkansas's secretary of education issued guidance on August 5th, 2020, requiring all school districts in the state to offer in-person learning instruction 5 days a week when classes resumed later that month. Decisions about whether a school could close for in-person learning and pivot to remote learning options had to be made in collaboration with the Arkansas Department of Health and Education (Arkansas Division of Elementary and Secondary Education, 2020). As a result, most districts in Arkansas (84%) offered fully in-person learning for all students in mid-September 2020. No districts were fully remote at that time. However, changes in teaching modality were frequent with 45% of Arkansas teachers teaching in a district that changed modalities at least once during the 2020 to 2021 academic year.

Arkansas is not unique in requiring that schools offer in-person learning. Governors in

three other states (Florida, Iowa, and Texas) issued similar orders by September 2020. Together, these states account for nearly one in five public school students and teachers in the United States. However, a lack of in-person learning mandates in other parts of the country did not mean that remote learning was the norm. Throughout much of the country, reopening decisions were left to individual districts with significant variation in terms of which districts offered in-person learning and which did not (Grossmann et al., 2021). Similarly, while districts in Arkansas were mandated to provide in-person learning options, virtually all districts also offered hybrid or remote options. As a result, in October of 2020, 62% of Arkansas students attended school in-person, 25% remote, and 13% via a hybrid modality (Arkansas Department of Education, 2023). While comparisons to other contexts are hindered by data availability, estimates using cell phone data indicate that approximately 50% of students nationally were attending school in-person at that same time (Parolin & Lee, 2021). Therefore, although Arkansas provides a different context to study teacher turnover during the pandemic, the state is still representative of multiple areas in the country.

Data

To examine teachers' mobility and attrition in Arkansas, we use administrative data maintained by the Office of Education Policy and the Department of Education Reform at the University of Arkansas. These data cover the universe of traditional public and charter school teachers for the 2013 to 2014 through the 2022 to 2023 school years and allow us to track individuals throughout their time in the Arkansas education workforce.

We identify teacher turnover using these longitudinal data. We define an individual as a teacher in an Arkansas school if they serve as a teacher of record for one or more classes at that school or serve as a special education inclusion teacher for one or more classes. For teachers assigned to multiple schools (e.g., music teachers who may split time between buildings), we associate these teachers with up to four separate schools within a district each school year. We then construct a categorical variable representing employment decisions for each teacher at the start of each school year.

We distinguish between four possible employment decisions. If a teacher remains in an instructional role at their current school(s), we consider them a "Stayer." If a teacher begins teaching at a school within the same district or in a different district but remains in the Arkansas teacher labor force, we categorize the teacher as a "Mover." If an individual ceases to teach in an Arkansas school but continues to be employed in the public education workforce (e.g., as a principal or instructional coach), we classify them as a "Switcher" while if the teacher exits the state's public education workforce entirely, they are considered an "Exiter." Teacher turnover is measured by aggregating Movers, Switchers, and Exiters within the Arkansas teacher labor force.

As labor transitions may vary for teachers in STEM subjects or those who teach special education (Nguyen et al., 2020), we identify STEM and special education teachers based on the subject area of courses they serve as teachers of record for. These administrative data also include the teacher's date of birth, race, gender, years of teaching experience, and if they hold an advanced degree (master's, specialists' degree, etc.) as recorded by district personnel for pre-pandemic years 2018 to 2019 and 2019 to 2020 and for pandemic years 2020 to 2021 to 2022 to 2023.

For our analyses, described below, we merge these data with several other sources. We first merge our data with information from the Arkansas Department of Education's Data Center and the Common Core of Data from the National Center for Education Statistics to create variables representing the demographic composition of each school's student body, enrollment, grade levels served, discipline rates, average teacher experience, and urbanicity.

To examine changes in the quality of the Arkansas teacher workforce, we merge teacher-level test-based value-added scores as provided by the Arkansas Department of Education through their partnership with the Office of Innovation for Education. These value-added scores were estimated using a mixed model approach controlling for up to four prior achievement scores and the student's English-language proficiency level. Due to testing cancelations in the 2019 to 2020 school year, we match

value-added scores only for the 2017 to 2018, 2018 to 2019, and 2020 to 2021 school years, which are then used to study teacher labor market transitions entering the 2018 to 2019, 2019 to 2020 and 2021 to 2022 school years.

Changing instructional mode (e.g., switching to remote or hybrid learning) and teaching via hybrid instruction have been associated with increased intentions to leave current teaching positions (Zamarro et al., 2021). To explore the association between these factors and actual turnover, we use a measure of effective in-person learning (EIPL) created by Kurmann and Lalé (2021), which is constructed using both information on reported school learning modes (from surveys and official websites) as well as cell phone data.[2] The EIPL measure represents the proportion of the 2020 to 2021 school year that students were exposed to in-person learning and allows us to identify correlations between teacher turnover and the rate of "in-personness" during the 2020 to 2021 school year.

Abrupt but infrequent school closures may also contribute to teachers' dissatisfaction and intentions to leave. These closures would not be well captured by the yearlong EIPL average. To explore the relationship between changes in the mode of instruction and turnover, we use data from the American Enterprise Institute's Return to Learn (R2L) tracker, which contains a weekly record of the primary instructional mode used by districts. Using these data, we construct a variable[3] indicating if the district changed the mode of instruction (i.e., switched to remote or hybrid learning) at any point during the 2020 to 2021 school year. We exclude changes to remote

instruction that coincide with major holidays (e.g., Thanksgiving and Christmas).

Analytic Strategy

Using the data described above, we first study patterns of teacher turnover during the 2014 to 2015 to 2022 to 2023 academic years to see how teachers' mobility and attrition might have changed during the pandemic. To gain further insight into how factors established by the existing teacher turnover literature relate to teacher turnover and how their relationship might have been affected by the pandemic, we use discrete-time hazard models. For this analysis, we focus on the 2018 to 2019 to 2022 to 2023 school years where, as explained above, we have information on all explanatory variables used in the analysis.

Our primary analysis explores factors relating to possible employment decisions (e.g., Stayer, Mover, Switcher, and Exiter) using a multinomial logit discrete time hazard model following (1), below. In this specification, Y_{ikt} is the employment decision made by teacher i in school k entering year t. The vector γ_{ikt} includes individual characteristics of teacher i in year t at school k that the literature has found may relate to labor transitions such as race, gender,[4] indicator variables for different age groups, indicator variables for levels of experience (less than 5 years and more than 24 years[5]), an indicator for holding an advanced degree (MA or higher), an indicator for serving as a teacher of record for one or more STEM courses, and an indicator for serving as a teacher of record for a special education course or serving as a special education inclusion teacher.

$$\Pr\left(Y_{ikt} = j \mid \gamma_{ikt}, \theta_{ikt}, \ln(s_{ikt})\right) = \frac{\exp\left(\left[\gamma'_{ikt}\beta^j_{0P_t} + \theta'_{ikt-1}\beta^j_{1P_t} + \beta^j_{3P_t}\ln(s_{ikt})\right]\right)}{\sum_{l=1}^{4}\exp\left(\left[\gamma'_{ikt}\beta^l_{0P_t} + \theta'_{ikt-1}\beta^l_{1P_t} + \beta^l_{3P_t}\ln(s_{ikt})\right]\right)} \tag{1}$$

$$\text{where } j = \begin{cases} 1 \ \textit{Stayer} \\ 2 \ \textit{Mover} \\ 3 \ \textit{Switcher} \\ 4 \ \textit{Exiter}. \end{cases}$$

School and district characteristics for teacher i in school k during year $t-1$ are captured by the vector θ_{ikt-1} to proxy for working conditions.

