Working Paper

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Does Teacher Retention Vary by Preparation Pathway? Insights from Tennessee and Kentucky

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Introduction

Teacher recruitment and retention remain critical challenges for the United States education system. In recent years, declining interest in careers in education has prompted closer examination of the factors influencing students' college and career choices (Kraft & Lyon, 2024). Nationwide, the number of undergraduates receiving degrees in education has declined substantially since 2005 (AACTE, 2022), adding to broader challenges in recruiting new teachers. Between 2013 and 2019, the number of teacher preparation program completers declined in most states, with the annual number of traditional program completers declining by 28% over this period (U.S. Department of Education, 2023). These declines mean fewer teachers to fill the gaps from the about 8% of teachers who leave the profession each year, according to recently available federal estimates (Taie & Lewis, 2023).

Despite declining interest in traditional teacher preparation programs (Ellison, Smith, & Booker, 2025), alternative routes into the education profession have grown over the past two decades (Redding, 2022). Numerous states and school districts have adopted alternative programs that remove barriers to obtaining teacher certification and streamline entry to the profession (Podolosky et al., 2019). The expansion of these non-traditional routes into teaching has led to a substantial shift to broaden avenues of teacher preparation and credentialing (Fraser & Lefty, 2018; Johnson et al., 2005; Redding, 2022) and the expansion of pathways into the profession has also led to changes in the demographic composition of beginning teachers (Redding, 2022; Booker et al.; 2024).

While the decline in traditional education preparation program completers and declines in retention in some areas indicate the need for expanded pathways, policymakers and practitioners question whether these expanded preparation pathways yield teachers who are just as likely to remain in the profession as those who enter through traditional routes. This study provides insight into teacher retention by entry pipeline using statewide longitudinal administrative data from Tennessee and Kentucky over the 2016–17 to 2022–23 school years.

Across both Tennessee and Kentucky, the teacher workforce has undergone notable changes in demographic composition over time, with early-career teachers skewing older and slightly more male in recent years (Booker et al., 2024). These shifts may be partially explained by the changing landscape of educator preparation routes across both states. In this report, we first examine demographic trends of incoming teachers, based on their

preparation pathways. We then examine early-career teacher retention and how retention rates vary based on preparation pathways.

Key Findings:

1. In both Kentucky and Tennessee, newly hired teachers entering through non-traditional routes are more likely to be male, non-White, and older than those entering through traditional routes. Non-traditional route teachers are also more likely to have middle/secondary endorsements.
2. Newly hired teachers entering through non-traditional preparation pathways are more likely to teach in upper grades and in schools serving more economically disadvantaged students and students of color.
3. Non-traditionally prepared teachers in Tennessee and out-of-state teachers in Kentucky have lower retention rates, but these differences are likely driven by differences in teacher and school characteristics.

Prior Research Overview

The Southern Regional Education Board and researchers at Vanderbilt University's Peabody College of Education and Human Development formed a research partnership to study teacher labor market trends of approximately the last decade. In the first phase of the partnership, we used statewide data from Kentucky and Tennessee to deepen our understanding of teacher shortages, vacancies, retention, and quality to support education leaders and policymakers in making evidence-based decisions. As part of this effort, our research team produced two studies exploring the teacher labor market in Tennessee and Kentucky (Booker et al., 2024; Ellison, Smith & Booker, 2025). These analyses provided several insights on the teacher workforce across both states, including trends in teacher retention. We report a summary of key findings below.

The Next Generation of Teachers: A Study of Interest in the Teaching Profession

- Interest in an education career among high school students across 8 southern states has declined steadily since 2013. Interest dropped from 8% to 5% in Kentucky and from 7% to 4% in Tennessee over 10 years.

- In both Kentucky and Tennessee, students who plan to major in education and express interest in an education career are predominantly White and female and have lower average ACT scores than other students.
- Enrollment in high school "Teacher as a Profession" courses in Tennessee is increasing.
- Across both states, participation in some alternative or non-traditional preparation pathways and hire rates of alternatively prepared teachers have increased.

Teacher Labor Market Trends: Insights from Tennessee and Kentucky

- From 2017 to 2023, the teacher workforce in Kentucky grew by 3%. The racial and sex composition of teachers stayed the same, while the proportion of teachers over age 50 increased.
- Newly hired teachers of color and newly hired teachers over 30 are more likely to enter the teaching profession through non-traditional preparation and certification pathways.
- While starting teacher salary has increased in both states, the increases have been outpaced by inflation.
- Fewer Tennessee teachers report that they plan to continue teaching, and teachers who say they plan to exit the profession identify leadership as a primary reason for their decision.
- From 2017 to 2022, teacher turnover rates in Kentucky largely held steady while turnover rates in Tennessee dipped and then increased.
- On the 2022 Tennessee Educator Survey, early-career teachers reported feeling less prepared and having less support than they did on the 2017 Tennessee Educator Survey.
- Less than half of early-career teachers in Tennessee formed aspirations to become educators before college.

Data

We used administrative data linking teacher preparation, licensure, and other staffing information. For Tennessee, these data were provided to the Tennessee Education Research Alliance at Vanderbilt University by the

Tennessee Department of Education via a longstanding data use agreement. For Kentucky, data were shared via the Kentucky Center for Statistics (KYSTATS), which collects and links education and workforce data across the state.

Both states' data files report teachers' individual characteristics (e.g., sex, race/ethnicity, age), school assignments, and characteristics of those schools each year. They also contain teachers' licensure status and information about the preparation programs associated with their licenses. We used this information to categorize their preparation pathways, as explained in the next section.

For both states, we employed data spanning the 2016–17 to 2023–24 school years. We refer to school years by the spring year (i.e., 2016–17 is 2017). We focused our analysis on newly hired teachers, or those who have no prior years of experience teaching within the state.

Categorizing Educator Preparation Pathways in Tennessee and Kentucky

Both Tennessee and Kentucky have a variety of preparation pathways that prospective teachers can follow to obtain their initial teaching license and enter the profession. These pathways are commonly classified as either traditional educator preparation programs or non-traditional (sometimes labeled "alternative") certification programs for prospective teachers who do not hold a degree in education. Identifying traditional program completers in both states is relatively straightforward, but classifying non-traditional program completers is more challenging given differences in both programs and data across the two states.

Traditional Program Completers

As in most states, traditional preparation programs in Tennessee and Kentucky are offered by accredited colleges and universities, providing prospective educators with coursework and training experiences and preparing to pass the appropriate licensure examination prior to becoming a full-time teacher. Most traditional completers are undergraduate students, although prospective teachers who enroll in and complete a master's degree in education prior to starting as a full-time teacher are classified as a traditional completer as well. In Tennessee's data, we identify traditional

teachers by their clinical preparation; they complete student teaching prior to obtaining a license. Kentucky's data explicitly labels traditional completers.

We use the following categories throughout to classify preparation pathways:

1. Traditional BA: Completer of a traditional preparation program with a bachelor's degree
2. Traditional, Post-Baccalaureate (MA+): Completer of a traditional preparation program with a master's degree
3. Non-Traditional, University-Based (IHE): Licensee in a post-baccalaureate teacher preparation program concurrently with employment as a teacher in a school district
4. Non-Traditional, Teacher for America (TFA): Licensee placed in a participating school district by Teach for America
5. Non-Traditional, Other: Licensee in a local district training program or residency program that offers teacher certification and is not housed in a college or university
6. Out-of-State: Licensee who completes a teacher preparation program or obtains a teaching license out-of-state
7. Missing: No preparation history is available for this teacher

Non-traditional Program Licensees in Tennessee

"Non-traditional" or alternative licensees in Tennessee are those who engage in a paid clinical experience or internship in lieu of student teaching. These programs include university-based programs, such as "job-embedded" programs that allow people who already have bachelor's degrees to begin teaching while completing training requirements. They also include Teach For America (TFA),[1] as well as other programs, such as the Nashville Teacher Residency and Memphis Teacher Residency, that are not run by a college or university but that allow teachers to be employed during preparation.

For our analysis, we separate these non-traditional licensees into those who are enrolled in or have completed (1) a university-based program (e.g., job-embedded), (2) TFA, or (3) another non-university non-traditional program, such as a residency. We identify the pathway of non-traditional licensees using educator preparation data, which identifies an individual's clinical experience (student teaching, job-embedded, or internship), as well as the program where an individual is completing training or the college/university where he/she is working towards a graduate degree. In Tennessee, TFA corps members are placed in two major regional centers in Tennessee - Memphis and Nashville-Chattanooga.

[1] Teach for America (TFA) is a national nonprofit organization that recruits, trains, and supports recent college graduates for career placement in participating school districts. TFA teachers make a commitment to teach for a minimum of two years.

Non-traditional Program Licensees in Kentucky

The Kentucky Department of Education offers numerous non-traditional, in-state routes to initial teacher certification. Kentucky teachers who do not complete a traditional, in-state program can enter the profession through one of nine state-approved alternative routes to certification (ARCs). These are open to individuals who already hold a bachelor's degree or demonstrate relevant work experience. Each route targets slightly different populations. Routes include:

Option 1: Exceptional Work Experience for Teaching Grades P-12
Option 2: Local District Training Program for Teaching Grades P-12
Option 3: College Faculty for Teaching Grades 8-12
Option 4: Adjunct Instructor for Teaching Grades P-12
Option 5: Veterans of the Armed Forces
Option 6: University-Based Alternative Route for Teaching Grades P-12
Option 7: Institute Alternative Route
Option 8: Teach for America (TFA)
Option 9: Expedited Route

The most common route that alternative completers take is option 6, which is a university-based alternative route that targets individuals who hold a bachelor's or master's degree in a non-teaching major to pursue initial teacher certification through an approved teacher preparation program at a participating Kentucky college or university. Upon admission to a program, the participating college or university produces a hiring eligibility letter for the candidate to submit to a hiring district. Teachers entering through this route begin teaching on a one-year Temporary Provisional certificate, which can be renewed up to four times while a candidate completes the relevant coursework for full certification. We label these teachers as "Non-traditional, university-based" to parallel the classification in Tennessee.

Kentucky's other alternative routes have smaller participation. As in Tennessee, we separate option 8 teachers, who enter via TFA to serve in districts in the Appalachian region of the state. Through this route, qualifying candidates receive a one-year temporary provisional certificate that may be renewed up to two times.

