Two Years Later: How COVID-19 Has Shaped the Teacher Workforce

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The unprecedented challenges of teaching during COVID-19 prompted fears of a mass exodus from the profession. We examine the extent to which these fears were realized using administrative records of Massachusetts teachers between 2015–2016 and 2021–2022. Relative to prepandemic levels, average turnover rates were similar going into the fall of 2020 but increased by 17% (from 15.0% to 17.5%) going into the fall of 2021. The fall 2021 increases were particularly high among newly hired teachers (31% increase) but were lower among Black and Hispanic/Latinx teachers (5% increases among both groups). Gaps in turnover rates between schools serving higher and lower concentrations of economically disadvantaged students narrowed during the first 18 months of the pandemic. The same holds true for gaps in turnover between schools serving higher and lower shares of Black and Hispanic/Latinx students. Together, these findings highlight important differences in teachers' responses to the pandemic across subgroups and the need to improve early-career retention to ensure long-term stability within the teacher workforce.

Keywords: descriptive analysis; economics of education; educational policy; longitudinal studies; policy analysis; secondary data analysis; teacher research

The COVID-19 crisis has created unprecedented disruption for school systems, educators, and the students they serve. The nationwide school closures in March of 2020 marked the beginning of a long series of pandemic-induced disruptions spread across 3 school years. During this time, teachers faced a wide range of additional pressures, including unexpected shifts in schooling mode, learning new technologies, and managing personal health concerns. These pandemic-related challenges had the potential to alter both the retention of the existing teacher workforce and the supply of new teachers willing to enter the profession.

Although these challenges raise concerns about driving teachers out of the profession, additional contextual factors make the effects of the pandemic on the teacher workforce unclear. First, the supply of new teachers and retention of existing teachers depends on the availability and relative appeal of alternative careers. The economic challenges across a wide range of sectors during the pandemic may have supported the teacher labor market, which tends to attract higher-quality teachers during recessions (Nagler et al., 2020) and retain existing teachers at higher rates when unemployment is high (Goldhaber & Theobald, 2022a). Second, teaching typically requires substantial job-specific training and licensing. These investments of time and money may have insulated the teacher labor market from a mass exodus in the early stages of the pandemic, when uncertainty was high and teachers had less time to obtain training for alternative careers (Lazear, 2009). Third, many states also implemented measures to prevent a pandemic-induced shortage of new teachers, such as waiving licensure exams or student teaching requirements (Slay et al., 2020).[1] For example, the Massachusetts Department of Elementary and Secondary Education (MADESE) created an emergency license with substantial reductions to the minimum requirements needed to teach in Massachusetts (An Act Relative to Municipal Governance During the COVID-19 Emergency, 2020). Finally, the unequal pressures of the pandemic across age, race, and gender may also have resulted in compositional changes across the distribution of the teacher workforce (Milovanska-Farrington, 2021).

Changes on the margin of entry and exit from the teaching workforce also have implications for the cross-school movement of those who remain in the profession. For example, if relatively desirable schools had more job openings during the pandemic, teachers may have transferred at higher rates. The pandemic also created new residential needs and priorities for many families

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(Lei & Liu, 2022), which may have increased cross-school movement if teachers relocated during the pandemic.

To better understand these changes to the teacher workforce during the pandemic, we employ data from MADESE between the 2015–2016 and 2021–2022 school years. Using these data, we compare prepandemic levels of teacher turnover to turnover into the fall of 2020–2021 (Year 1) and into the fall of 2021–2022 (Year 2), which mark the starts of the first and second new school years during the pandemic. In doing so, we address the following three research questions:

Research Question 1: How did teacher turnover at 6 months and 18 months into the pandemic compare to prepandemic turnover?

Research Question 2: How did turnover patterns among newly hired teachers change during the pandemic?

Research Question 3: Did turnover differ by teacher and school characteristics?

Four main results emerge from our analysis. First, we find that overall teacher turnover in Massachusetts remained stable in Year 1 but increased in Year 2. Compared to turnover in 2019, the percentage of teachers leaving the state teaching workforce in Year 2 increased by 15% (from 8.2% to 9.4%), and the percentage of teachers leaving their school increased by 17% (from 15.0% to 17.5%).

Second, we find that the overall patterns also hold for newly hired teachers, although their turnover levels —and increases in Year 2—are much higher. Among teachers hired in Year 1, 28.1% left the state teaching workforce in Year 2, corresponding to a 42% increase compared to 2019. There were also increases in within-state movement, bringing the total turnover to 44.8%, a 31% increase compared to 2019. This substantial increase in Year 2 turnover does not appear to be driven by newly hired emergency license holders, who entered the teaching profession during the pandemic without meeting typical licensing requirements; turnover among this group is similar to that of their peers with more traditional licenses. Rather, the sharp increase in turnover among new hires in Year 2 likely highlights the widespread challenges of entering the profession during the pandemic.

Third, we document different trends during the pandemic in turnover by teachers' characteristics, including within-state experience, race/ethnicity, and gender. In Year 1, turnover declined for early-career teachers but increased for more senior teachers. In Year 2, on the other hand, turnover increases were concentrated among early-career teachers. We also find different patterns by teachers' race and gender. Turnover increases during the pandemic were relatively larger for female teachers and for White teachers. In sum, these differences highlight how the challenges of the pandemic did not evolve uniformly across all teachers.

Fourth, we document different trends by school characteristics, including grade levels served and socioeconomic and ethnoracial composition. We find that turnover increases were concentrated in elementary and middle schools; turnover in high schools remained roughly consistent with prepandemic levels. Examining differences across socioeconomic composition, we find that turnover increases were concentrated among schools serving lower shares of economically disadvantaged students; schools serving the highest shares of economically disadvantaged students experienced lower levels of turnover relative to prepandemic levels. We also document similar turnover patterns by the share of Black and Hispanic/Latinx students served. These results again highlight differences across schools, perhaps surprisingly in the direction of narrowing existing turnover gaps by racial and socioeconomic composition, which is a point we return to in the conclusion.