These include the demographic composition of the student body (i.e., the percentage of the school that is non-white and percent qualifying

for free- or reduced-price lunch), the school pre-pandemic number of discipline infractions per student measured during the 2018 to 2019 school year,[6] average teacher experience in the school last year, urbanicity, and grade level span (i.e., elementary school, middle school, and secondary school). As teacher retention may be directly related to changes in student enrollment, we also include the percentage point change in enrollment at school k from year $t-1$ to t. We additionally include as $\ln(s_{ikt})$ the natural log of the length of time (in years) that teacher i has taught at school k entering year t. To further study the relationship between pandemic-specific factors and teacher turnover we use an augmented version of the model specified in Equation (1) as we explain further in the next section.

Lastly, to study how the influence of these factors might have changed during the pandemic, we estimate separate effects by time period (P_t) by fully interacting all variables with indicators for four time periods—pre-COVID (2018–2019 and 2019–2020 school years), and the 2020 to 2021, 2021 to 2022, and 2022 to 2023 school years. We report our results as group-average marginal effects, which help us avoid issues of interpreting estimates in our fully interacted models (Ai & Norton, 2003). We test statistically significant differences between marginal effects estimated for the pre-COVID period and during-COVID periods using standard errors obtained via the delta method.

Results

Descriptive Trends in Teacher Turnover Before and During the Pandemic

Figure 1 shows Arkansas teacher turnover and retention from the 2014 to 2015 through 2022 to 2023 school years. For context, 1% of the Arkansas public school teacher workforce corresponds to approximately 315 teachers. As a result, a 1 percentage point increase in the proportion of Exiters would correspond to an additional 315 teachers leaving the education sector statewide. If in-state educator preparation programs were expected to prepare and certify enough teachers to replace this increase in attrition, they would need to increase their yearly output of certified individuals by at least 20%.

Before the pandemic, on average, 22% ($N=6,800$) of teachers either moved schools, switched to a non-instructional role, or exited the Arkansas public school workforce entirely. This turnover rate is somewhat variable, however, and ranges from a low of 20.1% in 2019 to 2020 to a high of 24.4% in 2015 to 2016.[7] Among those that left their teaching positions, nearly half would transfer to teach in another school or district in the state and approximately half would exit the Arkansas education workforce entirely. A small percentage (between 2% and 2.6% of teachers) would transition into a non-instructional role within the Arkansas education sector. We see that moving between schools and switching to non-instructional roles were the most stable forms of turnover during the pre-pandemic period and that higher or lower turnover in any given year was largely driven by exits from the Arkansas public education workforce.

During the first 2 years of the COVID-19 pandemic, the overall turnover rate among Arkansas teachers remained within these historic bounds. However, the composition of turnover does appear to have changed. Interestingly, as compared to the pre-pandemic average, a smaller proportion of individuals appears to exit the public school workforce and a higher proportion appears to move between schools or districts. While the proportion of teachers switching to non-instructional roles in the 2020 to 2021 school year was in line with pre-pandemic norms, there appears to be a relatively large increase in switchers entering the 2021 to 2022 school year. Compared to the pre-pandemic average, the rate of switchers increased by 0.9 percentage points (a 39% relative increase), which corresponds to an additional 280 teachers exiting the classroom for a non-instructional role statewide during the 2021 to 2022 school year.

Three years after the start of the pandemic, however, we observe increased turnover that exceeds the highest turnover pre-pandemic year in Arkansas since at least the 2014 to 2015 school year. Entering the 2022 to 2023 school year, approximately one-quarter of prior-year teachers were no longer teaching in the same school. Compared to pre-pandemic trends, this increase represents an additional 1,000 teachers who no longer remain teaching in the same school from year to year and appears to be driven largely by
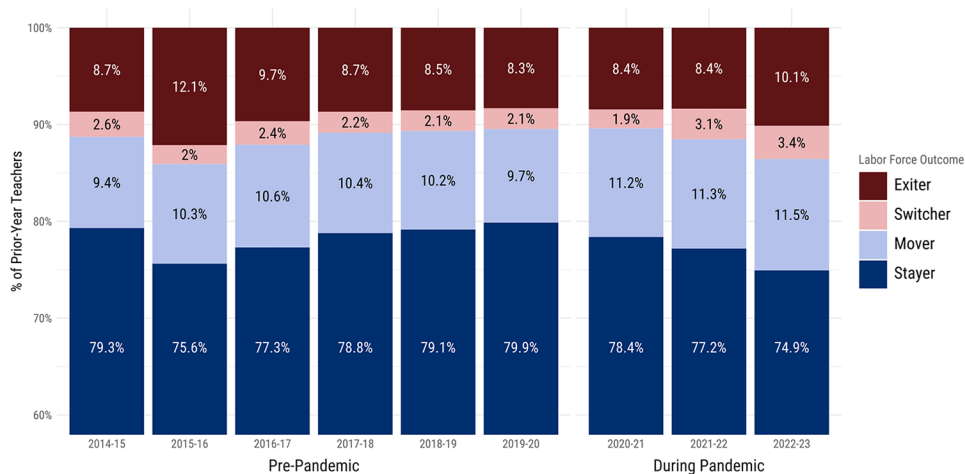
FIGURE 1. *Arkansas teacher turnover: all teachers.*

increased exits from the Arkansas education workforce and increased switches to non-instructional roles. While before the pandemic 2.2% (*N* = 700) of Arkansas teachers exited the classroom for these non-instructional positions each year, 3.4% (*N* = 1,071) of Arkansas teachers made this switch entering the 2022 to 2023 school year.

It may seem counterintuitive that overall teacher turnover did not increase much entering the 2020 to 2021 and 2021 to 2022 school years when schooling disruptions and health concerns were especially prevalent yet did increase entering the 2022 to 2023 school year as schooling conditions began to normalize and an effective vaccine was widely available. While there is no conclusive explanation for this phenomenon, several possible explanations exist. First, by the spring of 2022, many school districts had begun to create new positions that teachers may have switched into (Institute of Education Sciences, 2022). These new, potentially non-teaching, positions may have offered teachers whose salary was primarily set by a single salary schedule an opportunity for a raise or career advancement that they would not have if they stayed in the classroom.

Second, conditions in the overall labor market (which includes opportunities outside of the education sector) began to recover quickly after initial COVID-19-related shutdowns and layoffs. In April 2020, when many teachers were considering whether to continue teaching during the 2020

to 2021 school year, there were approximately five unemployed persons per job opening (U.S. Bureau of Labor Statistics, 2023). In response, many teachers may have preferred the stability of their teaching career instead of contending with a highly competitive labor market. By April 2021, the ratio of unemployed persons to job openings had shrunk to a level slightly above pre-pandemic levels. However, by April of 2022, this ratio had fallen to the lowest level on record. During this time, as teachers were considering whether or not to return to the classroom in the following year, there were approximately two job openings for every unemployed person (U.S. Bureau of Labor Statistics, 2023). Teachers who previously held off on changing careers due to uncertainty in the overall labor market may have responded to these favorable conditions by finally exiting the education sector.