Entry through the remaining seven routes is small. We group these other entrants into the "non-traditional, other" category, recognizing that this group may be quite different from the similarly labeled group in Tennessee.

Out-of-State and Missing Licenses

Newly hired teachers in Kentucky are classified as an "out-of-state" completer if they hold a degree from a state other than Kentucky and did not enter via

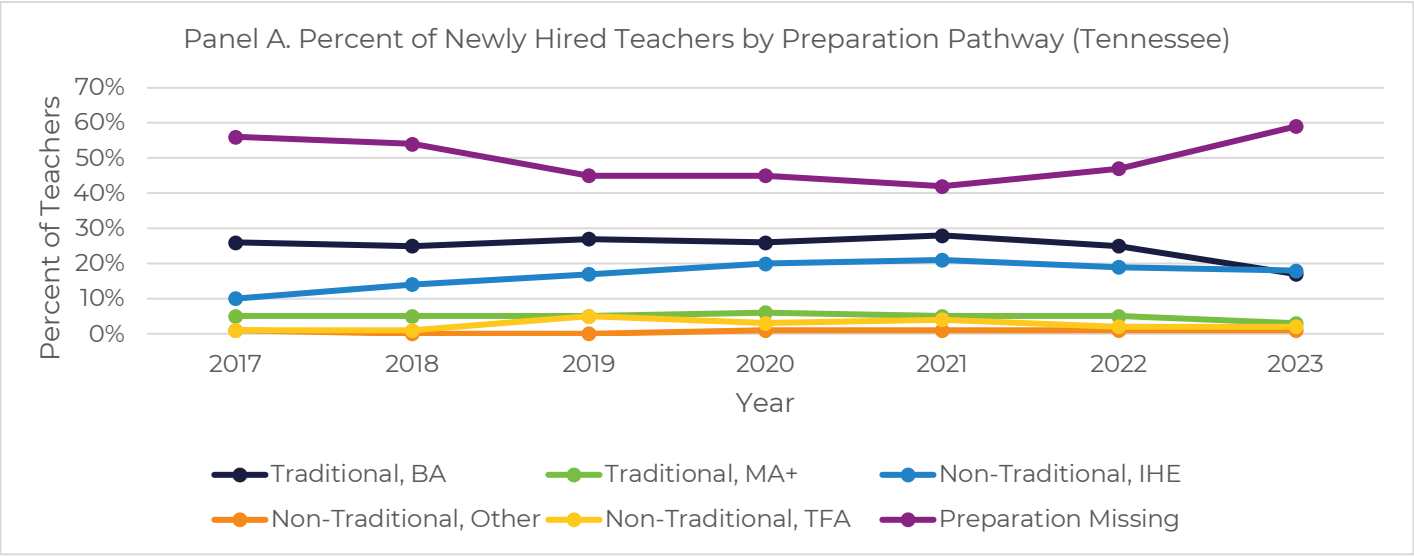
one of the aforementioned in-state routes. Kentucky's data assigns an in-state route or out-of-state label to nearly every new teacher, so those with "missing" pathway information are minimal.

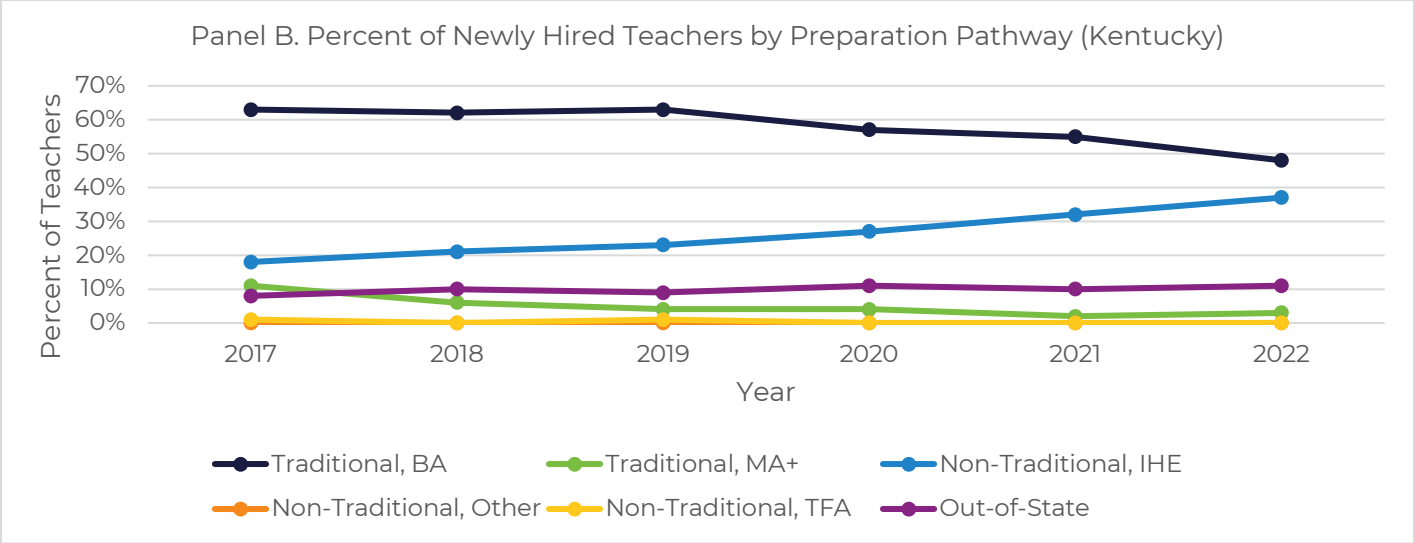
In contrast, Tennessee's data do not record preparation pathway for teachers who do not complete an in-state program. As a result, Tennessee has many teachers for whom pathway is labeled "missing." This group likely is overwhelmingly out-of-state program completers, though this group cannot be separated from those completing non-Tennessee-based programs with an in-state presence (e.g., the *iteach* program), or other teachers whose pathway information is unknown.

Setting the Stage: Changes in Teacher Entry by Preparation Pathway

Before we look at retention by preparation pathway, we first look at how enrollment into different pathways has changed over time and whether characteristics of beginning teachers are different by the different pathways. In both states, the proportion of teachers entering the state on new licenses by different pathways has shifted over the 2017 to 2023 timeframe. Entrants by pathway are shown in Figure 1.

Figure 1. More newly hired teachers are entering the profession through non-traditional routes.





In Tennessee (Panel A), among in-state licensees, traditional routes remain more common than non-traditional routes. However, teachers coming from traditional vs. non-traditional routes have nearly reached parity as the proportion from traditional Bachelor degree programs has declined (especially since 2021) and as a growing proportion of teachers come from non-traditional programs—especially university-based programs. In 2017, 26% of newly hired teachers who had completed an in-state program came through a traditional Bachelor's degree route. In 2023, that proportion was just 17%. In contrast, teachers completing either a job-embedded or internship clinical experience through non- traditional routes made up 12% of newly hired teachers from in-state programs in 2017 and 21% of newly hired teachers in 2023.

Another important pattern from Panel A is that the fraction of new Tennessee licensees for whom preparation information is missing—likely a proxy for being out-of-state—also changes over time. In 2017, 56% fell into this category. This proportion then declined through 2021 before rebounding to approximately its original proportion by 2023.

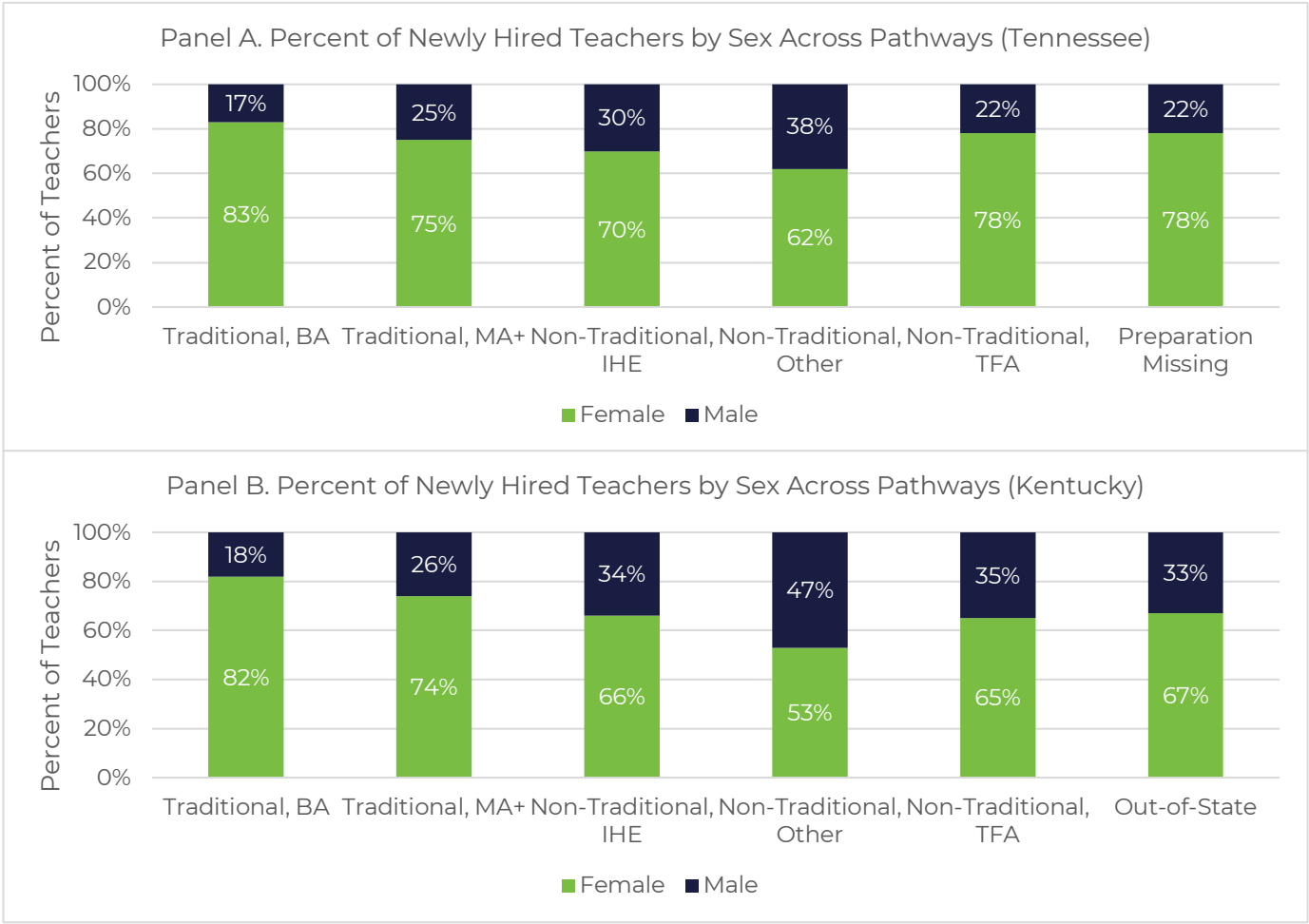
Kentucky (Panel B) has seen shifts like Tennessee's in the relative importance of non-traditional university-based routes, which have grown in proportion every year since 2017, approximately doubling in proportion (18% to 37%). At the same time, the fraction of teachers entering through traditional BA or BS routes have fallen from 62% to 47%.