Collectively, these findings not only provide timely detail on the evolution of the overall teacher workforce during the pandemic but also highlight important differences by teacher and school characteristics. Our analysis reveals important differences over time, with large increases in turnover not appearing immediately following the school closures in March 2020 but, rather, in the period between spring and fall of 2021, roughly 18 months after the onset of the pandemic. The substantial increase in overall turnover in Year 2 raises concerns about growing instability among the broader workforce. Increased retention, particularly among newly hired teachers, is necessary to sustain a stable workforce after 2 years of disruption, a point we discuss further in the conclusion.

Literature Review and Massachusetts Context

Literature on Teacher Turnover and the Workforce

A large literature documents substantial turnover among teachers, much of which focuses on the teacher- and school-level factors that predict turnover. Of most relevance to the current study are teacher differences across experience, race, and gender and school differences across grade levels and student composition. Teacher experience is a strong predictor of turnover and typically follows a U-shaped pattern, where rates are highest among novice teachers and those nearing retirement age (e.g., Ingersoll et al., 2018; Papay et al., 2017; Redding & Henry, 2018). Prior work also documents higher turnover among females compared to males (Goldring et al., 2014; Ingersoll, 2001). Differences by race are less consistent, although the more recent evidence tends to find relatively higher turnover among Black and Hispanic/Latinx teachers (e.g., Goldring et al., 2014; Ingersoll & May, 2011; Sun, 2018). In terms of school characteristics, a large literature shows that teachers are more likely to leave schools that serve high concentrations of traditionally underserved racial/ethnic groups and low-income students (Ingersoll, 2001; Lankford et al., 2002; Papay et al., 2017; Scafidi et al., 2007). Turnover also tends to be higher—although only slightly—in elementary schools than in middle and high schools (Goldring et al., 2014).

The onset and continuation of the pandemic, with its disproportionate impacts across age, race, and gender (e.g., Milovanska-Farrington, 2021), may have altered or exacerbated these existing patterns in teacher turnover. Recent evidence suggests that teacher turnover was relatively stable—or in some cases even lower—in the fall of 2020–2021, compared to historical trends (e.g., Aldeman et al., 2021; Bacher-Hicks et al., 2021; Bastian & Fuller, 2021). However, evidence from surveys collected during the 2020–2021 year indicates that teachers' stress levels and their

considerations of leaving the profession have increased during the pandemic (Diliberti et al., 2021; Zamarro et al., 2022).

The extent to which turnover will follow the reported increases in stress and considerations of leaving—in 2021–2022 and beyond—remains an open question. Data from selected states and districts suggest that schools experienced an uptick in teacher turnover following the 2020–2021 school year compared to the prior year (Barnum, 2022). For example, Goldhaber and Theobald (2022b) found that teacher turnover in Washington State increased substantially after the 2020–2021 school year, with a nearly 20% increase in the proportion of teachers who left teaching positions in public school districts compared to the prior year. Continuing to learn more about how turnover varies across geographies and teaching contexts will help policymakers determine to which schools and teachers to direct additional supports.

The Massachusetts Context

Since the onset of the pandemic, Massachusetts schools have experienced a series of disruptions, upending notions of normalcy. In March 2020, schools shifted to remote instruction with little planning, guidance, or support. When the 2020–2021 school year began, Massachusetts's school districts varied widely in their modes of instruction; for example, roughly half of the state's 40 largest districts offered fully remote instruction, and the other half offered hybrid instruction (Martin, 2020).

Then, in March 2021, state education officials mandated that districts reopen their elementary and middle schools for full-time in-person instruction by the end of April 2021, forcing many schools to again shift instruction modes on a short timeline (Toness & Russell, 2021). High schools followed with full-time in-person learning by mid-May 2021 (Gans, 2021). By the fall of the 2021–2022 school year, Massachusetts school districts were required to provide fully in-person instruction, although the highly transmissible Delta variant continued to cause disruptions through the winter of 2021–2022 (Murphey, 2021). The challenging context faced by teachers in Massachusetts is not unique to the state, and the difficulty of teaching during the pandemic has been documented nationally. For example, using nationwide teacher survey data, Zamarro et al. (2022) found that pandemic-related health concerns and teaching in a hybrid model are associated with concerns about job burnout. In addition, teachers who switched instructional modalities during the year were more likely to report burnout and that they are considering leaving teaching. Their findings suggest that the trying circumstances that teachers faced over the span of 3 school years may play a major role in teachers' job satisfaction and career decisions.

These challenges also extend to individuals who were preparing to enter the teaching profession during the pandemic. Testing center closures prevented license-seeking individuals from taking licensure exams, and school closures disrupted student teaching requirements. In response, Governor Baker signed an order in June 2020 creating an emergency teaching license, which dramatically lowered the minimum professional entry requirements (An Act Relative to Municipal Governance During the COVID-19 Emergency, 2020). Individuals hired under an emergency license need only a bachelor's degree and do not need to fulfill traditional requirements, such as passing the Massachusetts Tests for Educator Licensure, completing an educator preparation program, or obtaining required endorsements.[2] These changes made it possible for individuals who were already planning to enter the profession to still do so without meeting the traditional requirements. However, it also created an opportunity for individuals who were not planning to enter the profession to do so without investing significant time in teaching-specific training, which may have implications for turnover (e.g., Redding & Henry, 2018; Redding & Smith, 2016).