Third, surveys of teachers during the winter of 2022 indicate consistently lower levels of well-being than other adults working outside of the education sector and higher levels of job-related stress (Steiner et al., 2022). Teachers experienced increasing challenges in meeting the academic, social, and emotional needs of their students following the COVID-19 pandemic. These increased strains, if not met by appropriate supports, could lead to increased levels of burnout (Demerouti et al., 2001), which could then increase teachers' dissatisfaction and intentions to leave the profession (Skaalvik & Skaalvik, 2020).
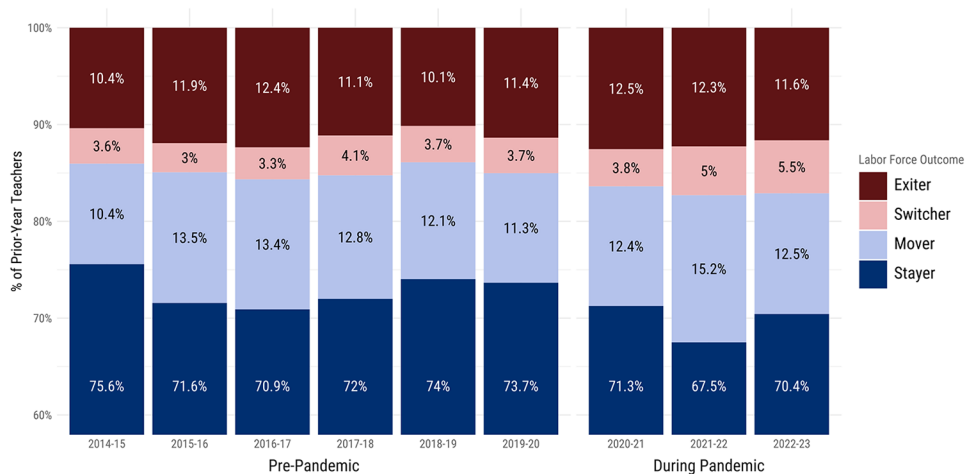
FIGURE 2. *Arkansas teacher turnover: Black teachers.*

Given available research showing the benefits of a diverse teacher workforce (Dee, 2005; Gershenson et al., 2022), in Figure 2, we similarly compare the turnover of teachers before and during the pandemic, this time with a focus on Black teachers. Here, we see that even before the pandemic, the highest retention rate for Black teachers was about the same as the lowest retention for teachers overall. This result is in line with prior literature documenting the challenges of maintaining a diverse teaching workforce (Goldhaber & Mizrav, 2021). Overall, the turnover rate for Black teachers in the state averaged 27% pre-pandemic with a low of 24.4% in 2014 to 2015 and a high of 29.1% in 2016 to 2017. While there is more variability in terms of what drives this turnover, we see proportions of Exiters and Movers for Black teachers that are generally comparable with overall teacher turnover in the state. However, we see that a higher proportion of Black teachers transition to non-instructional roles than the general teacher population during this period.

During the pandemic school years, rates of turnover for Black teachers appear to have sharply increased compared to the pre-pandemic school years that we observed. The retention rate in 2021 to 2022 reaches a low of 67.5%, which is nearly 10 percentage points lower than the retention rate for all teachers during that same year. The increase in turnover among Black teachers during the pandemic appears to be driven primarily by increased movements between schools and increased switches to non-instructional roles. The proportion of Black teachers exiting the profession was only about 1 percentage point higher (e.g., an additional 30 Black teachers exiting the education sector) during the pandemic years as compared to the pre-pandemic average. In contrast, the rate of Black teachers switching to non-instructional roles increased from 3.6% in the pre-pandemic period to 6% (approximately 85 additional Black teachers leaving the classroom) in the 2022 to 2023 school year. Similarly, while the rate of moving between schools among Black teachers did not change much entering the first pandemic school year (2020–2021), we see an increase in the proportion of Black teachers changing schools of nearly 3 percentage points in the 2021 to 2022 school year before returning to pre-pandemic levels entering the 2022 to 2023 school year.

Given the increased prevalence of switches to non-instructional roles entering the 2021 to 2022 and 2022 to 2023 school years, we explore the types of roles teachers who leave the classroom but remain in the public education sector take in Figure 3. Here, we document changes in roles for the 1,728 individuals who were teachers during the 2020 to 2021 school year but switched to a non-instructional role entering either the 2021 to 2022 or 2022 to 2023 school year. Of these former teachers, we see that a plurality (41%) transition into an instructional leadership role (e.g.,
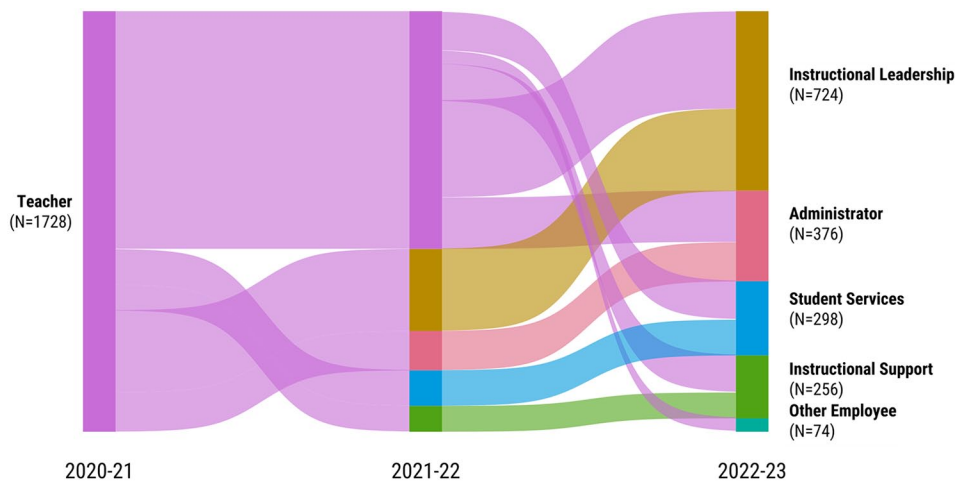
FIGURE 3. *Role changes for teachers remaining in the public education sector.*

interventionalists, content area specialists, and instructional facilitators). Approximately 20% of these former teachers leave the classroom to serve as building- or district-level administrators while 15% become instructional support (e.g., paraeducators, substitute teachers, etc.). The remaining 24% of former teachers who leave the classroom assume roles as other employees such as guidance counselors, front office staff, technology coordinators, and transportation supervisors. Interestingly, the total number of positions (e.g., headcount) for most instructional and non-instructional roles has remained relatively unchanged since the start of the pandemic. However, there has been a marked increase in the number of instructional leader positions. Based upon the individual-level data we use for our primary analysis, there was a 32% increase in instructional leader positions entering the 2022 to 2023 school year relative to the 2019 to 2020 school year.

Mid-Year Teacher Turnover

Much of the discussion of teacher turnover during the COVID-19 pandemic has focused on the additional stress and dissatisfaction that teachers have reported during these difficult times. As teachers are contractually committed to working for a full school year, abnormally high levels of mid-year turnover may be indicative of this increased stress manifesting into unplanned exits from the classroom. This appears to be the case in North Carolina where the rate of mid-year turnover increased substantially during the COVID-19 pandemic (Bastian & Fuller, 2023). We explore this phenomenon by comparing employment records from mid-October and mid-February of each year in our panel. Importantly, this differs from the North Carolina analysis of mid-year turnover which examined turnover between September and May of each school year. Additionally, in this respect, the Arkansas context does differ from other states because districts hiring teachers already under contract with another district for that school year face potentially large financial penalties.[8] In this way, the teacher labor market is less fluid within the academic year than in other states.