Key Finding 1:

In both Kentucky and Tennessee, newly hired teachers entering through non-traditional routes are more likely to be male, non-White, and older than those entering through traditional routes. Non-traditional route teachers are also more likely to have middle/secondary endorsements.

The section documents characteristics of teachers entering teaching in Tennessee and Kentucky by different preparation pathways. Specifically, we examine differences by sex, race/ethnicity, age, and endorsement area.

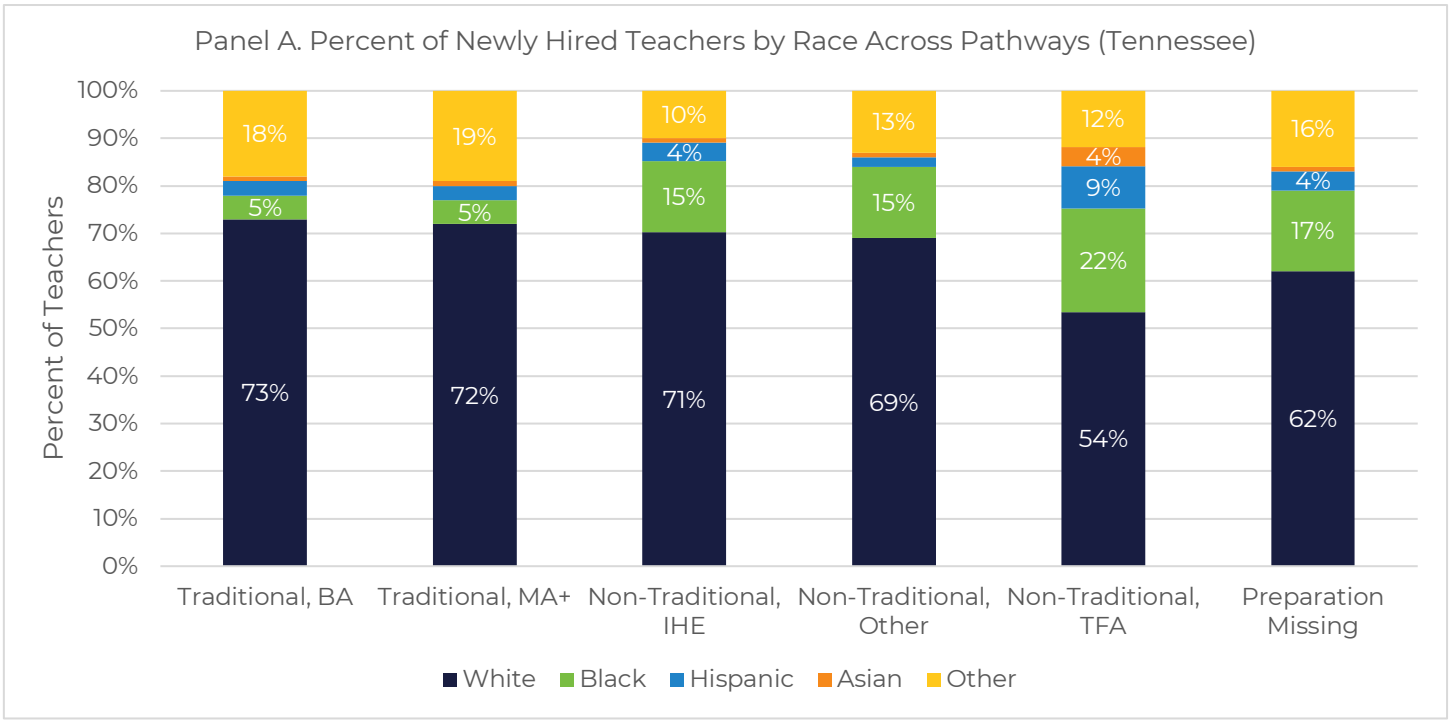
Figure 2. Non-traditional completers in both Tennessee and Kentucky are more likely to be male compared to traditionally prepared new teachers.

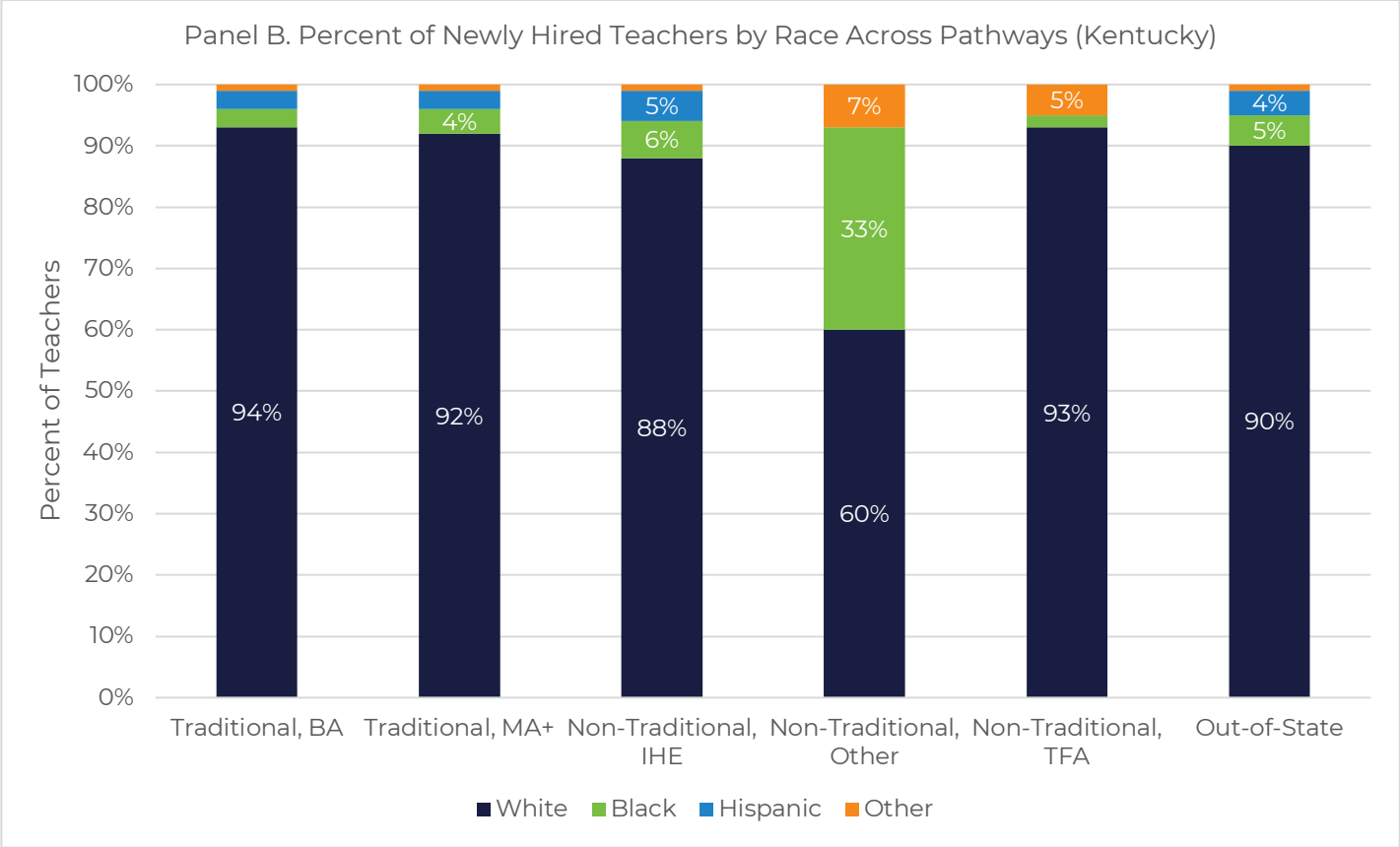


Between 2017 and 2023, 77% of all newly hired teachers in Tennessee were female. Looking across preparation pathways, we observe traditional BA or BS completers are 84% female, which has remained relatively consistent over time (see Panel A). By comparison, university-based non-traditionally prepared teachers are only 70% female on average. All non-traditional routes are proportionally less female compared to traditional BA or BS completers.

Between 2017 and 2023, 77% of all newly hired teachers in Kentucky were female. Similar to Tennessee, a greater proportion of newly hired teachers who complete non-traditional preparation programs are male, compared to traditionally prepared new teachers. On average, the percent of newly hired teachers who complete traditional BA o BS routes are 82% female (Panel B). Newly hired teachers completing non-traditional, university routes are 66% female. These trends have remained consistent over time.

Figure 3. Non-traditional completers across both states are more likely to be teachers of color, compared to traditionally prepared new teachers.