Data and Methods

We constructed a rich longitudinal data set based on administrative records from MADESE. These records include annual files of (a) human resource data for all teachers, including demographic information and their current school; (b) teacher licensure and preparation background; and (c) student demographic information.

Using these data, we constructed a teacher-year-level longitudinal data set spanning 7 school years (2015–2016 to 2021–2022) and including 116,760 unique teachers. In Appendix Table A1 (available on the journal website), we present summary statistics on a variety of characteristics for the teacher-years included in our study. On average, teachers in our sample have 10.7 years of within-state experience, 10% are newly hired, and 76% of teachers are female. In addition, 92% are White, 3% are Black, and 3% are Hispanic/Latinx.

Using this teacher-year-level longitudinal data set, we derive two measures of turnover. To do so, we examine teachers employed in the spring semester of a given school year and then examine their employment status in the fall semester of the subsequent school year. This measure, which we refer to as "spring to fall" turnover, captures teachers who leave their teaching role during the summer months.[3] We count a teacher as being retained even if they change grades or subjects but not if they move to a nonteaching role. Our two primary measures of spring to fall turnover are as follows:

- Transfer schools within Massachusetts: A teacher in the spring semester of school year t transfers to a different Massachusetts public school in the fall of school year $t + 1$ but remains in a teaching assignment.
- Leaving teaching in Massachusetts: A teacher in the spring semester of school year t is no longer in a teaching assignment in the fall semester of school year $t + 1$.

In addition to examining turnover among the full workforce, we also examine differences across a range of subgroups. To examine turnover among newly hired teachers, we present turnover rates among the set of teachers who were not employed in the previous school year.[4] We also examine differences in turnover by within-state teaching experience, race/ethnicity, and gender, which come from the teachers' human resources records. Finally, we leverage student characteristics to examine turnover differences by the average composition of students by school.
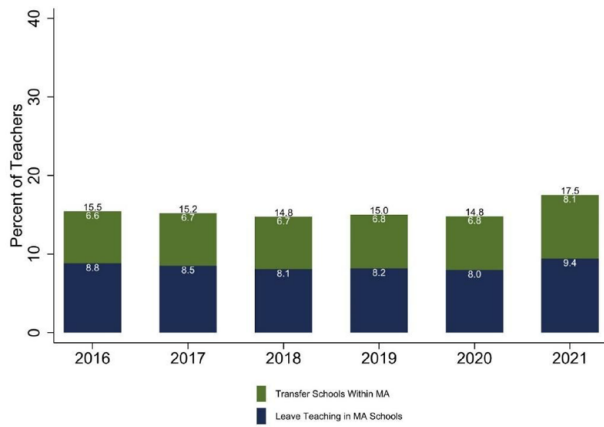
FIGURE 1. *Teacher turnover patterns over time.*
Note. Turnover is measured between the spring semester and fall semester of each calendar year (e.g., turnover in 2021 is measured as the turnover from spring 2021 to fall 2021).

Results

Overall Turnover

Figure 1 presents the spring to fall turnover rates among teachers in Massachusetts from spring 2016 through fall 2021. Each column presents the percentage of teachers employed in the spring semester of the calendar year who left their teaching position by the fall semester of the same calendar year. Overall turnover was stable in the years before COVID, which is captured in the first four bars. Over this 4-year period, the percentage of Massachusetts teachers exiting the state teacher workforce ranged from 8.1% to 8.8% (presented in the blue bars). The percentage who remained teaching in Massachusetts but moved to a new school ranged from 6.6% to 6.8% (presented in green bars). In total, between 14.8% and 15.5% of teachers transitioned out of teaching roles in their schools during the prepandemic time period.

From spring 2020 to fall 2020, these patterns largely remained stable. That is, we find no evidence of a mass exodus of teachers in Massachusetts in Year 1. The percentage of teachers leaving the state workforce (8.0%) was lower than any of the previous 4 years, and the percentage of teachers who moved to a new school within the state (6.8%) was consistent with prior years. Combining these two forms of turnover, we therefore find that the total turnover rate (14.8%) was equal to or lower than any of the prepandemic years examined in this study. Overall, these results confirm that teachers did not leave the profession during the onset of the pandemic in larger numbers than in prior years.[5]

The relative stability in Year 1 disappears when examining turnover in Year 2. From spring to fall of 2021, both forms of turnover increased. Compared to 2019, the state-level turnover increased by 15% (from 8.2% to 9.4%), and the within-state turnover rate by 19% (from 6.8% to 8.1%).[6] Therefore, the total turnover rate increased by 17% (from 15.0% to 17.5%). Although turnover in 2020 was slightly below prepandemic levels, turnover in 2021 was substantially above prepandemic levels, thereby pushing the average pandemic-era turnover above earlier levels.
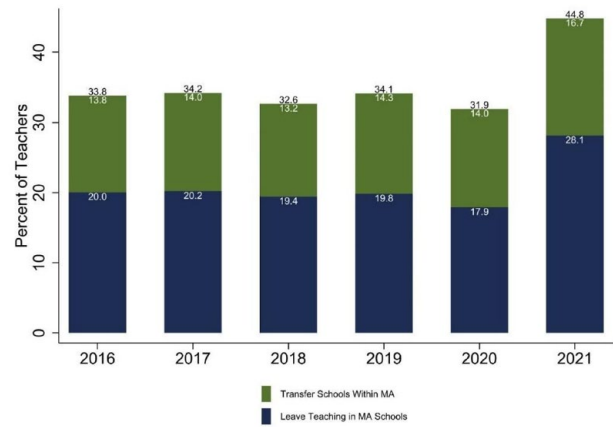

FIGURE 2. *Turnover among newly hired teachers.*
Note. Turnover is measured between the spring semester and fall semester of each calendar year (e.g., turnover in 2021 is measured as the turnover from spring 2021 to fall 2021). This figure presents turnover among the subset of teachers who were newly hired each year.