For this analysis, Exiters are those teachers who are assigned to a school in October of a given school year but no longer appear employed by any Arkansas public school in any role in February of that same school year. Similarly, Switchers are those who begin the school year as a teacher but, at some point before the February report, switch to a non-instructional role either at the same school or at a different school. As teaching assignments may routinely vary by semester, we only consider Movers who teach in a different district in the spring than they did in the fall. We show mid-year Exiters, Switchers, and Movers as a proportion of the total teacher workforce in Figure 4.
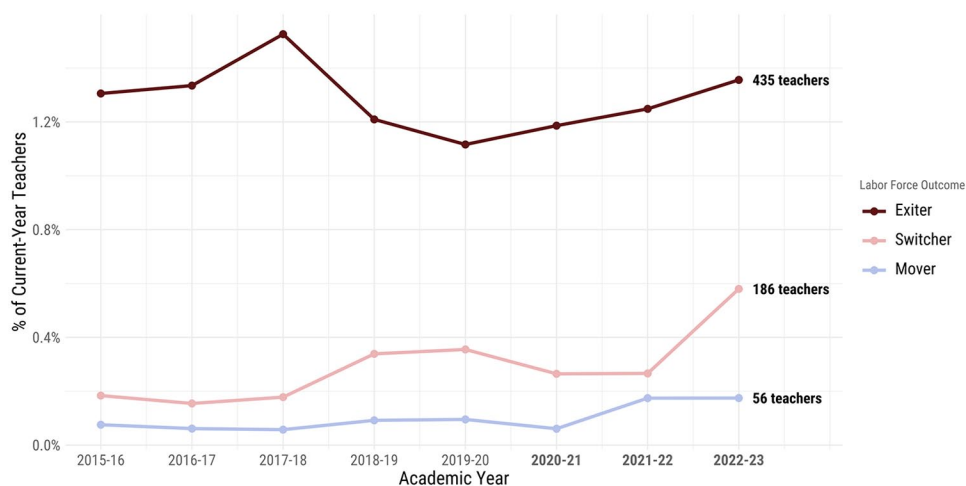
FIGURE 4. *Mid-year teacher turnover.*

Overall, we do not observe meaningful changes in mid-year exits or moves before and after the start of the COVID-19 pandemic. While there has been a slight increase in the proportion of teachers switching to non-instructional roles during the 2022 to 2023 school year, this increase represents less than a quarter of 1% of teachers statewide.

Traditional Factors Associated With Teacher Turnover Before and During the Pandemic

We next study traditional factors associated with year-to-year teacher turnover, and how they might have changed during the pandemic, by estimating discrete hazard models as described in Equation (1). Results from our primary analysis are reported in Table 1.[9] We display the association between each factor and four potential labor outcomes (e.g., Stayer, Mover, Switcher, and Exiter) separately in panels A through D. Bolded estimates in Table 1 represent statistically significant differences in the estimated coefficients as compared to pre-pandemic years. We will first describe the associations pre-COVID before exploring how these associations have changed since the start of the COVID-19 pandemic.

Although our descriptive analysis documented differences in teacher retention rates (e.g., being a Stayer) for Black teachers pre-COVID, once we control for other factors in our discrete-time hazard models, in line with the results reported by Nguyen et al. (2020), we find

that these differences are not statistically significant at conventional confidence levels as shown in panel A. However, pre-COVID we do see that Black teachers were 1.3 percentage points more likely to switch to non-instructional positions and 1.4 percentage points less likely to exit the public school workforce than white teachers, all else equal. These differences are significant at the 99.9% confidence level.

Before the pandemic, we found that teachers aged 35 to 54 were between 3 and 5 percentage points more likely to be Stayers than teachers under the age of 35 and that late-career teachers (e.g., those with more than 25 years of experience) were 3 percentage points less likely to remain in the classroom and 3.8 percentage points more likely to exit the education workforce entirely. These findings are consistent with prior literature that found that teacher retention tends to be highest among mid-career educators and lowest for early and late-career teachers (Papay et al., 2017). Also, in line with the prior literature discussed above, Special Education (SPED) teachers appear more mobile than non-SPED teachers. All else equal, SPED teachers were 4.9 percentage points less likely to remain teaching in the same school each year and 3.5 percentage points more likely to move to another school within the same district or to another district entirely. SPED teachers also were 1.6 percentage points more likely to exit the Arkansas public education sector as compared to

TABLE 1

Changes in Factors Associated with Teachers' Labor Force Outcomes

	Panel A: Stayer				Panel B: Mover			
	Pre-COVID	2020–2021	2021–2022	2022–2023	Pre-COVID	2020–2021	2021–2022	2022–2023
Teacher: Black	0.000 (0.006)	**−0.022* (0.009)**	**−0.027** (0.009)**	0.010 (0.009)	0.002 (0.004)	0.001 (0.007)	−0.006 (0.006)	**−0.018** (0.006)**
Teacher: Age 35–44	0.031*** (0.004)	0.023** (0.007)	0.040*** (0.006)	**0.051*** (0.007)**	−0.014*** (0.003)	−0.010* (0.005)	−0.018*** (0.005)	−0.007 (0.005)
Teacher: Age 45–54	0.050*** (0.005)	**0.021** (0.007)**	0.038*** (0.007)	**0.069*** (0.007)**	−0.024*** (0.003)	**−0.008 (0.005)**	−0.015** (0.005)	−0.016** (0.005)
Teacher: Age 55+	−0.029*** (0.007)	**−0.057*** (0.010)**	−0.008 (0.010)	**0.007 (0.009)**	−0.044*** (0.004)	−0.039*** (0.006)	−0.048*** (0.006)	−0.044*** (0.006)
Teacher: Early career	−0.008+ (0.005)	**−0.028*** (0.007)**	−0.001 (0.007)	−0.020** (0.007)	0.004 (0.003)	0.015** (0.005)	0.007 (0.005)	0.015** (0.005)
Teacher: Late career	−0.031*** (0.006)	−0.043*** (0.009)	−0.048*** (0.010)	−0.040*** (0.010)	−0.006 (0.005)	−0.013+ (0.007)	−0.011 (0.007)	**−0.027*** (0.007)**
Teacher: STEM	−0.001 (0.004)	−0.015* (0.006)	−0.009 (0.006)	−0.008 (0.006)	0.003 (0.003)	0.013** (0.005)	0.008+ (0.005)	0.008 (0.005)
Teacher: SPED	−0.049*** (0.006)	−0.044*** (0.008)	−0.053*** (0.008)	−0.029** (0.009)	0.035*** (0.005)	0.043*** (0.007)	**0.059*** (0.007)**	0.030*** (0.007)
School: % Non-white	−0.079*** (0.010)	**−0.017 (0.014)**	−0.103*** (0.014)	−0.099*** (0.015)	0.009 (0.007)	−0.011 (0.011)	**0.063*** (0.010)**	**0.048*** (0.011)**
School: % FRL	−0.013 (0.013)	−0.030+ (0.018)	−0.001 (0.015)	0.011 (0.018)	0.045*** (0.010)	0.031** (0.014)	0.030** (0.012)	0.022+ (0.014)
School: Enroll increase	0.336*** (0.019)	0.302*** (0.029)	**0.155*** (0.030)**	**0.240*** (0.030)**	−0.315*** (0.013)	−0.294*** (0.024)	**−0.173*** (0.023)**	**−0.184*** (0.022)**
School: Discipline rate	−0.008** (0.002)	**−0.019*** (0.003)**	−0.017*** (0.004)	−0.012** (0.004)	0.006*** (0.002)	0.012*** (0.002)	0.010*** (0.003)	0.007** (0.003)
Urbanicity: city	0.038*** (0.005)	**−0.015* (0.008)**	0.036*** (0.007)	0.051*** (0.008)	−0.016*** (0.004)	**0.022*** (0.007)**	**−0.033*** (0.005)**	**−0.032*** (0.006)**
Urbanicity: Suburb	−0.031*** (0.006)	−0.015 (0.009)	**0.015+ (0.008)**	**0.027*** (0.009)**	0.034*** (0.005)	0.021** (0.008)	**−0.011+ (0.006)**	**−0.030*** (0.006)**
Urbanicity: Town	0.013** (0.004)	**−0.020** (0.007)**	0.016* (0.007)	**−0.016* (0.007)**	−0.007* (0.003)	**0.019*** (0.006)**	**−0.023*** (0.005)**	−0.002 (0.005)
Year indicators	−0.007* (0.003)	−0.007* (0.003)	−0.024*** (0.003)	−0.049*** (0.003)		0.009*** (0.002)	0.014*** (0.002)	0.020*** (0.002)
Pseudo R^2				.112				.112
Observations				149,687				149,687

Note. Heteroskedastic robust standard errors reported. Bolded estimates are statistically significantly different from pre-COVID average marginal effects at the 95% or greater confidence level. SPED = special education; FRL = free/reduced lunch.