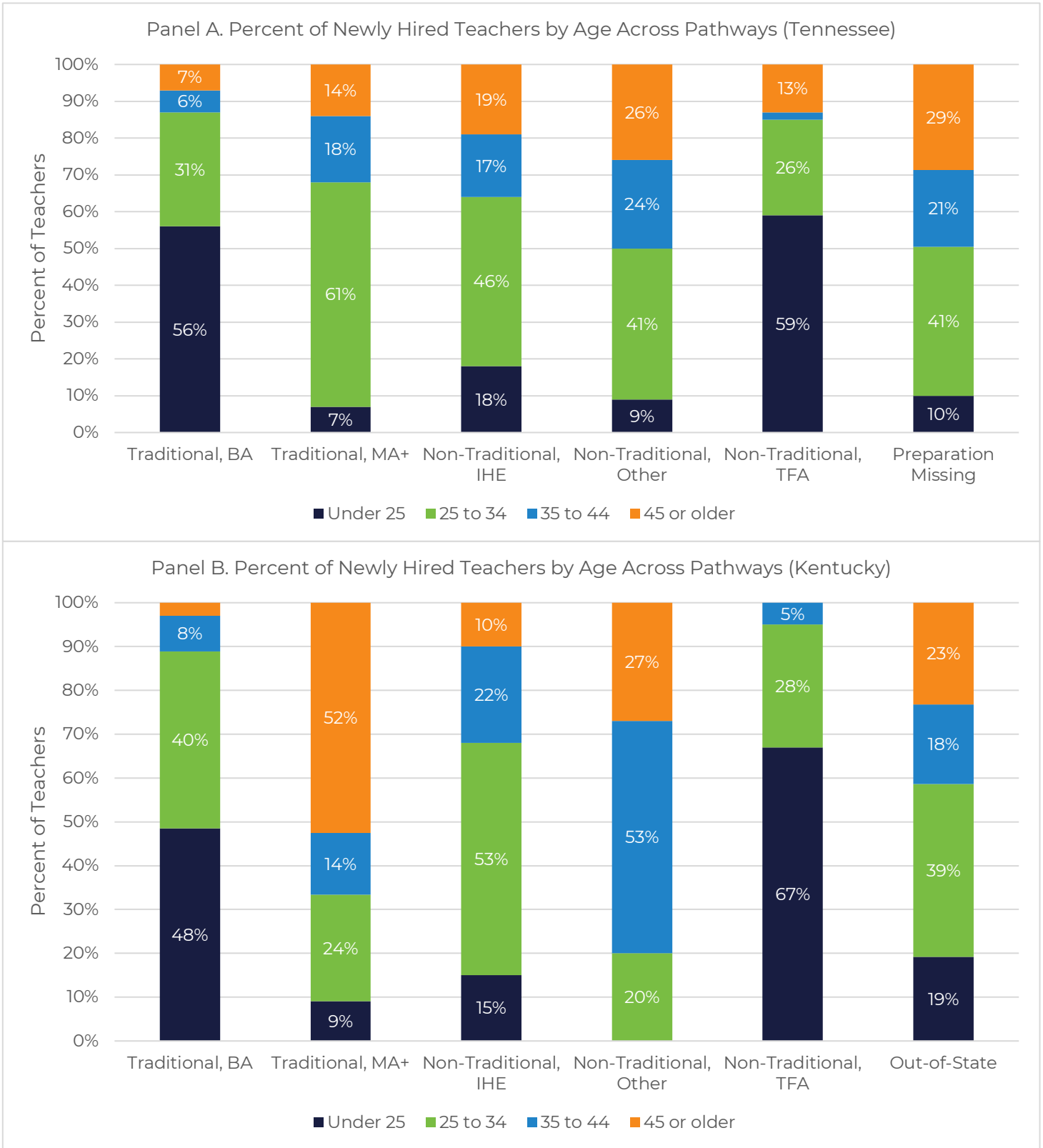




A greater proportion of non-traditional completers in Tennessee are teachers of color, compared to traditionally prepared new teachers (Panel A). We see no significant changes numerically in the number of newly hired teachers by racial or ethnic diversity. However, Black completers do make up smaller proportions of non-traditional pathways in recent years. On average, in Tennessee, traditional BA or BS completers are 73% White, which has remained stable over time. While the number of teachers of color participating in non-traditional routes has remained small but steady over time, growing take-up of non-traditional routes by White teachers has reduced the proportion of teachers of color.

In Kentucky, a greater proportion of non-traditional completers (university-based and other) are teachers of color, compared to traditionally prepared new teachers (Panel B). On average, traditional BA or BS completers are 94% white. By comparison, teachers who complete alternative other routes are 60% White and 33% Black. There are no distinct changes over time in the racial or ethnic composition of incoming teachers based on their preparation pathway. The proportion of non-White teachers across the state is relatively small overall.

Figure 4. Aside from traditional BA or BS routes and TFA, most newly hired teachers are older than 25.



In Tennessee, the age of teachers trends younger for incoming traditional BA and BS and TFA completers. On average, 56% of traditional BA and BS completers and 59% of TFA completers are 25 or younger when they begin teaching. Newly hired teachers who complete other routes are older. Non-traditional routes target teachers who already hold non-teaching degrees or are switching careers. As a result, newly hired teachers completing these routes trend older. Interestingly, the proportion of incoming teachers aged 45 or older has grown significantly over time across all pathways. In other words, the average age of newly hired teachers in Tennessee is growing older over time.

In Kentucky, the patterns by age are less clear, however, we observe similarly that newly hired traditional BA and BS and TFA teachers are the youngest. On average, 48% of traditional BA and BS completers and 67% of TFA completers are 25 or younger when they begin teaching. Between 2017 and 2022, the average age of out-of-state incoming teachers decreased from 40 to 34. The average age of non-traditional, university-based teachers increased slightly over time from 31 to 33. We do not observe the same growth in newly hired teachers aged over 45 in Kentucky.

We also explore the endorsement types that teachers hold when they enter the profession in Tennessee and Kentucky. While this analysis is not inclusive of all the extracurricular endorsements that a teacher may hold, we sought to capture demand across school levels, as well as investigate endorsement types across high-demand areas. The figures reflect the endorsements or certifications that a teacher holds when they first enter the profession, and do not include any subsequent endorsements a teacher may acquire after they begin teaching. The figures in this section focus on elementary, middle and secondary endorsements.

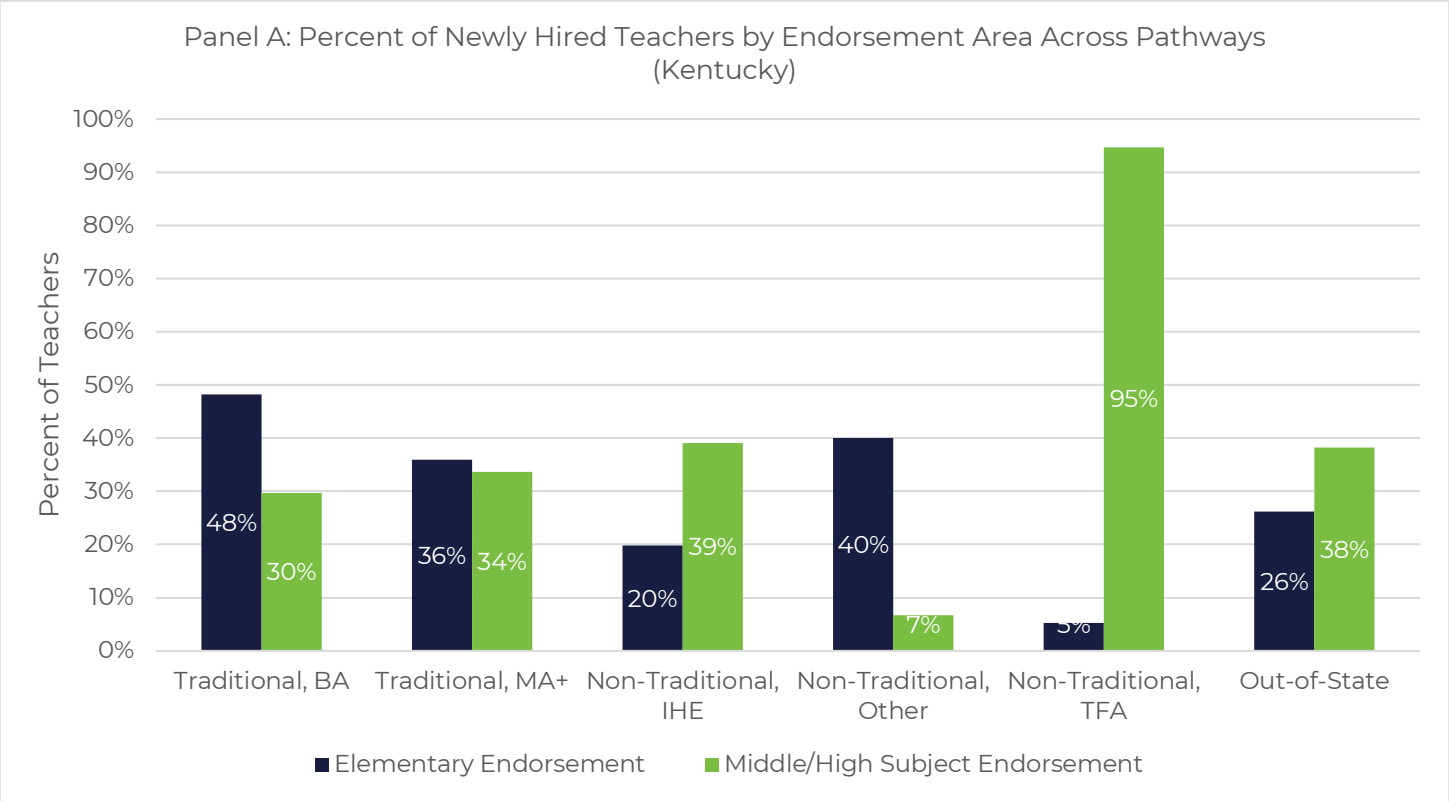
Figure 5. Non-traditional routes in Tennessee produce a greater proportion of teachers with middle/secondary endorsements.