Turnover Among Newly Hired Teachers

A large literature documents high levels of turnover among newly hired teachers during typical school years (e.g., Ingersoll et al., 2018; Redding & Henry, 2018), but those hired during the pandemic likely faced an additional set of challenges. In Figure 2, we present turnover rates among newly hired teachers. Similar to Figure 1, we see relative stability over the prepandemic period and in Year 1 of the pandemic. However, the overall level of turnover is more than twice as high compared to the full workforce (Figure 1). Over the prepandemic period, approximately one out of every five newly hired teachers left the state teaching workforce after just 1 year, and one out of every three no longer remained in the same school.

The last bar of Figure 2 shows a dramatic increase in the turnover rates in the fall of 2021 (Year 2) among newly hired teachers. Among those who were hired in Year 1, 28.1% left the state teaching workforce by Year 2, corresponding to a 42% increase compared to 2019. There were also increases in the within-state movement, bringing the total turnover to 44.8%, which represents a 31% increase compared to 2019.[7]

Given these substantial increases in turnover among new hires, one potential explanation is that the reduced professional entry requirements in the form of emergency licenses drove these trends.[8] Prior work finds that teachers with alternative certifications—such as Teach for America—are more likely to leave at the end of the school year than traditionally certified teachers (Redding & Henry, 2018; Redding & Smith, 2016). Because emergency licenses only required a bachelor's degree and no teaching-specific training, it afforded an opportunity for individuals to potentially test the profession without investing in educator-specific training. However, we find that teachers with emergency licenses have turnover similar to that among their peers.

Figure 3 presents turnover rates among newly hired teachers in the 2020–2021 school year, where we focus on the three licenses that are most common for teachers with no prior
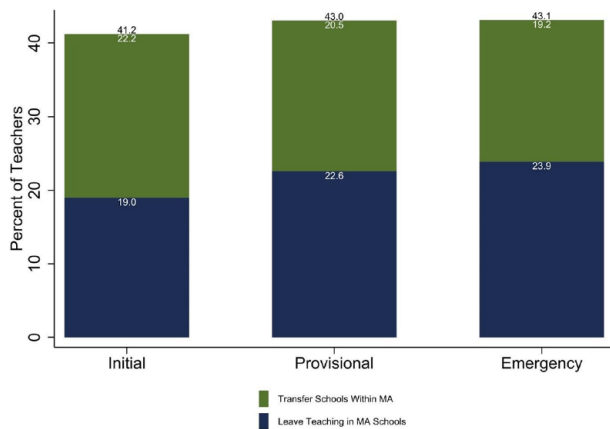
FIGURE 3. *Turnover of newly hired teachers in 2020–2021 by license type.*

Note. This figure presents turnover among the subset of teachers who were hired in the 2020–2021 school year.

teaching experience: initial (n = 3,378), provisional (n = 1,064), and emergency (n = 1,382). The requirements for each of the three licenses differ substantially. Whereas emergency licenses require only a bachelor's degree, provisional licenses require the additional component of passing Massachusetts-specific educator licensure exams. Initial licenses are the most involved and require a bachelor's degree, passing licensure exams, completion of an educator preparation program, and obtaining relevant endorsements. Despite the substantial differences in requirements, turnover rates were similar in 2020–2021 and ranged from 41.2% to 43.1%. In fact, turnover rates were nearly identical for emergency (43.1%) and provisional (43.0%) license holders, although they were slightly lower among initial license holders (41.2%). Although it is too soon to tell what the long-run implications are for turnover among teachers who enter the workforce with emergency licenses, these results suggest that their short-term turnover is in line with their peers with more traditional training and licensure. Moreover, it highlights that the challenges of entering the profession during the pandemic were broadly felt across those with and without educator-specific training.

Turnover by Teacher and School Characteristics

Figure 4 presents trends in teacher turnover by within-state teaching experience (Panel A), race/ethnicity (Panel B), and gender (Panel C). Each panel highlights how the overall stability in Year 1 is driven by divergent patterns that balance out across subgroups. Panel A divides the sample into five subgroups of prior teaching experience, based on 5-year windows.[9] Turnover rates in 2020 decreased among the least experienced teachers but increased for those with more experience. Compared to 2019, turnover decreased in 2020 by nearly 10% (from 24.5% to 22.3%) for teachers in their first 5 years of teaching but increased by nearly 20% for teachers with 10 to 14 and 15 to 19 years of experience. By Year 2 (i.e., 2021), turnover was substantially higher than prepandemic levels for every subgroup except those with 20 or more years of experience.[10]

Turnover trends also diverged substantially by race (Figure 4, Panel B). In 2020 (Year 1), turnover rates declined for all racial/ethnic groups other than White teachers. White teachers, who comprise 92% of the Massachusetts teacher workforce, left at nearly identical rates to typical years. In 2021 (Year 2), turnover increased for all racial/ethnic groups. The largest increase is among White teachers, who left at a 17% higher rate than in 2019. In contrast, turnover increased by only 5% among both Black and Hispanic/Latinx teachers relative to 2019.[11]

Turnover patterns by gender (Figure 4, Panel C) also reveal different patterns during the pandemic. Female teachers, who comprise more than three-quarters of the overall teaching workforce in Massachusetts, had rates of turnover in Year 1 that were nearly identical to prior years. However, turnover increased by 19% in Year 2 (from 15.2% to 18.1%) compared to 2019. Male teachers, on the other hand, left at slightly lower rates in Year 1 compared to 2019, and the increase in Year 2 was more muted.[12] Overall, the results in Figure 4 show that turnover during the pandemic did not evolve uniformly across experience, race, and gender.