+$p < .1$. *$p < .05$. **$p < .01$. ***$p < .001$.

TABLE 1

Continued—Changes in Factors Associated with Teachers' Labor Force Outcomes

	Panel C: Switcher				Panel D: Exiter			
	Pre-COVID	2020–2021	2021–2022	2022–2023	Pre-COVID	2020–2021	2021–2022	2022–2023
Teacher: Black	0.013***(0.003)	0.013***(0.004)	0.015**(0.005)	0.016***(0.005)	−0.014***(0.004)	**0.008 (0.006)**	**0.017** (0.006)	−0.008 (0.006)
Teacher: Age 35–44	0.002 (0.002)	0.001 (0.002)	−0.001 (0.003)	0.000 (0.003)	−0.018***(0.003)	−0.013**(0.005)	−0.022***(0.004)	**−0.043***(0.004)**
Teacher: Age 45–54	−0.005***(0.002)	−0.002 (0.002)	−0.007*(0.003)	−0.009**(0.003)	−0.020***(0.003)	−0.011*(0.005)	−0.016***(0.005)	**−0.043***(0.005)**
Teacher: Age 55$^+$	−0.011***(0.002)	**−0.007**(0.002)**	**−0.017***(0.003)**	**−0.013***(0.003)**	0.083***(0.006)	0.103***(0.009)	0.073***(0.008)	**0.049***(0.008)**
Teacher: Early career	−0.006***(0.001)	**−0.007***(0.002)**	**−0.016***(0.002)**	**−0.014***(0.003)**	0.010*(0.003)	0.020***(0.005)	0.010*(0.005)	0.019***(0.005)
Teacher: Late career	−0.001 (0.002)	0.003 (0.003)	0.002 (0.004)	−0.007 (0.003)	0.038***(0.004)	0.053***(0.006)	**0.058***(0.007)**	**0.074***(0.008)**
Teacher: STEM	−0.001 (0.001)	−0.003 (0.002)	−0.002 (0.002)	**−0.009***(0.002)**	−0.001 (0.003)	0.005 (0.004)	0.003 (0.004)	**0.009*(0.004)**
Teacher: SPED	−0.002 (0.002)	0.001 (0.003)	**−0.010***(0.003)**	−0.004 (0.003)	0.016***(0.004)	**0.000 (0.005)**	0.004 (0.005)	0.003 (0.006)
School: % Non-white	−0.001 (0.004)	0.004 (0.005)	0.010$^+$(0.006)	0.011$^+$(0.006)	0.071***(0.007)	**0.024*(0.009)**	**0.029***(0.009)**	**0.040***(0.011)**
School: % FRL	0.005 (0.004)	0.001 (0.006)	−0.001 (0.006)	0.002 (0.007)	−0.037***(0.009)	**−0.002 (0.012)**	−0.028**(0.010)	−0.036**(0.013)
School: Enroll increase	0.000 (0.007)	−0.007 (0.010)	0.009 (0.012)	−0.021$^+$(0.012)	−0.021 (0.014)	0.000 (0.018)	0.009 (0.019)	−0.035$^+$(0.021)
School: Discipline rate	0.000 (0.001)	**0.002*(0.001)**	0.002 (0.001)	0.001 (0.002)	0.001 (0.002)	0.005*(0.002)	0.005*(0.002)	0.004 (0.003)
Urbanicity: City	0.000 (0.002)	−0.002 (0.002)	−0.002 (0.003)	−0.007*(0.003)	−0.023***(0.004)	**−0.005 (0.005)**	**−0.002 (0.005)**	−0.011$^+$(0.006)
Urbanicity: Suburb	0.001 (0.002)	**−0.008***(0.002)**	−0.002 (0.003)	−0.004 (0.004)	−0.004 (0.004)	0.001 (0.006)	−0.002 (0.006)	0.007 (0.007)
Urbanicity: Town	−0.004**(0.002)	−0.003 (0.002)	0.000 (0.003)	**0.008*(0.003)**	−0.002 (0.003)	0.004 (0.004)	0.007 (0.005)	**0.011*(0.005)**
Year indicators	−0.002*(0.001)	−0.002*(0.001)	0.009***(0.001)	0.010***(0.001)		0.000 (0.002)	0.000 (0.002)	0.019***(0.002)
Pseudo R^2				.112				.112
Observations				149,687				149,687

Note. Heteroskedastic robust standard errors reported. Bolded estimates are statistically significantly different from pre-COVID average marginal effects at the 95% or greater confidence level. SPED = special education.
$^+p < .1$. $^*p < .05$. $^{**}p < .01$. $^{***}p < .001$.

non-SPED teachers. These estimates are significant at the 99.9% confidence level.

In line with the existing literature on teacher turnover (Goldhaber, Kasman, et al., 2023), we also document a negative relationship between the probability of a teacher being retained and the demographics of students at that school. All else equal, a 10 percentage point increase in the proportion of non-white students at a school was associated with a 0.8 percentage point decrease in the probability of a teacher being retained in the pre-pandemic years. This estimate is significant at the 99.9% confidence level.

Additionally, teachers appeared to respond to factors related to working conditions as higher discipline rates were associated with decreased probabilities of retention and an increased likelihood of moving to another school. Lastly, we find different patterns of retention by urbanity in the pre-pandemic period. All else equal, teachers at urban schools were nearly 4 percentage points more likely to be retained and approximately 2 percentage points less likely to move schools or exit the education sector workforce entirely as compared to teachers at rural schools. These estimates are significant at the 99.9% confidence level.

Moving to changes in the relationship between these explanatory factors and teacher turnover during the pandemic years, we see that entering the 2020 to 2021 school year Black teachers were approximately 2 percentage points less likely to be retained (i.e., be Stayers) than white teachers in the same year or Black teachers pre-COVID. These differences are significant at the 95% confidence level. This result contrasts with research from Massachusetts and North Carolina, which found that turnover rates among minoritized teachers tended to decrease entering the 2020 to 2021 school year (Bacher-Hicks, Chi, & Orellana, 2023; Bastian & Fuller, 2021), although results from these studies are not conditional upon other factors such as school characteristics. Entering the 2021 to 2022 school year, we see that Black teachers continue to be more likely to leave their current school than either white teachers in the same school year or Black teachers pre-COVID and are nearly 3 percentage points more likely to exit the public education workforce than pre-COVID. These estimates are significant at the 95% or greater confidence level. In contrast,

entering the 2022 to 2023 school year, we see that the relationship between being Black and being a Stayer, Switcher, or Exiter has largely returned to pre-pandemic trends. However, entering the 2022 to 2023 school year, Black teachers were 1.8 percentage points less likely to move between schools as compared to white teachers, all else equal. This estimate is significant at the 99% confidence level and statistically significantly different from the pre-pandemic estimate.

Entering the 2020 to 2021 school year, when controlling for teacher experience, we find that teachers aged 55 or older were 5.7 percentage points less likely to be Stayers than teachers under the age of 35 and that this is a statistically significant change from pre-pandemic trends. Similarly, while before the pandemic teachers with more than 25 years of experience were approximately 4 percentage points more likely to exit the education sector workforce than mid-career teachers, controlling for teacher age, entering the first pandemic school year, these teachers were 5.3 percentage points more likely to exit the education sector workforce as compared to mid-career teachers. This elevated probability of late-career teachers exiting the education sector workforce as compared to mid-career teachers rose from 5.3 percentage points entering the 2020 to 2021 school year to 7.4 percentage points entering the 2022 to 2023 school year with statistically significant differences from pre-pandemic levels entering the 2021 to 2022 and 2022 to 2023 school years.