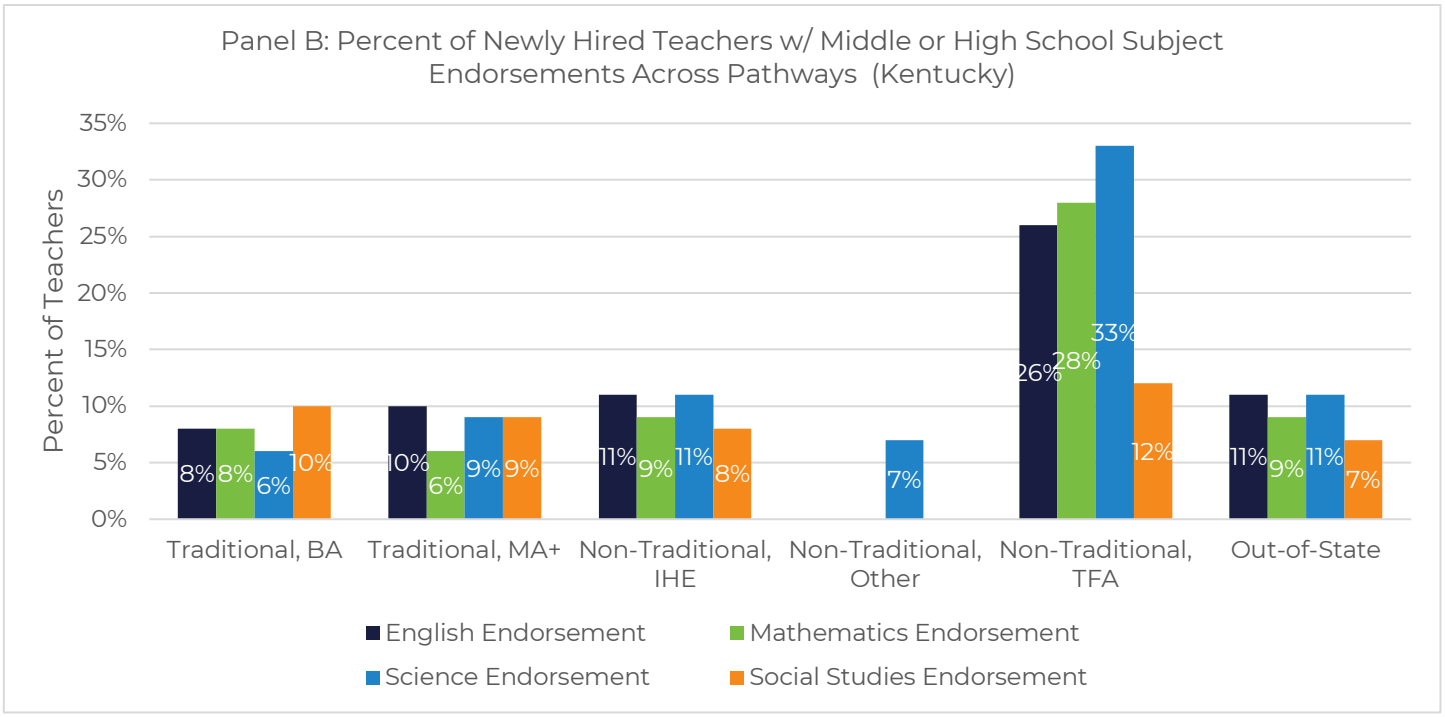
Note. Tennessee endorsements and certifications are captured from professional certification files. Middle and High School Subject Endorsement includes English, Mathematics, Sciences, and Social Studies for grades 6-12. Health, Arts, Special Education, ESL, Languages, CTE endorsements are not included. Panel A combines middle and high school endorsements for teachers who hold one more subject area endorsement.

In Tennessee, traditional BA and BS routes produce the greatest proportion of early childhood elementary (ECE) and elementary endorsements for newly hired teachers (Figure 5 Panel A). Conversely, non-traditional and traditional MA+ routes produce a greater proportion of middle subject and secondary subject endorsements. Roughly 45% of traditional BA and BS completers hold an ECE or elementary endorsement when they begin teaching.

We continue to observe patterns when we examine secondary and specialty endorsements more closely (Panel B). Interestingly, we find that non-traditional, other pathways in Tennessee produce a greater proportion of teachers with English endorsements than other pathways. Incoming teachers trained in-state with special education teachers primarily come through the traditional BA or BS route. However, it is important to note that a large proportion of newly hired teachers with special education endorsements are "missing preparation" in Tennessee. We are unable to discern whether these teachers are entirely new to the profession or moving from another state with prior teaching experience.

Figure 6. Almost half of newly hired teachers who complete traditional BA and BS pathways hold an elementary endorsement.





Note. Newly hired teachers may hold more than one endorsement type. Kentucky endorsements and certifications are captured from credential descriptions. Middle/High subject endorsements capture teachers who hold one or more endorsements to teach English, mathematics, science, or social studies. Health and CTE endorsements are not included. Panel A combines middle and high school endorsements for teachers who hold one more subject area endorsement.

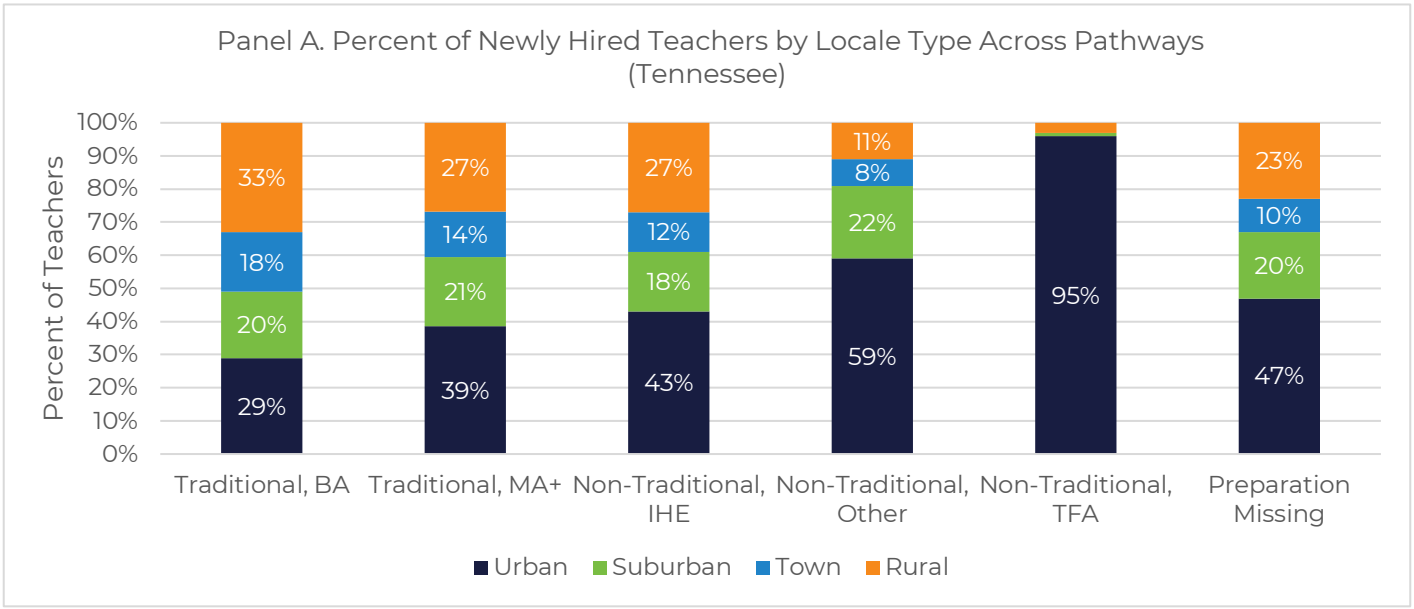
In Kentucky, we observe that traditional BA or BS, traditional MA+, and non-traditional, other routes produce large proportions of teachers who hold elementary endorsements (Figure 6 Panel A). Conversely, incoming teachers who hold special education endorsements are less likely to have completed a traditional preparation program.

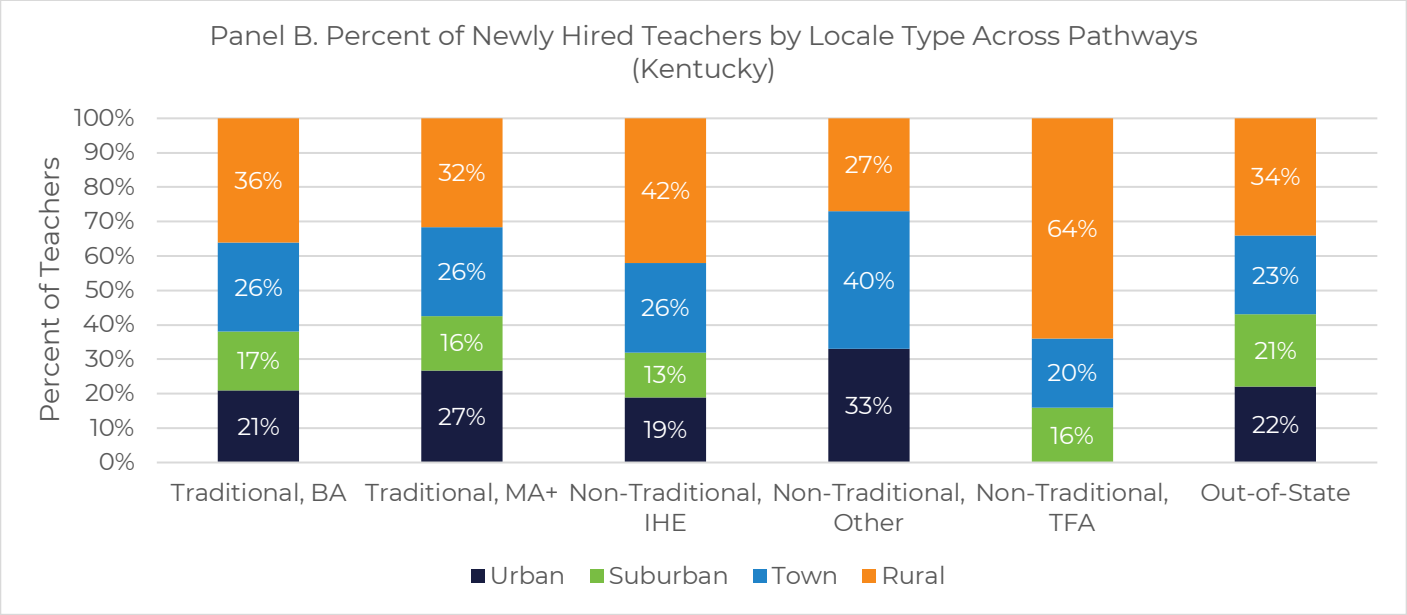
Key Finding 2:

Newly hired teachers entering through non-traditional preparation pathways are more likely to teach in upper grades and in schools serving more economically disadvantaged students and students of color.

In this section, we examine patterns in the characteristics of newly hired teachers' initial school placements by preparation pathway. Because preparation routes are not distributed evenly across each state, we expect that preparation pathways sort teachers into different types of schools. School locale types are derived from the NCES school locale assignments and grade level placements come from state school staff files.