Figure 5 presents turnover patterns by school characteristics, focusing on the grade levels served by the school (Panel A), the share of students who are economically disadvantaged (Panel B), and the ethnoracial composition of students (Panel C).[13] Panel A divides schools into those serving elementary grades, middle grades, and high school grades.[14] Increases in turnover are concentrated in elementary and middle schools. Elementary schools had the largest increases, moving from a turnover rate of 13.8% in 2019 to 15.3% in 2020 and 16.5% in 2021. Increases in middle school followed a similar pattern, although the magnitude of the increases somewhat smaller. High schools, on the other hand, had a decrease in turnover in Year 1 followed by a small increase in Year 2.

Figure 5 Panels B and C show turnover by the ethnoracial and socioeconomic composition of students. We divide schools into four quartiles based on percentage of students who are economically disadvantaged in 2017–2018 (Figure 5, Panel B) and the percentage Black or Hispanic/Latinx in 2017–2018 (Figure 5, Panel C). Turnover increased—both in 2020 and 2021—for schools serving lower shares of economically disadvantaged students. Among the schools in the top quartile of economic disadvantage, turnover rates declined substantially in 2020 and remained below prepandemic levels in 2021. Figure 5 Panel C shows a similar pattern by racial composition, with schools serving the highest concentration of Black and Hispanic/Latinx students following a different pattern than schools serving lower shares. Again, among schools in the top quartile, turnover declined in 2020 and remained below prepandemic rates in 2021. In all other groups, turnover in 2021 was higher than prepandemic levels.

Discussion and Conclusion

Despite fears of a mass exodus, we find that teacher turnover in Massachusetts during the first year of the pandemic was slightly below—but still consistent with—prepandemic levels of turnover. In contrast to the relative stability in the first year of pandemic, teacher turnover increased by 17% (from 15.0% to
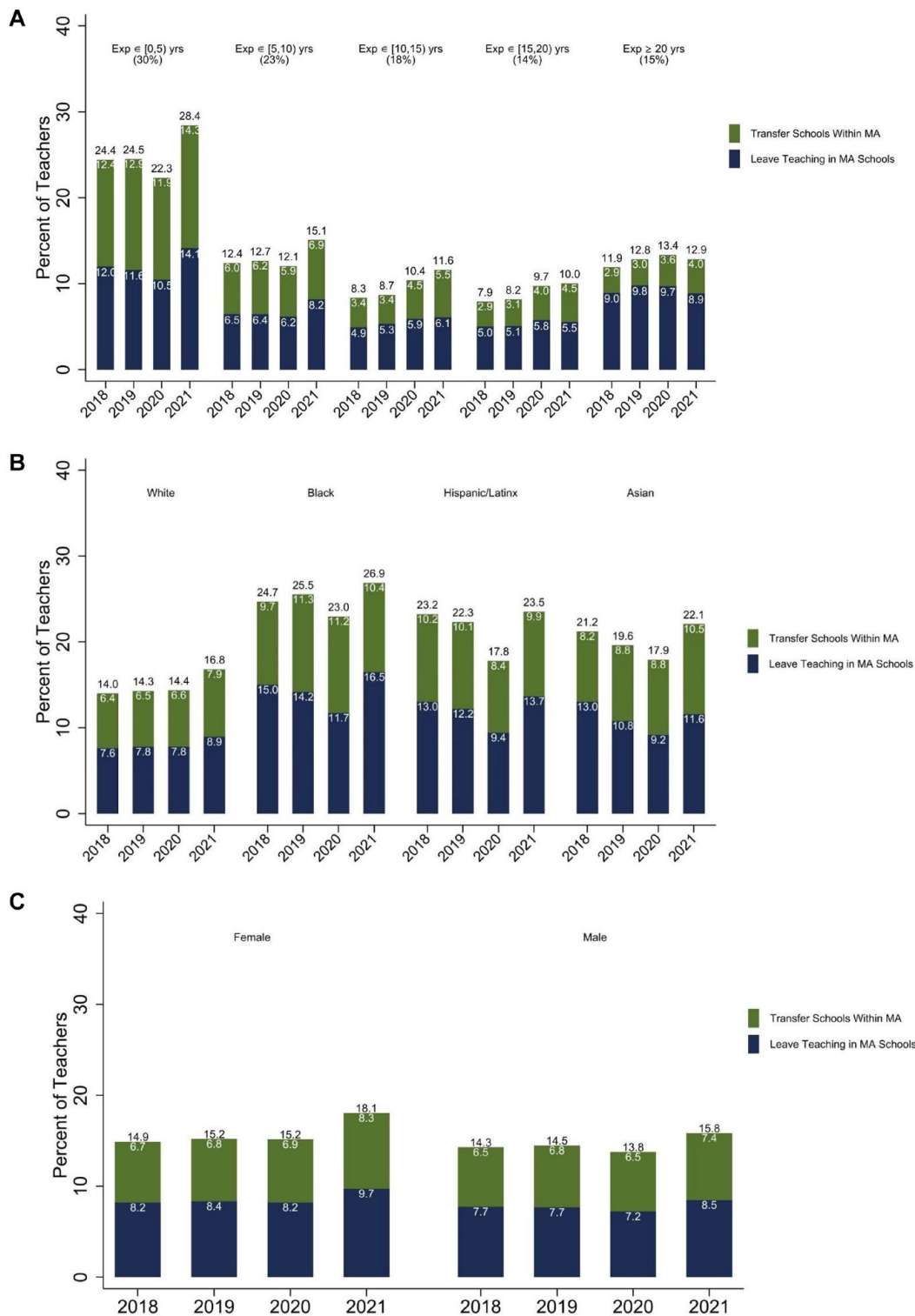
FIGURE 4. *Turnover by teacher characteristics. (Panel A) Turnover by experience. (Panel B) Turnover by race/ethnicity. (Panel C) Turnover by gender.*
Note. Turnover is measured between the spring semester and fall semester of each calendar year (e.g., turnover in 2021 is measured as the turnover from spring 2021 to fall 2021).