We also find evidence of decreased retention among early career teachers with fewer than 5 years of experience. All else equal, early career teachers were 2.8 percentage points less likely to be Stayers entering the 2020 to 2021 school year, and this is a statistically significant difference from pre-pandemic levels. This decrease in retention appears to be driven by an increased probability of early career teachers moving to another school and a slight increase in the likelihood of these teachers exiting the education sector entirely.

As described above, teacher attrition and retention in Arkansas public schools were also related to student demographics before the COVID-19 pandemic. During the COVID-19 pandemic, we see large changes in how school demographics relate to teacher turnover that

differed by year. Entering the 2020 to 2021 school year, we see that the relationship between the proportion of non-white students in a school and the likelihood of teachers being Stayers diminished in magnitude and became no longer significant at conventional confidence levels. This finding is in line with research from other states which found decreases in turnover at schools serving higher proportions of minoritized students entering the 2020 to 2021 school year (Bacher-Hicks, Chi, & Orellana, 2023; Bastian & Fuller, 2021). However, this decrease appears to have been temporary as, entering the 2021 to 2022 and 2022 to 2023 school years, a 10 percentage point increase in the proportion of non-white students at a school was associated with a 1 percentage point decreased probability of being retained and an approximately 0.5 percentage point increased probability of moving to another school, all else equal. These estimates are significant at the 99% confidence level. Interestingly, while the relationship between exiting the public school workforce and the proportion of non-white students was nearly one-third of the pre-pandemic level for the 2020 to 2021 and 2021 to 2022 school years, this relationship returned to two-thirds of its pre-pandemic level entering the 2022 to 2023 school year.

Teacher retention and student enrollment are naturally strongly linked as a large decline in student enrollment requires fewer teachers to maintain staffing ratios. We show that, before the pandemic, a 10 percentage point decrease in a school's enrollment was associated with a 3.4 percentage point decrease in the probability of a teacher returning to that school in the following school year. Consistent with the idea that teachers who lose employment due to changes in enrollment may still be attached to the teaching profession, the same change in student enrollment pre-pandemic was associated with a 3.2 percentage point increased probability of moving to another school and continuing in a teaching role. These estimates are significant at the 99% confidence level. While this relationship was largely unchanged entering the 2020 to 2021 school year, it was significantly attenuated entering the 2021 to 2022 and 2022 to 2023 school years. All else equal, the same 10 percentage point decrease in student enrollment was associated with a 1.6 and 2.4 percentage point lower probability of being a Stayer in 2021 to 2022 and 2022 to 2023 (55% and 30%

relative decreases), respectively, with corresponding changes in the probability of being a Mover. These results suggest that during the pandemic, schools might have become less responsive to adjusting staff needs as a response to changes in student enrollment. This could have implications moving forward if ESSER funds provided to districts were used to help fund teaching positions, given the documented enrollment declines in public schools (Dee, 2023; Dee & Murphy, 2021).

Entering the 2020 to 2021 and 2021 to 2022 school years, we also observe a large and significant change in the relationship between discipline rate (e.g., number of discipline incidents reported per student) and retention. While turnover was already negatively associated with discipline rates before the pandemic, the size of this relationship was twice as large entering these two pandemic school years. All else equal, an increase of one more discipline incident per student was associated with a 1.9 to 1.7 decrease in the probability of a teacher returning to that school to teach a subsequent year and a 1 to 1.2 percentage point increase in the probability of moving to another school. These estimates are significant at the 99% confidence level. Importantly, these discipline rates are taken from the 2018 to 2019 school year (as described in Supplemental Appendix A in the online version of the journal) to avoid changes in the nature of discipline referrals during the pandemic school year (Anderson & McKenzie, 2022). This indicates that since the start of the COVID-19 pandemic, teachers have become more likely to leave schools with existing student discipline issues.

We also see significant variability in patterns of retention by urbanicity during the pandemic. Entering the first pandemic school year (2020–2021), we see that teachers in city and town schools had a decreased probability of being retained as compared to before the pandemic. While before the pandemic teachers in urban schools were approximately 4 percentage points more likely to be Stayers than teachers in rural schools, all else equal, entering the 2020 to 2021 school year we do not observe any statistically significant difference between urban and rural teachers at the 95% or greater confidence level. By the start of the second pandemic school year, these relationships appeared to rebound with teachers in city and town schools being 3.6 and

5.1 percentage points more likely to be retained than teachers in rural schools, respectively. These estimates are significant at the 99.9% or greater confidence level. Entering the 2022 to 2023 school year, we see that, relative to teachers in rural schools, teachers in urban and suburban schools have an increased retention rate of 4 to 6 percentage points.

Lastly, the average marginal effects for year indicators in our model represent changes in turnover and retention holding the composition of the teacher workforce constant. These estimates closely match those reported in Figure 1; however, they also highlight that the likelihood of teachers being "Stayers" has consistently fallen since the beginning of the pandemic through the 2022 to 2023 school year. While the estimated marginal effect for these years has been statistically significant since the beginning of the pandemic for Stayers, Movers, and Switchers, it was not until the 2022 to 2023 school year that the probability of a teacher being an Exiter became statistically significant. This result is in-line with the relatively large increase in teacher turnover entering the 2022 to 2023 school year that we describe above and other researchers have found in Washington State and North Carolina (Bastian & Fuller, 2023; Goldhaber & Theobald, 2023).

Pandemic-Specific Factors and Teacher Turnover

We next explore the relationship between pandemic-specific factors that could help explain the patterns of teacher turnover during the pandemic that we document above. For this purpose, we use an augmented version of the multinomial logit discrete-time hazard model specified in Equation (1). As described in the data section, we explore pandemic-specific factors that could have a short-lived effect on teacher turnover. Specifically, we use two explanatory variables to explore the relationship between teacher turnover and instructional mode during the 2020 to 2021 school year. First, we use a measure of EIPL (Kurmann & Lalé, 2021) which represents the exposure to in-person learning as the fraction of total school hours that students had access to in-person learning during the 2020 to 2021 school year. Second, we use a variable indicating

if the district changed instructional mode (e.g., temporarily switching to remote or hybrid learning) during the 2020 to 2021 school year.

Importantly, as reopening plans and changes in learning modality have been found to be correlated with other characteristics of schools and districts such as local political leanings (Grossmann et al., 2021), the demographic composition of students enrolled in the school (Camp & Zamarro, 2021), and district poverty (Kurmann & Lalé, 2021; Parolin & Lee, 2021), we estimate the association between each potential explanatory factor and turnover for all years, including the pre-pandemic period. As it is impossible for shifts to remote learning during the 2020 to 2021 school year to have effects on turnover in prior years, estimates for the pre-pandemic period serve as a placebo test for these explanatory factors and provide us with information on the extent to which our estimates may reflect the influence of time-invariant endogeneity. To maximize sample size, we estimate this augmented version of Equation (1) separately for each explanatory factor and report relevant average marginal effects in Table 2.