Figure 7. Teachers entering through non-traditional routes are more likely to teach in urban areas in Tennessee. In Kentucky, some teachers who enter through non-traditional routes have no options for urban placements and others find placements in similar patterns to those entering through traditional routes.





In Tennessee, we observe differences across preparation pathways in placement for newly hired teachers by locale type. This may be partially explained by geographic availability of various pathways. For example, "other" non-traditional routes such as district residency programs and Teach for America (TFA) are clustered in urban school districts. TFA placements in Tennessee are only in Nashville and Memphis. These programs target teacher placement in high-needs, urban schools, which is reflected in the sorting patterns in Figure 7.

Looking at other preparation routes in Tennessee, we observe that rural and town schools hire a greater proportion of teachers who complete traditional BA degrees than suburban and urban schools. In urban and suburban schools, half of newly hired teachers are missing preparation data. This suggests that half of teachers working in these schools were trained out-of-state.

In Kentucky, greater proportions of teachers from non-traditional, university-based and TFA programs are initially working in rural schools. TFA in Kentucky targets placement in Appalachian schools. By design, there are no TFA teachers starting in urban schools. We do not observe any other stark differences in initial sorting by preparation pathway for newly hired teachers in Kentucky.

Figure 8. Across both states, over half of traditional BA completers initially work in elementary schools.

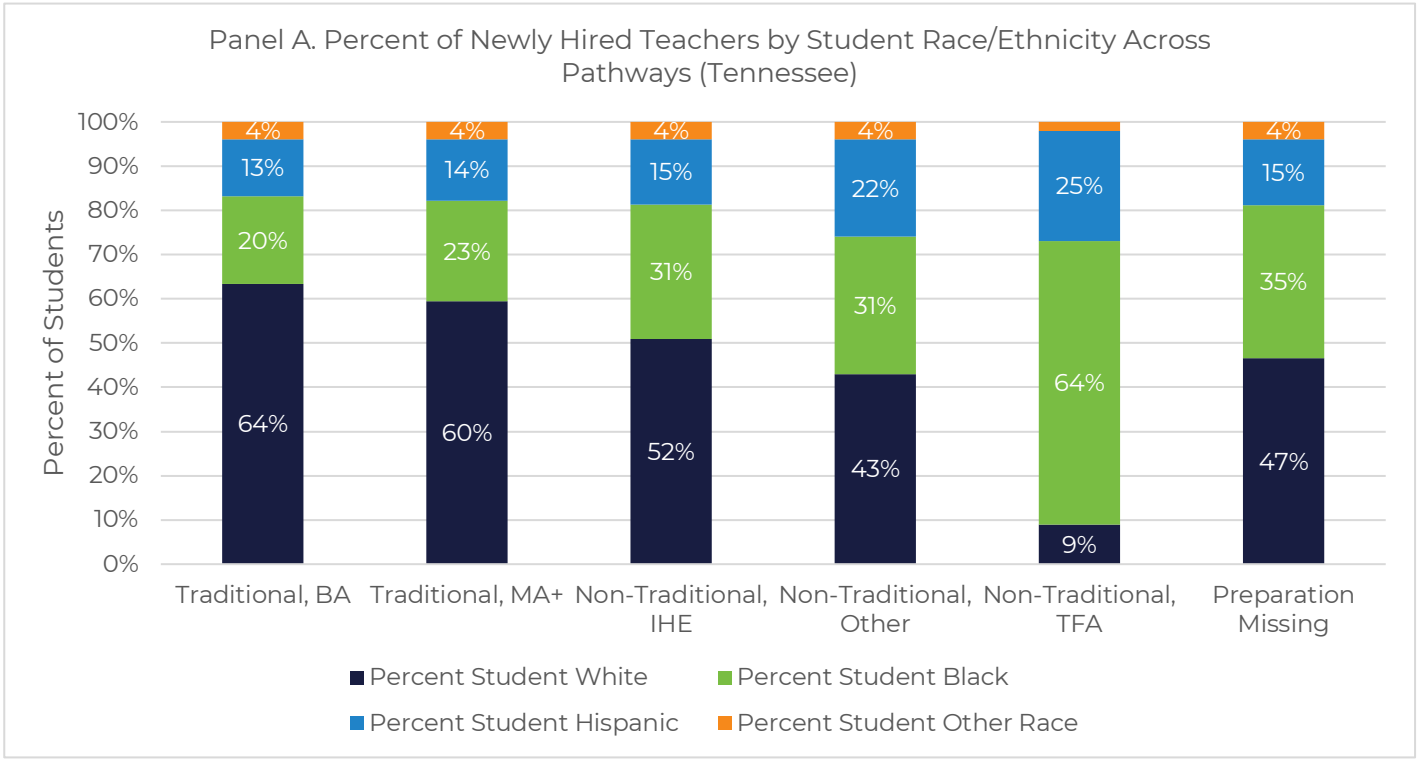
Note. School level in Kentucky is assigned based on the highest grades offered (primary) or lowest grade offered (secondary) in a school.

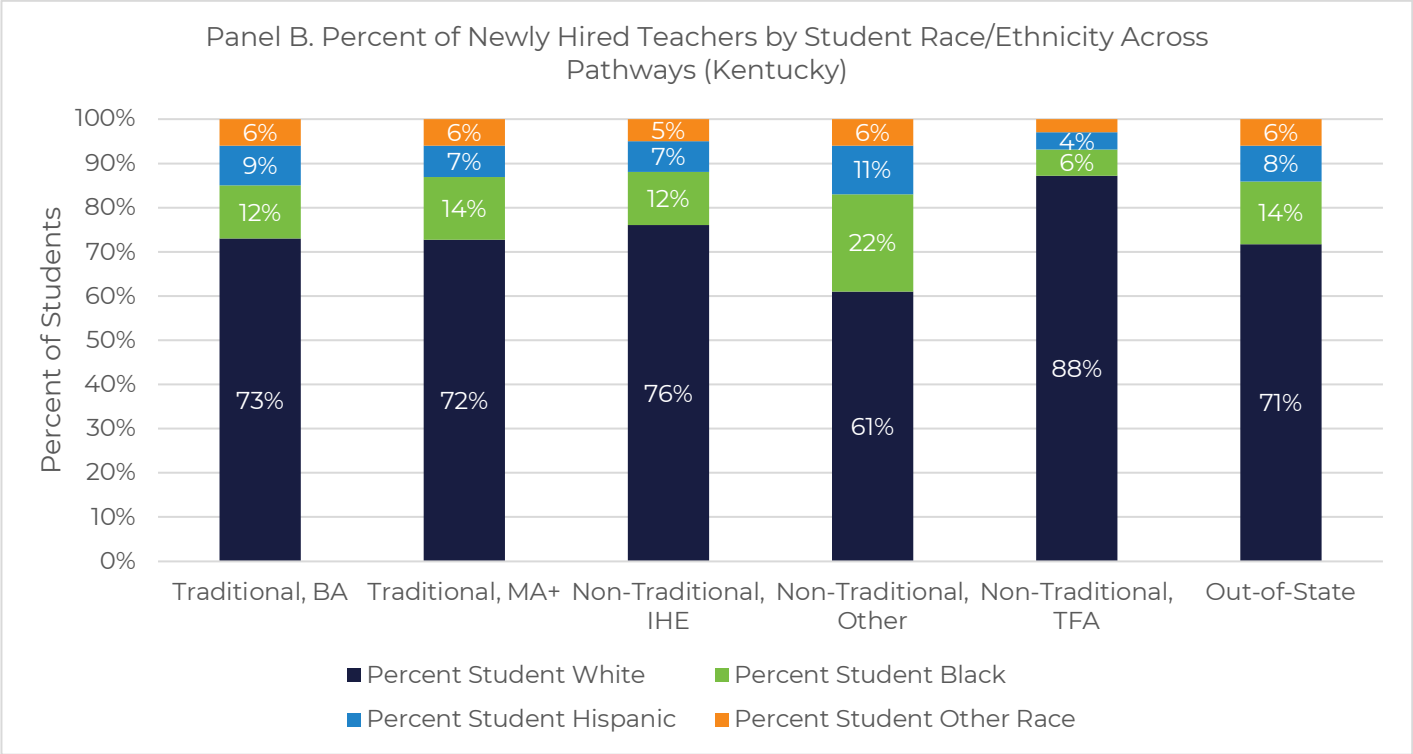
We observe that pathways are preparing incoming teachers for different types of teaching positions. In Tennessee, over half of traditional BA and BS completers work in schools serving grades K-5. While newly hired teachers across all routes have a significant proportion of teachers working in elementary schools, a greater proportion of completers from non-traditional routes work in middle and high schools. When we look at sorting by school type, we observe that schools serving grades 9-12 hire more teachers who complete non-traditional, university-based programs than other schools.

We observe similar sorting patterns in Kentucky. Over half (57%) of traditional BA and BS completers initially work in primary (PK-5) schools. On the other hand, greater proportions of traditional MA+, non-traditional completers, and out-of-state teachers work in secondary (6-12) schools.

A focus of many non-traditional programs is to place teachers in high-needs or hard-to-staff schools. This likely explains many of the school sorting patterns observed.

Figure 9. Non-traditionally prepared teachers work in schools with greater proportions of students of color, on average.





In Tennessee, teachers who complete traditional BA or BS programs work in schools with the greatest proportion of White students. Completers of non-traditional routes work in schools serving larger proportions of students of color. This is particularly true for TFA teachers in Tennessee. These sorting patterns can be attributed to the distribution of students across schools. In Tennessee, students of color are clustered in urban districts where many non-traditional pathways into teaching are also located. As a result, non-traditional completers work in schools where their pathway program is located.

In Kentucky, non-traditional, other completers work in schools with greater proportions of students of color. Teachers completing these routes go through local district training programs and are placed in schools with staffing needs. TFA teachers work in schools with greater proportions of White students, which is reflective of the Appalachian region for TFA placements in the state.

Figure 10. Teachers who enter through non-traditional other and TFA programs serve greater proportions of students who are economically disadvantaged, on average.