17.5%) in Year 2. These overall results align with emerging evidence from other contexts that shows stable or lower turnover in Year 1 followed by an increase in turnover in Year 2. For example, turnover in Washington State dipped to 14.5% in Year 1 compared to 17.4% in 2014–2015 (Aldeman et al., 2021).

Similarly, turnover in North Carolina declined from roughly 18% in prepandemic years to roughly 15% in Year 1 (Bastian & Fuller, 2021). In a survey of nearly 300 district leaders across the United States, Diliberti et al. (2021) found that most respondents indicated that teacher turnover during the first year of
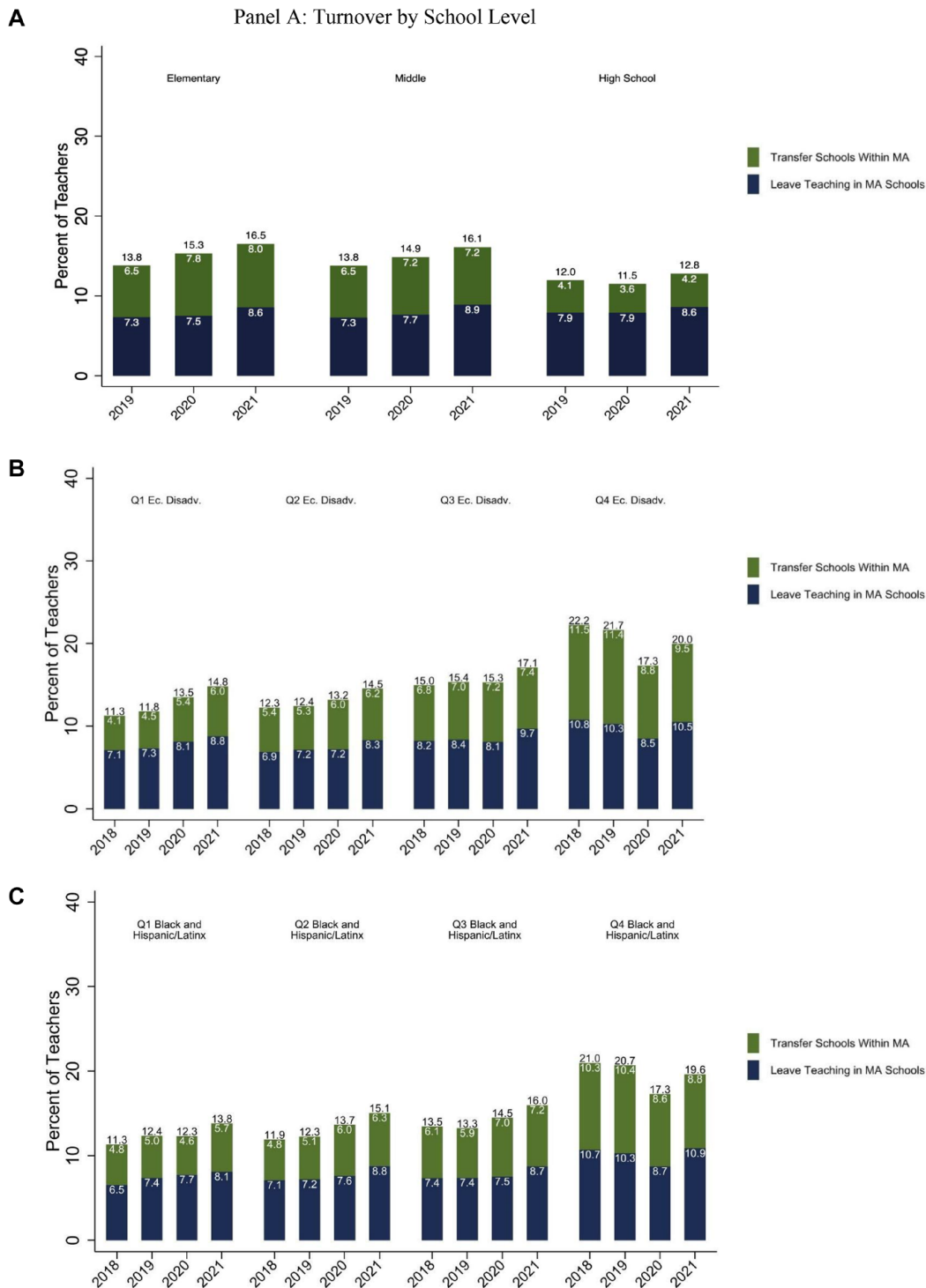
FIGURE 5. *Turnover by school characteristics. (Panel A) Turnover by school level. (Panel B) Turnover by school composition of economically disadvantaged students. (Panel C) Turnover by school ethnoracial composition.*

Note. Turnover is measured between the spring semester and fall semester of each calendar year (e.g., turnover in 2021 is measured as the turnover from spring 2021 to fall 2021). Economic disadvantage (Panel B) is defined as students' participation in one or more of the following state-administered programs: the Supplemental Nutrition Assistance Program (SNAP), the Transitional Assistance for Families with Dependent Children (TAFDC), the Department of Children and Families' (DCF) foster care program, or MassHealth (Medicaid).

pandemic was in line with prepandemic rates. In the second year of the pandemic, turnover rates in Washington State increased by 16% (from 15.3% to 17.8%) compared to the prior year (Goldhaber & Theobald, 2022b), whereas those in Arkansas increased by 14% (from 19.7% to 22.4%) compared to the last prepandemic year (Camp et al., 2022).