In panel A of Table 2, we present our results for the association between EIPL and teacher turnover. Interestingly, while we find no statistically significant association between EIPL during the 2020 to 2021 school year and turnover entering the 2021 to 2022 school year, this factor is positively associated and statistically significant before the pandemic and entering the 2020 to 2021 school year, indicating that schools with higher levels of in-person learning during the 2020 to 2021 school year were those with higher levels of teacher retention both pre-pandemic and entering the 2020 to 2021 school year. In this respect, it is important to note that EIPL captures the uptake of in-person learning options and not only districts' primary learning modality. Schools with lower pre-pandemic turnover and stronger relationships with families might be expected to more effectively communicate safety measures during the pandemic which could increase participation in in-person learning (Polikoff et al., 2022). The lack of statistical significance for the EIPL measure entering the 2021 to 2022 and 2022 to 2023 school years could then be explained by either an increase in turnover among teachers who taught primarily in person

TABLE 2

Potential Explanatory Factors and Placebo Tests

| | Panel A: EIPL | | | | | Panel B: Ever changed modes | | | |
	Pre	2020–2021	2021–2022	2022–2023		Pre	2020–2021	2021–2022	2022–2023
Stayer	0.060** (0.022)	0.078* (0.033)	**−0.020 (0.033)**	0.041 (0.034)		−0.003 (0.004)	−0.013* (0.006)	**−0.040*** (0.006)**	−0.002 (0.006)
Mover	−0.044** (0.016)	−0.066* (0.026)	**0.042$^+$ (0.024)**	**0.030 (0.025)**		0.004 (0.003)	**0.018*** (0.005)**	**0.031*** (0.005)**	0.007 (0.005)
Switcher	0.007 (0.008)	−0.007 (0.011)	0.011 (0.014)	**−0.025$^+$ (0.014)**		0.000 (0.001)	0.000 (0.002)	0.000 (0.003)	0.003 (0.003)
Exiter	−0.022 (0.015)	−0.005 (0.021)	−0.034 (0.021)	−0.046* (0.023)		−0.001 (0.003)	−0.006 (0.004)	0.008* (0.004)	−0.008$^+$ (0.004)

Pseudo R^2: .167

Observations: 141,284

Pseudo R^2: .270

Observations: 124,007

Note. Heteroskedastic robust standard errors reported. Bolded estimates are statistically significantly different from pre-COVID average marginal effects at the 95% or greater confidence level. EIPL = effective in-person learning.

$^+p<.1.$ *$p<.05.$ **$p<.01.$ ***$p<.001.$

or an increase in retention among teachers who taught mostly through a hybrid or remote modality.

In panel B of Table 2, we examine the association between changing instructional modes and teacher turnover. As all districts in Arkansas were required to offer in-person learning from the beginning of the 2020 to 2021 school year, any changes in instructional mode would be temporary pivots to remote or hybrid learning in response to issues such as staffing challenges or surges in COVID-19 cases. All else equal, teachers in districts that changed instructional mode at least once during the 2020 to 2021 school year were 4 percentage points less likely to be Stayers, 3.1 percentage points more likely to be Movers, and 0.8 percentage points more likely to exit the education sector entirely entering the 2021 to 2022 school year than teachers in districts which did not change instructional mode. These estimates are significant at the 95% confidence level or higher. We find no statistically significant association between changes in instructional mode during the 2020 to 2021 school year and turnover pre-pandemic. We also observe that this association attenuates to pre-pandemic levels for turnover entering the 2022 to 2023 school year.

Changes in the Quality Composition of the Teacher Workforce

In addition to examining how patterns of teacher turnover changed in terms of teacher and student demographics, we also examine how the quality of the teacher workforce (as measured by value-added teacher contributions to student test scores) might have changed throughout the pandemic. Decreases in the quality of the teacher labor force could have important implications moving forward as schools try to accelerate student learning after the deceleration of student growth during the pandemic. Based upon changes in the composition of the teacher labor force during the Great Recession (Nagler et al., 2020), some have hypothesized that high-value-add teachers may be better retained due to the economic conditions created by the beginning of the pandemic (West et al., 2020) but empirical evidence on this issue is still lacking. To study these relationships, we adapt the multinomial discrete-time hazard model specified in Equation (1) to include both a variable indicating if a value-added

score was available for each teacher and the interaction of having a value-added score estimated with the subject-specific value-added score for that teacher. We report relevant results of this alternative specification in Table 3.

Overall, teachers in tested subjects are only slightly better retained than those in non-tested subjects, and this relationship does not change significantly during the pandemic. However, among teachers in tested subjects, before the COVID-19 pandemic, higher value-added teachers were more likely to be retained. All else equal, a one-standard deviation increase in value-add for teachers in math and English-Language Arts (ELA) was associated with a 20 and 14 percentage point increase in the probability of being a Stayer, respectively. These estimates are significant at the 99.9% confidence level and are matched by corresponding decreases in the probability of being a Mover or Exiter. However, entering the 2021 to 2022 school year we see that the association between value-add and retention for math teachers diminished by 5.9 percentage points (29.5%) with a corresponding increase in the likelihood of exiting the education sector workforce relative to pre-pandemic.

Interestingly, the positive association between high value-add and retention for English teachers increased entering the 2021 to 2022 school year, an increase that appears to be caused by a decreased likelihood of moving schools. The point estimate for the negative association between ELA value-added and the likelihood of being a Mover approximately doubles in magnitude entering the 2021 to 2022 school year as compared to the pre-pandemic period. However, like our results for math value-add, we see suggestive evidence that higher value-add ELA teachers have become more likely to exit the education sector during the pandemic as compared to pre-pandemic trends. While before the pandemic, a one-standard deviation increase in ELA value-added was associated with a 6.7 percentage point decrease in the likelihood of being an Exiter, this relationship is no longer statistically significant with a point estimate near zero entering the 2021 to 2022 school year.

Discussion and Conclusions

Since the beginning of the COVID-19 pandemic in March 2020, teachers have faced

TABLE 3

Changes in the Quality of the Arkansas Teacher Workforce

	Stayer		Mover		Switcher		Exiter	
	Pre	2021–2022	Pre	2021–2022	Pre	2021–2022	Pre	2021–2022
VAS: Math	0.200*** (0.037)	0.141** (0.048)	−0.076** (0.027)	−0.114** (0.036)	−0.008 (0.013)	0.014 (0.018)	−0.116*** (0.026)	−0.041 (0.032)
VAS: ELA	0.143*** (0.040)	0.246*** (0.065)	−0.093*** (0.029)	**−0.204*** (0.048)**	0.017 (0.013)	−0.036 (0.024)	−0.067* (0.028)	−0.006 (0.046)
VAS: Science	0.094 (0.060)	0.122 (0.091)	−0.019 (0.044)	−0.059 (0.067)	−0.011 (0.022)	0.028 (0.040)	−0.065 (0.042)	−0.090 (0.058)
Has VAS	0.010** (0.004)	0.005 (0.006)	0.001 (0.003)	0.002 (0.005)	0.001 (0.001)	0.004$^+$ (0.002)	−0.012*** (0.003)	−0.011** (0.004)
Pseudo R^2	.111							
Observations	90,070							

Note. Heteroskedastic robust standard errors reported. Bolded estimates represent a statistically significant difference from pre-COVID average marginal effects at the 95% or greater confidence level. VAS = value-added score; ELA = English-Language Arts.

$^+ p < .1.$ $^* p < .05.$ $^{**} p < .01.$ $^{***} p < .001.$

considerable challenges and frequent, abrupt, changes in working conditions. Early research documented high levels of teachers' stress and burnout and an increase in reported intentions to leave their positions (Zamarro et al., 2021). Some commentators raised concerns about a potential increase in teacher turnover and widespread teacher shortages while others stressed that even small increases in turnover could exacerbate existing, highly localized, teacher shortages (Goldhaber, 2021).

In this paper, we use administrative data from the state of Arkansas to document the impact of the COVID-19 pandemic on teachers' mobility and attrition before and 3 years after the start of the pandemic. Similar to analyses of turnover documented in Massachusetts, Washington State, and North Carolina (Bacher-Hicks et al., 2021; Bastian & Fuller, 2021; Goldhaber & Theobald, 2022a), we find relatively stable turnover rates entering the first pandemic school year (2020–2021) followed by a moderate increase in turnover entering the second pandemic school year (2021–2022).