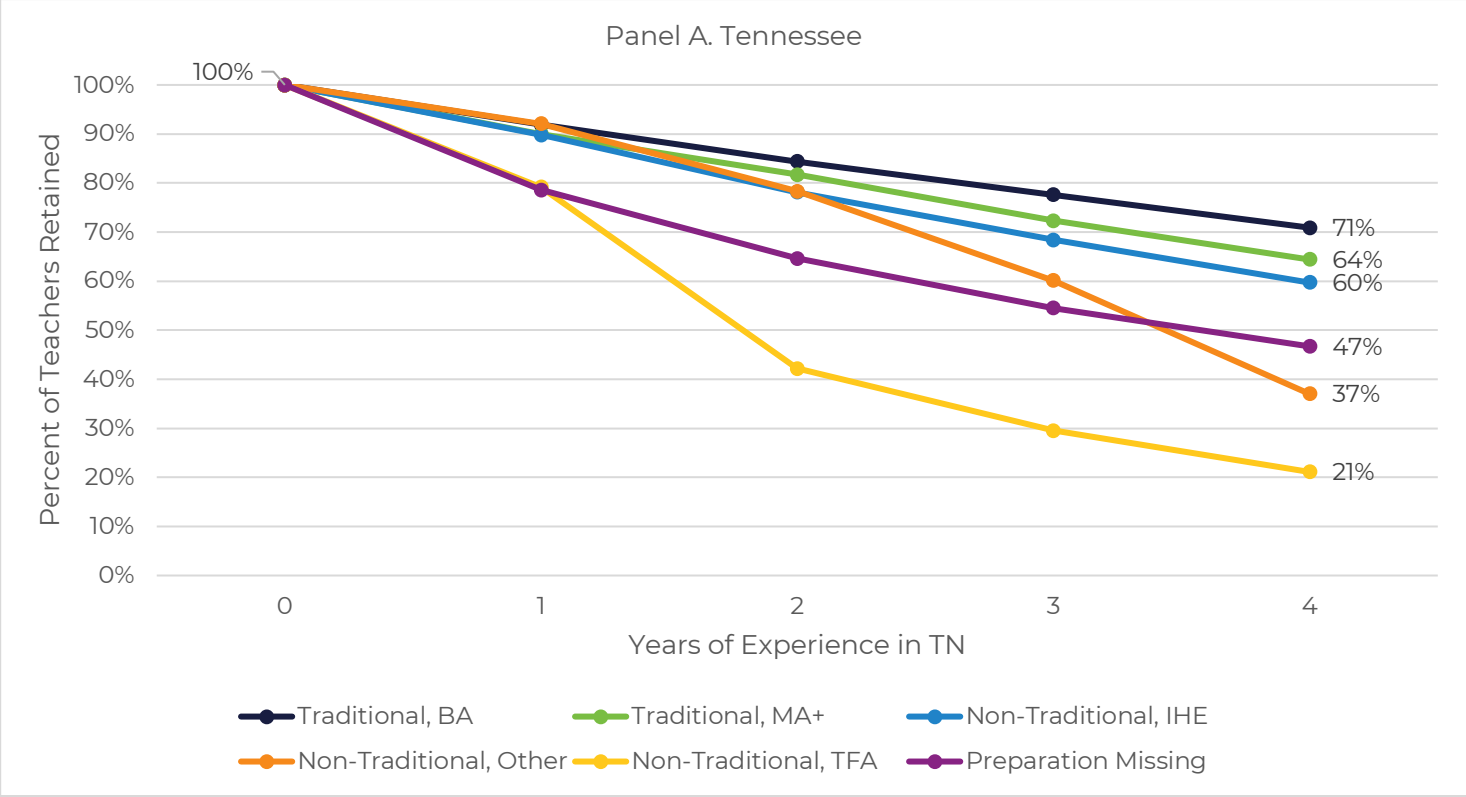
Note. In 2017, both Tennessee and Kentucky used a measure of Free and Reduced Price Lunch (FRPL) as a proxy for economic disadvantage (ED). Both states adopted new measures in 2018. Across both states, TFA teachers predominantly work in schools serving high proportions of economically disadvantaged students. This is reflective of the program's target of placing teacher in high-needs schools.

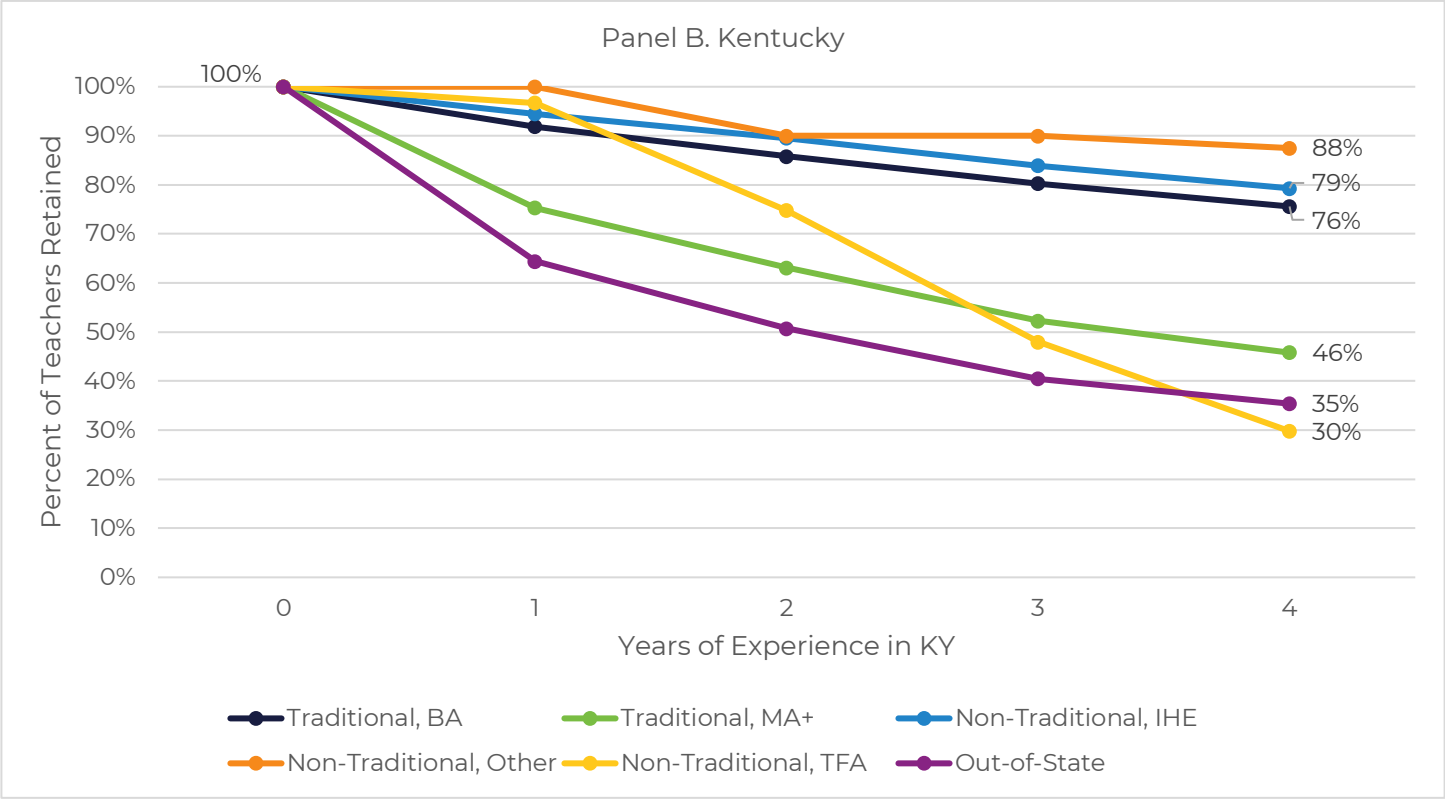
Key Finding 3:

Non-traditional teachers in Tennessee and out-of-state teachers in Kentucky have lower retention rates, but these differences are likely driven by differences in teacher and school characteristics.

Next, we examine the relationship between a teacher's preparation pathway and early-career retention. We first look at descriptive patterns in teacher retention to understand what proportion of teachers from each preparation route are still in the profession after five years. In our analysis, teachers are retained if they remain teaching within the state (and can be observed in our data). We do not differentiate between teachers who may move to new teaching positions in another school or district.

Figure 11. By the start of year five, 70% of traditional BA and BS completers are still working as a teacher in both states.





Note. The graph above shows the proportion of teachers who remain teaching in the state averaged across cohorts of teachers who begin teaching between 2017 and 2022. Not all cohorts can be observed for the full five years. Zero years of experience marks a teacher's first year in the state.

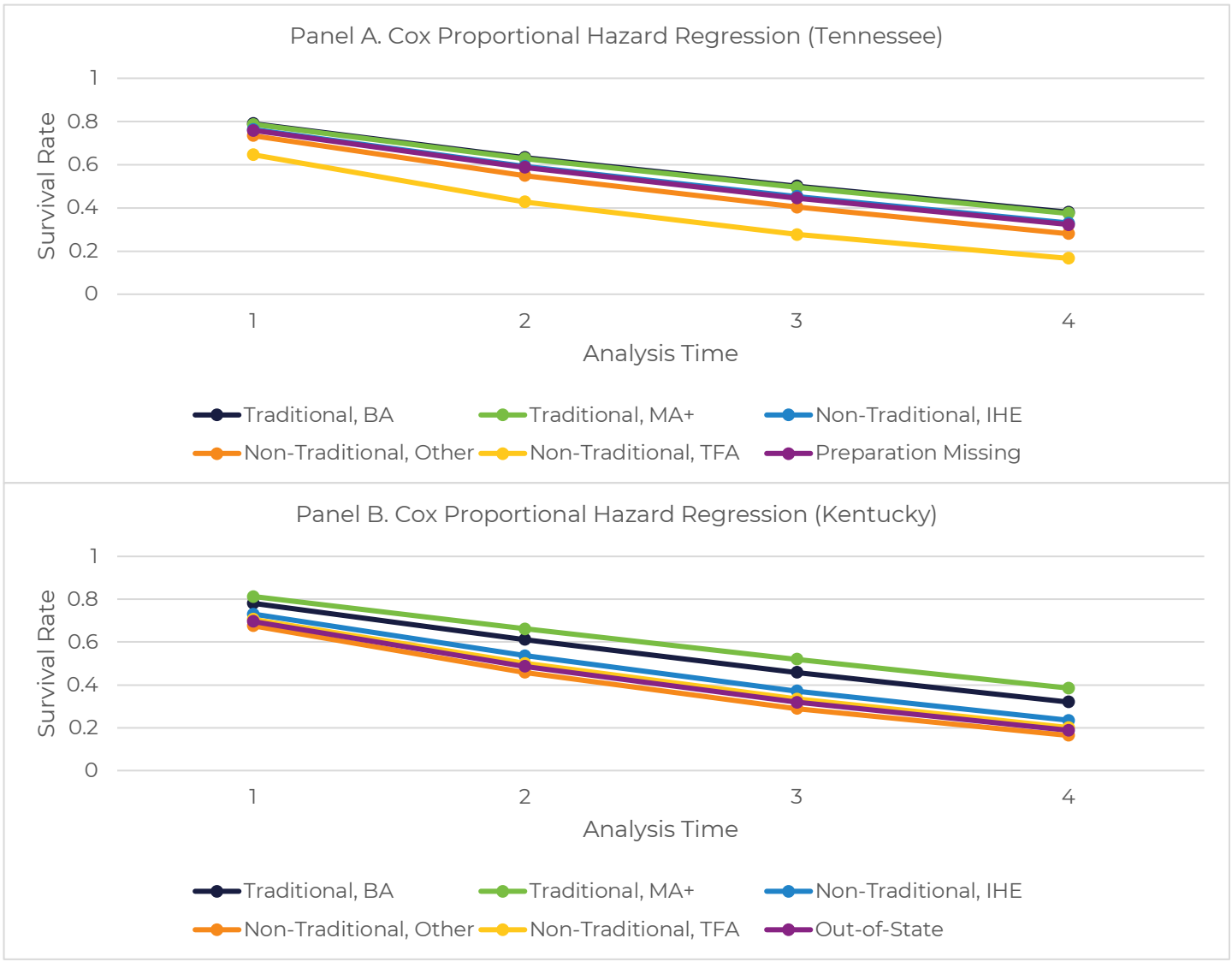
In Tennessee, by the start of year five, 70% of traditional BA and BS completers are still working as a teacher in the state. Exit rates are relatively stable across the first five years for traditionally prepared teachers. Although we observe low retention among TFA teachers after the second year, this is expected as part of the program's design.