We find a similar but sharper pattern among newly hired teachers in Massachusetts. Compared to pre-COVID levels, turnover among new hires increased by 31% (from 34.1% to 44.8%) in Year 2. The substantial increase in turnover among new hires does not appear to be driven by emergency license holders, who have similar turnover to their peers. Rather, the relatively high turnover among both the new hires with educator-specific training and those without such training (e.g., emergency license holders) highlights the widespread difficulty of joining the teacher workforce during the pandemic. For example, accounts from news media suggest that teachers who began their careers during the pandemic felt isolated, unsupported, and unprepared.[15]

When examining results by teacher and school characteristics, we find that turnover differed along several key dimensions. Turnover among the most senior teachers was relatively stable, and the largest increases in Year 2 were concentrated among those with less experience. On the one hand, this result is surprising given the greater COVID-related health risks among older individuals (Alsan et al., 2021). On the other hand, teachers with long, stable careers face strong financial incentives to retire at specific age-experience thresholds (e.g., Costrell & Podgursky, 2009); perhaps even the extraordinary challenges of the pandemic were not enough to counteract these forces. In contrast, teachers with fewer years of experience—and relatively lower personal and financial investment in teaching—appear to have been more willing to make career changes.

We similarly document increases in Year 2 turnover among both female and male teachers, although the increases were larger among female teachers. This pattern is consistent with disproportionate family burdens being placed on female workers during the pandemic (e.g., Zamarro & Prados, 2021). We also find that turnover in Year 2 increased across all ethnoracial groups, although the relative increase in turnover among White teachers is larger than that among Black and Hispanic/Latinx teachers. This pattern differs from Camp et al. (2022), who found that increases in teacher turnover during COVID were relatively larger among Black teachers compared to White teachers in Arkansas. It is also surprising given the disproportionate health impact of the pandemic on people of color (e.g., Alsan et al., 2021) but mirrors the patterns by teaching experience because the largest turnover increases are not concentrated among the teachers with the greatest health risks.

Across schools, we show that preexisting gaps by socioeconomic and racial composition narrowed modestly. These results are consistent with the earlier results by teacher race, which showed that turnover declined in Year 1 and only modestly increased in Year 2 among Black and Hispanic/Latinx teachers. These patterns are largely mirrored in the schools that employ more Black and Hispanic/Latinx teachers, which are those serving high concentrations of students of color and with high levels of economic disadvantage. Although the substantial preexisting turnover gaps still exist to a large degree across school (and teacher) characteristics, this is a promising contrast to the expansion of achievement gaps during the pandemic (Goldhaber et al., 2022). We also find cross-school differences related to grade level, with increases concentrated among the younger grades. This result may reflect greater challenges in adjusting to remote and hybrid modalities with younger students (e.g., Leech et al.,

2022) or health risks of teaching younger students who were not vaccine-eligible prior to the start of the 2021–2022 school year.

Although not necessarily rising to the level of a mass exodus, these increases in teacher turnover—particularly among new hires—do raise concerns about growing instability among the teacher workforce and how it may impact students. Moving forward, school leaders and policymakers will continue to benefit from research that examines changes to the teacher workforce during the pandemic. One limitation to the current study is that the fall of the 2021–2022 school year does not mark the end of COVID-related challenges to the teacher workforce. For example, the effects of the Omicron variant during the winter of 2021–2022 are not captured in these data and likely created additional instability. Similarly, because teacher data for the end of the 2021–2022 school year are not yet available, our analysis does not include within-year turnover. Although our focus on spring to fall (i.e., between-year) turnover captures the largest share of overall teacher turnover, we hope future analysis will provide additional nuance by examining within-year turnover. Future analysis may also benefit from examining additional teacher subgroups that were not available in our data, such as differences by subject area or age. Nonetheless, we now know that the stress of the pandemic is changing not only teachers' attitudes toward remaining in the profession (Zamarro et al., 2022) but also their actual decisions to leave. This suggests that policymakers need to prepare for the potential consequences and develop strategies for supporting schools and their educators following another difficult school year.

To inform these strategies, future research ought to focus on elucidating the mechanisms underlying the turnover patterns documented in this article; information from surveys and interviews may be particularly beneficial. Further research is also needed to better understand the effects of pandemic-related policies on the teacher workforce. We found that newly hired emergency license holders have similar turnover to that of their peers, but additional work may examine how these licenses relate to the quality of newly hired teachers. Finally, states varied greatly in their educational responses to the pandemic, including the extent to which they taught in person, remotely, or in a hybrid modality. Future analysis of such cross-state differences in educational responses to the pandemic may illuminate potential levers to improve the stability and quality of the teacher workforce.

NOTES

[1]These measures were, in part, implemented due to the prospective teachers' inability to complete student teaching and in-person certification exams.

[2]Typically, individuals seeking academic teacher roles in Massachusetts need to obtain a provisional or initial license, but

experienced out-of-state teachers may enter the state teaching workforce with a temporary license. Provisional licenses require a bachelor's degree and passing all required Massachusetts Tests for Educator Licensure (MTELs). Initial licenses require the completion of an educator preparation program and obtaining required endorsements in addition to a bachelor's degree and passing required MTELs.