In line with research from North Carolina and Washington State (Bastian & Fuller, 2023; Goldhaber & Theobald, 2023), we find evidence of greater increases in teacher turnover entering the 2022 to 2023 school year than were observed earlier in the pandemic. This increase in turnover occurred even as COVID-19 waned and indicates that the effects of the pandemic on teacher labor markets may continue to be felt for years to come.

Our analysis provides additional insights into these aggregated patterns of turnover. We find that a meaningful share of increased transitions out of the classroom can be explained by switches into non-instructional roles. This finding is consistent with results from an Institute of Education Sciences survey conducted in January 2022 which found that 30% of school vacancies were newly created positions (Institute of Education Sciences, 2022) and the increase we observe in the number of instructional leadership positions in Arkansas. This phenomenon merits future study.

Specifically, researchers should explore how the influx of ESSER funds has affected the teacher labor market in potentially lasting ways. Given the scale of the relief funds and their progressive allocation to high-poverty districts (Gordon & Reber, 2021), there are certainly lessons to be learned about how to effectively use dollars to improve student outcomes. Some districts used ESSER funds to create new, non-instructional roles, resulting in teachers leaving the classroom to take teacher-adjacent positions. Documenting the extent of this phenomenon, the drivers behind these choices, and the impact on student outcomes could help inform future policy and spending decisions.

Further research is needed to fully understand how schooling disruptions, competition from outside job opportunities, and political/social pressures may affect teachers' retention decisions. While the abrupt school closures in March of 2020 were likely to be a once-in-a-generation event, schooling disruptions stemming from seasonal outbreaks of infectious disease (e.g., influenza) or natural disasters occurred before the COVID-19 pandemic, albeit at a much smaller scale, and will continue to occur in the future. Our results inform an absent literature on how these disruptions impact teachers' decisions.

Additionally, there appears to be a meaningful connection between the availability of job opportunities outside of the education sector and teacher turnover (Goldhaber & Theobald, 2022b; Nagler et al., 2020); however, there is also evidence that teachers tend to earn less when they transition into these outside opportunities (Goldhaber, Krieg, et al., 2023). Additional research is needed to unpack this seeming contradiction. Lastly, schools have often been the center of political and social tensions in the years following the COVID-19 pandemic (Schwartz & Pendharkar, 2022; Slungaard Mumma, 2023), yet there is scant evidence examining the impact that these culture wars may have on teacher retention.

Who is leaving the teaching profession is as important as how many are leaving. We find that teachers with 25 or more years of experience (e.g., eligible for early or normal retirement) were nearly 2 percentage points more likely to leave the education sector workforce in the first two pandemic school years and nearly twice as likely to leave the education sector workforce entering the 2022 to 2023 school years. Losing experienced teachers who otherwise would have remained in the classroom could harm students' academic progress and hinder their recovery from pandemic effects for years to come.

We also find evidence suggesting that relative to pre-pandemic trends, higher value-added math teachers have become more likely to exit the Arkansas education workforce. This loss of effective teachers would be concerning at any time but is especially troubling given the large and persistent learning loss among COVID-19 era students. If continued, increased attrition of highly effective teachers, relative to pre-pandemic trends, could hamper academic recovery from the COVID-19 pandemic.

Additionally, we find that Black teachers have become more likely to move between schools, switch to non-instructional roles, and exit the education sector workforce during the pandemic, although turnover for these teachers entering the 2022 to 2023 school year is more in line with pre-pandemic patterns than entering the 2020 to 2021 or 2021 to 2022 school years. Efforts should be made to address concerns about teachers leaving the classroom and promote the diversity of new entrants to the teacher workforce.

Together, these changes in the composition of the Arkansas teacher workforce may have lasting implications for students and the effectiveness of the Arkansas public education system. Since the beginning of the COVID-19 pandemic, Arkansas schools have struggled to retain experienced teachers, Black teachers, and high value-added teachers. Even if retention for these teachers returns to their pre-pandemic levels, the Arkansas teacher workforce has already experienced a decrease in teacher diversity and quality. Efforts, such as those described above, may be necessary to restore or increase the diversity and quality of the teacher workforce.

While not rising to the level of the mass exodus of teachers, the observed increase in teacher turnover entering the 2021 to 2022 and 2022 to 2023 school years raises concerns about potential instability in the Arkansas teacher labor force. Further increases in turnover could create significant issues, particularly for those districts already facing staffing challenges. Kraft et al. (2021) showed that schools with strong communication, targeted training, meaningful collaboration, fair expectations, and authentic recognition for their teachers were more successful at maintaining teachers' sense of success at the beginning of this pandemic.

Looking forward, it will be important to continue monitoring the health of the teacher labor force. Across the country, there has been a renewed interest in a variety of educational reforms. Notably, bipartisan interest in bolstering teacher compensation and enhancing the allure of the teaching profession has gained momentum (DiMarco & Kirsch, 2023). In this context, comprehensive analyses akin to ours assume a crucial role. They furnish policymakers with invaluable insights to better understand challenges and opportunities, sculpt tailored remedies, effectively addressing the pandemic's reverberations on both students and the teaching workforce.

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Notes

1. Licensure waivers include emergency teaching permits, long-term substitute waivers, alternative licensure plans, and waivers for charter schools and schools of innovation under Arkansas Act 1240. An

uncertified teacher is defined as a teacher employed under an Act 1240 wavier, a teacher employed under an emergency teaching permit, or a long-term substitute serving as classroom teacher for a full year.

2. Kurmann and Lalé develop the EIPL measure and note that it may be less accurate in certain, more rural, parts of Arkansas. As a robustness check, we estimate all models that use EIPL with districts' reported proportion of students participating in in-person learning at two points during the 2020 to 2021 school year. While results are largely similar, we prefer the EIPL measure as it captures year-long "in-personness" rather than two points in time.

3. For more detail on the construction of these and other variables, see Supplemental Appendix A: Variable Construction (available in the online version of the journal).

4. To account for potential gender effects in turnover due to childcare needs, we estimate an alternative specification that includes age as a continuous variable and the interaction of age and gender. While results (available upon request from the author) were largely similar, using age as a continuous variable resulted in collinearity issues with experience variables.

5. We define late career as teachers with more than 24 years of experience as these teachers are eligible for early retirement (with a modest reduction in benefits) at any age and, so, may be less attached to the teaching profession by the "golden handcuffs" of their pension. Similarly, we define early career teachers as those with fewer than 5 years of experience as they will not be vested in the Arkansas Teacher Retirement System.

6. To avoid potential measurement issues, described in Supplemental Appendix A (available in the online version of the journal), we use the discipline rate for each school/district calculated for the 2018 to 2019 academic year in all years of our analysis.

7. We believe the relatively large increase in exits entering the 2015 to 2016 school year is likely explained by increased participation in the teacher deferred retirement option plan (T-DROP) 10-years earlier. A policy change in 2004 appears to have induced more teachers to enter T-DROP. Since teachers can only participate in the program for 10 years, this enrollment bump likely resulted in more exits than usual in 2015 to 2016 (Costrell & McGee, 2010). According to our calculations, the number of active participants in T-DROP rose from 4,251 to 5,064 (i.e., by 813 or 19%) during the summer of 2005, which aligns with the increase in teacher exits observed in 2015-16. However, future research is needed to fully investigate this hypothesis.

8. Arkansas Code § 6-17-304 requires the hiring district to pay the district which holds a valid contract with the hired teacher an amount equal to the employee's salary at the non-hiring district excluding benefits.

9. Unabridged results tables containing estimated average marginal effects for all variables described in Equation (1) are available in Supplemental Appendix B (available in the online version of the journal). Additionally, we provide all results with Exiters and Switchers collapsed into a single outcome in Supplemental Appendix C (available in the online version of the journal).

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