In Kentucky, by the start of year five, 75% of traditional BA and BS completers and 80% of non-traditional, university-based teachers are still working in the state. In Kentucky, alternative routes (other than TFA) have the highest retention rates by a teacher's fifth year. By the start of year three, about half of out-of-state teachers are no longer working in the state.

To better understand what predicts a teacher's likelihood of retention, we use Cox proportional hazard models to estimate the effect of a teacher's

preparation pathway on the risk of a teacher not being retained within the profession.[2]

Figure 12. In both Tennessee and Kentucky, some preparation pathways are significantly associated with teacher retention even when controlling for individual and school characteristics.



[2] A Cox proportional hazard model is a regression model that is designed for analyzing situations where you want to understand how different factors influence the time until an event occurs. In our study, we use this model to estimate the effect of preparation pathways on the likelihood that a teacher is not retained within the first five years of teaching. One of the key advantages of this model, compared to standard regression models, is that it can handle censoring. Censoring occurs when you do not observe the event of interest for all participants during the study period. In the case of our study, we do not observe the first five years of teaching for all cohorts of newly hired teachers. In addition, teachers may exit the data prior to reaching their 5th year. In a standard regression, censored observations can lead to biased results, as the model conditions on teachers who make it to the 5th year. Cox models are specifically designed to account for this, allowing us to still draw meaningful conclusions even with censored data.

Note. Our Cox proportion hazard model's outcome of interest is a binary measure of retention (1=retained). Failure is measured when retention is 0. The observed time interval is experience. Model covariates include preparation pathway individual characteristics (sex, race, age, logged salary), and school characteristics (student race, % special education, % ED, % immigrant or EL, student sex, school locale, logged enrollment, school level). Standard errors are clustered at the school level. Graph plots the survival function (retention) holding covariates constant at the mean. See Appendix Table 1 for full list of covariates.

In both Tennessee and Kentucky, a teacher's preparation pathway can alter a teacher's risk of not being retained within the profession within the first five years. In Tennessee, non-traditional, TFA teachers have a higher risk of not being retained. Tennessee teachers who complete traditional routes have the lowest risk of not being retained. In Kentucky, teachers who complete traditional routes also have the lowest risk of not being retained, with traditional MA+ completers exhibiting the highest survival rates for being retained. Kentucky teachers who enter through non-traditional other or TFA pathways, as well as those who come from out-of-state, have a greater risk of not being retained.

We find that school characteristic measures are associated with the risk of turnover for early career teachers. In Tennessee, teachers who initially work in less effective, high-poverty schools are less likely to be retained. In both Kentucky and Tennessee, teachers in secondary schools (or high schools) have a greater risk of not being retained compared to teachers who work in elementary schools. When accounting for a teachers' effectiveness in Tennessee, there is a greater risk of turnover among less effective teachers. In both states, a newly hired teacher's age is also associated with retention, as older teachers have a lower risk of not being retained than newly hired teachers in their twenties.

Discussion & Conclusion

The findings from this study highlight the complex relationship between teacher preparation pathways and early-career retention. Traditional preparation programs continue to be the dominant entry route into the teaching profession. However, non-traditional pathways are expanding across states, increasing access to the profession particularly for individuals from underrepresented backgrounds. Despite this growth in pathways, disparities in retention rates suggest that while non-traditional routes increase teacher supply, they may not yet provide the same level of long-term stability within the workforce.

Additionally, retention challenges are more pronounced in high-need subject areas and schools serving economically disadvantaged students, indicating systemic issues that extend beyond preparation alone. Addressing these challenges requires a multi-faceted approach.

This study underscores the importance of preparation pathways in shaping early-career teacher retention in Tennessee and Kentucky. While non-traditional preparation routes have expanded access to teaching, they present unique retention challenges. Addressing these requires a holistic approach, integrating targeted recruitment, professional development, and improved working conditions. By prioritizing these strategies, states can strengthen their teacher workforce to better serve diverse student populations.

Policy Implications

1. **Strengthening Support for Non-Traditional Pathways into Teaching**
   Given the growing reliance on non-traditional routes, states should enhance mentoring, professional development, and financial incentives to ensure the long-term retention of these educators. This may also include addressing barriers to licensure for out-of-state and non-traditional candidates.
2. **Targeted Retention Strategies for High-Needs Subjects and Schools**
   Schools with high attrition rates require targeted policies to attract and retain qualified teachers. These may include offering financial incentives for teachers in high-poverty and high-need schools.
3. **Focus on Rural Schools**

Rural and isolated schools should develop incentives to attract teachers. These districts should invest in local teacher training programs to build community-based pipelines into the profession.

4. **Data-Driven Policy Adjustments**
   Continuous monitoring of teacher workforce trends, using disaggregated data on retention rates by preparation pathway and school context, will help refine and tailor policies to reflect local needs.

By addressing these policy areas, state and district leaders can foster a more stable and diverse teacher workforce. Future research should continue to explore the long-term career trajectories of teachers from different preparation backgrounds and the impact of retention-focused policies on schools and the students they serve.

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Appendix Table 1
Cox proportional hazard model for the association between teacher retention and individual and school characteristics

Panel A. Tennessee

Characteristic	Estimate	Standard Error	Hazard Ratio (HR)
Female	0.00	0.01	1.00
Black	0.00	0.03	1.01
Hispanic	0.03	0.04	1.07
Asian	0.01	0.07	1.01
Other	0.04*	0.05	1.09
Age 30-39	-0.04***	0.01	0.91
Age 40-49	-0.07***	0.02	0.85
Age 50-59	-0.10***	0.02	0.79
Age 60+	-0.06**	0.04	0.87
Salary (Logged)	0.25***	0.18	1.79
Pct Asian Students	-0.20*	0.12	0.64
Pct Black Students	0.08***	0.06	1.20
Pct Hispanic Students	0.03	0.07	1.07
Pct Other Students	0.32**	0.54	2.10
Pct Immigrant Students	1.00***	2.15	10.01
Pct Students with Disabilities	0.09	0.16	1.24
Pct ED Students	0.13***	0.14	1.34
Pct Female Students	-1.48***	0.01	0.03
Suburban School	0.03	0.03	1.06
Town School	0.02	0.04	1.04
Rural School	0.02	0.03	1.04
Enrollment (Logged)	-0.07***	0.02	0.85
Grades 5-8	0.01	0.03	1.02
Grades 9-12	0.03**	0.03	1.08
Mixed/Other	0.01	0.04	1.02
N = 56,734			

Note. Parameter estimates are transformed into hazard ratio metrics for ease of interpretation (HR = exp[β]). HR > 1 indicates a higher hazard of failure (not being retained) for higher values of the predictor. Reference groups for covariates include male, White, age 20-29, pct. White students, urban schools, and grades K-4. Standard errors are clustered at the school-level.
* p<.05,
** p < .01,
*** p < .001

Panel B. Kentucky

Characteristic	Estimate	Standard Error	Hazard Ratio (HR)
Female	0.00	0.02	1.00
Black*	0.00	0.00	1.00
Hispanic	0.00	0.00	1.00
Other	0.00	0.00	1.00
Age 30-39***	-0.06	0.02	0.87
Age 40-49*	-0.04	0.04	0.91
Age 50-59*	-0.05	0.05	0.90
Age 60+	0.00	0.13	1.01
Salary (Logged)***	0.34	0.31	2.19
Pct Asian Students***	-2.73	0.00	0.00
Pct Black Students	0.00	0.00	1.00
Pct Hispanic Students	0.00	0.00	1.00
Pct Other Students	0.02	0.01	1.05
Pct EL Students***	0.85	2.92	7.07
Pct Students with Disabilities***	0.74	1.73	5.52
Pct ED Students***	-0.33	0.06	0.47
Pct Female Students	0.05	0.52	1.12
Suburban School	0.00	0.00	1.00
Town School	0.00***	0.00	1.00
Rural School	0.00***	0.00	1.00
Enrollment (Logged)	0.06***	0.04	1.14
Secondary School	0.09***	0.05	1.24
N = 24,914			

Note. Parameter estimates are transformed into hazard ratio metrics for ease of interpretation (HR = exp[β]). HR > 1 indicates a higher hazard of failure (not being retained) for higher values of the predictor. Reference groups for covariates include male, White, age 20-29, pct. White students, urban schools, and elementary schools. Standard errors are clustered at the school-level.

* p<.05,

** p < .01,

*** p < .001