[3]Because end-of-year staffing data for the 2021–2022 school year are not yet available, we focus on "spring to fall" turnover. This captures the largest form of turnover, which occurs between school years (i.e., over summer break), but does not account for any turnover within the school year. However, because our spring to fall measure captures turnover among all teachers in the spring semester, it includes those who replace any within-year leavers. Turnover among these "replacement" teachers would not be included, for example, in a "fall to fall" measure, meaning that any snapshot-based measure will exclude some set of individuals when within-year turnover exists. Appendix Table A2, available on the journal website, presents within-year turnover rates from the 2015–2016 school year through 2020–2021 and shows that between 1.6% and 2.2% of teachers transfer schools within school year and 1.9% to 3.2% leave the state workforce between 2015–2016 and 2020–2021. These rates are largely stable during the pandemic, suggesting that trends (i.e., changes in turnover rates during the pandemic) are not substantively impacted by within-year turnover.

[4]This definition of newly hired teachers includes those who have previously exited and reenter the teacher workforce as long as they were not employed in the prior year. In the years prior to the pandemic, between 7,000 and 8,800 teachers were hired per year, comprising 9% to 11% of the total teacher workforce in Massachusetts. This broadly corresponds to the overall percentage of teachers who leave the state each year (i.e., those in Figure 1), resulting in a fairly stable overall number of teachers in the state across years. In line with prior years, there were 7,838 new hires in 2020–2021 and 7,884 in 2021–2022, which represent 9.6% and 9.7% of the teacher workforce, respectively.

[5]Stability in teacher attrition during the onset of the pandemic has similarly been observed in other states and large districts (e.g., Aldeman et al., 2021; Bastian & Fuller, 2021).

[6]Consistent with prior literature (e.g., Boyd et al., 2011), Appendix Table A3, available on the journal website, shows that teachers who moved to new schools within the state went to schools that, on average, had relatively (a) lower shares of economically disadvantaged students, (b) lower shares of Black and Hispanic/Latinx students, and (c) higher math and English languate arts test scores. These patterns held during the pandemic, a;though the differences between the sending and receiving schools narrowed in Year 1, in part due to teachers transferring out of relatively more advantaged schools than in prior years. In Year 2, the magnitudes of the differences between the sending and receiving schools largely mirrored prepandemic differences, although, interestingly, both the sending and receiving schools were more advantaged, on average. We further examine these patterns of turnover by school characteristics in the section, "Turnover by Teacher and School Characteristics."

[7]These results are similar if we were to further restrict the sample of newly hired teachers to those with no prior within-state teaching experience. Under this restriction, overall turnover level is 36.2% in 2019, 32.7% in 2020 (Year 1), and 44.5% in 2021 (Year 2). The increase in Year 2 represents a 23% increase compared to 2019 and a 32% increase compared to Year 1.

[8]Other potential explanations include (a) differences in the composition of newly hired teachers or (b) differences in the schools employing newly hired teachers. We do not find evidence to support either of these explanations. Appendix Table A4, available on the journal website, shows that newly hired teachers in 2020–2021 (i.e., those with the high turnover rates) are similar to teachers in prior years with the exception

of being more likely to hold an emergency license. Appendix Table A5, available on the journal website, shows that newly hired teachers in 2020–2021 are—if anything—less likely to enter hard-to-staff schools compared to newly hired teachers who entered in prior years.

[9]The first four groups are divided into 5-year windows of prior experience (i.e., 0–4, 5–9, 10–14, and 15–19 years), and the last group includes teachers with 20 or more years of prior experience. Each group contains between 14% and 30% of the full sample, with the relatively less experienced groups comprising a greater share of the workforce.

[10]Compared to 2019, turnover in 2021 increased by 16% (from 24.5% to 28.4%) for teachers with 0 to 4 years of prior experience, by 19% (from 12.7% to 15.1%) for those with 5 to 9 years of experience, by 33% (from 8.7% to 11.6%) for those with 10 to 14 years of experience, and by 22% (from 8.2% to 10.0%) for those with 15 to 19 years of experience.

[11]Appendix Figure A1, available on the journal website, shows differences in turnover at the intersection of experience and race/ethnicity. Consistent with the overall figures, we find that turnover decreases in Year 1 and then subsequently increases in Year 2 among Black and Hispanic/Latinx teachers in most experience categories. Among White teachers, there is greater heterogeneity by experience. Among White teachers with fewer than 10 years of experience, there are slight declines in Year 1 followed by increases in Year 2. Among those with 10 to 19 years of experience, there are increases in Year 1 that persist into Year 2.

[12]Prior work has highlighted that the additional household and family pressures placed on female workers during the pandemic may have disproportionately burdened younger female workers (e.g., Zamarro & Prados, 2021). To examine this in our data, Appendix Figure A2, available on the journal website, presents turnover by gender and experience. We find larger turnover increases among female teachers at every experience category, with no clear interaction between experience and gender.

[13]Economic disadvantage is defined as participation in one or more of the following state-administered programs: the Supplemental Nutrition Assistance Program (SNAP), the Transitional Assistance for Families with Dependent Children (TAFDC), the Department of Children and Families' (DCF) foster care program, or MassHealth (Medicaid). This measure replaced free- or reduced-price meal eligibility as the MADESE's metric for income because subsidized meal information is not available for schools participating in the Community Eligibility Program.

[14]Schools that serve grades spanning multiple categories (i.e., K–8, 6–12, and K–12 schools) are not shown in Figure 5A because we cannot separate grade levels for these schools. These schools also tend to differ in other ways (e.g., are charter schools, serve specialized student groups, etc.). Nonetheless, we present turnover for these schools in Appendix Figure A3, available on the journal website, which shows that turnover decreased in Year 1 for schools that span grade categories. In Year 2, turnover in K–8 and 6–12 schools were slightly above the prepandemic levels in 2019.

[15]One first-year teacher in New York City described feeling unprepared because their training did not translate to a virtual setting (Xu, 2021). Another described feeling disconnected and isolated, without being able to easily call on veteran teachers for advice or build a natural sense of camaraderie through informal in-person interactions (Harris, 2021).

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