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Aide-to-Teacher Pathways: Evidence From Maryland

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Abstract

Instructional aides are a promising but understudied source of new teachers. Using 17 years of administrative data from Maryland, we compare novice teachers with and without prior aide experience. Former aides are older, more racially diverse, and far more likely to hold special education endorsements. Their students achieve at least as well as those of other novices, and they are substantially more likely to remain in teaching, with the largest retention advantages among conditionally licensed and Black teachers. Schools lose roughly one aide position for every three to four aides who become teachers, far less than when aides move between schools. Investing in aide-to-teacher pathways can strengthen teacher recruitment, retention, and diversity with little risk of depleting the aide workforce.

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Introduction

As interest in teaching hits historic lows (Bartanen et al., 2025; Kraft & Lyon, 2024), policymakers and education leaders are seeking pathways to fill vacant teaching positions, particularly in high-turnover, high-need specialties (Edwards et al., 2024). Paraeducators, sometimes called teaching or instructional aides, have long been discussed as a promising hiring pool for new teachers (Carver-Thomas, 2018; Haselkorn & Fideler, 1996; Shelton & Cruz, 2023; Villegas & Clewell, 1998). As their workforce has more than doubled over the past three decades—far outpacing growth in the teaching workforce (Bisht et al., 2021)—teaching pathways for aides have garnered renewed attention, becoming a growing component of Grow Your Own (GYO) programs that draw on localized teaching pipelines (Edwards & Kraft, 2025; Gist et al., 2022).

Four features make such pathways appealing: (1) aides have shown durable interest in schools and bring instructional and student-support experience (Villegas & Clewell, 1998); (2) aides disproportionately work in high-need specialties like special education that are most prone to vacancies (Edwards et al., 2024); (3) aides tend to be local to the communities in which they work (Haselkorn & Fideler, 1996), and teachers who work near home are less likely to switch schools or leave teaching (Reininger, 2012); and (4) aides are more racially and ethnically diverse than the teaching workforce overall (Bisht et al., 2021; Camp et al., 2024; Theobald et al., 2025; Villegas & Clewell, 1998), and teachers of color confer well-documented benefits for students (Blazar, 2024; Dee, 2005; Gershenson et al., 2022). Together, these workforce features imply a central hypothesis: aides who become teachers will be at least as effective as other teachers and stay in teaching longer, diversifying the profession and plugging shortages while supporting student learning. The argument also rests on a sub-hypothesis: the pool of available teaching aides is sustainable and readily replenished as aides convert to licensed teachers.

Statewide evidence from Arkansas (Camp et al., 2024) and North Carolina (Bastian et al., 2026; Fortner et al., 2015) has begun to test these hypotheses, and Maryland offers a useful contrast. The state spends substantially more per pupil than the other two (National Center for Education Statistics [NCES], 2024a)—a feature associated with employing more paraprofessionals (Bisht et al., 2021)—and serves a larger share of Black students (NCES, 2022). Maryland's current workforce is more racially diverse: roughly 65% white compared to over 70% white in North Carolina and close to 90% in Arkansas (Bastian et al., 2026; Camp et al., 2024; Maryland State Department of Education, 2025). And whereas both states often rely on emergency licenses that substantially reduce entry requirements, Maryland relies on "conditional" licenses that require progress toward standard certification. These differences may shape our outcomes of interest: teacher entry, diversification, retention, and student achievement gains.

Using Maryland data from 2009-10 through 2025-26, we find that aides who become teachers are older, more racially diverse, more likely to hold conditional licenses, and far more likely to be endorsed in special education than other novice teachers. Their share of new hires more than tripled over this period, and, unlike in Arkansas (Camp et al., 2024), Black aides appear as likely as white aides to convert to teaching. Former aides are at least as effective in raising math and English language arts (ELA) test scores and stay in teaching longer (by about 10 percentage points at longer horizons), with especially large advantages among Black and conditionally licensed teachers. Schools lose roughly one aide position for every three to four aides hired into teaching, far less than when aides move to other schools.

Our findings suggest that aide-to-teacher pathways can be a small but important component of a broader staffing and diversification strategy, with considerable room to grow before they deplete the aide workforce; leaders concerned about losing aides should focus instead on why aides move between schools.

Literature Review

Historical Context

Calls to support paraeducators in entering the teaching profession date back to at least the mid-1990s (Haselkorn & Fideler, 1996), responding to emerging teacher shortages and a policy focus on diversifying teaching and increasing supports for students with disabilities. Most scholarship on the teaching aide workforce is qualitative or mixed-methods and focuses on the formal and informal functions aides perform in schools (e.g., Mason et al., 2021)—including serving as vital "bridge builders" supporting emergent multilingual students and students of color amid a mostly white, native English-speaking teaching staff (Villegas & Clewell, 1998).

A larger body of work examines barriers for paraeducators seeking to become teachers. In the most comprehensive review to date, Gist and colleagues (2019) document substantial structural and social barriers. Aides may struggle to pass certification exams, find licensure programs compatible with a full-time work schedule, or pay for those programs. Aides—older and even more disproportionately female than teachers—may also juggle childcare alongside after-work certification requirements. Aides' position within schools can also engender perceptions of lower expertise and a power disadvantage relative to teachers of record (Abbate-Vaughn & Paugh, 2009; Gist, 2022; Mason et al., 2021). Aides of color face additional intersectional barriers to becoming teachers, compounded by structural racism embedded in school systems and communities (Gist, 2022; Villegas & Clewell, 1998).

Characteristics of the Teaching Aide Workforce

More recent scholarship uses representative quantitative data to characterize paraeducators. Teaching assistants tend to be older and more likely female than teachers (Fortner et al., 2015; Villegas & Clewell, 1998), and they are more likely to be from the local community (Chopra et al., 2004). The aide pool also tends to be more racially and ethnically diverse than the teaching workforce, and increasingly so over time (Camp et al., 2024; Theobald et al., 2025). Paraeducators generally have lower

educational attainment (Sosinsky & Gilliam, 2011) and lower licensure exam scores (Abbate-Vaughn & Paugh, 2009; Fortner et al., 2015) than teachers, in part reflecting the different requirements of each role but still posing a potential barrier to obtaining a full teaching credential. Given growing evidence that licensure exams disproportionately bar educators of color (Nettles et al., 2011)—even though Black students learn just as much with lower-scoring Black teachers as they do with higher-scoring white teachers (Goldhaber & Hansen, 2010)—such test barriers may be particularly perverse for a disproportionately Black and Hispanic[1] paraeducator workforce.

Aides are also especially likely to work with children with disabilities, a fit that matters because the special educator workforce is more than 80% white while more than half of students receiving special education services are students of color (Billingsley et al., 2019). Aides-turned-teachers also disproportionately work in elementary grades (Fortner et al., 2015), even though teaching vacancies tend to be more acute in secondary grades. Far less is known about aides who become teachers of record, though their share of new teachers is growing, perhaps driven by pandemic-era urgency; in Arkansas, it rose from 8% to 15% between 2015-16 and 2021-22 (Camp et al., 2024).

Little research has examined whether growth in aides becoming teachers corresponds to greater racial/ethnic diversity in the workforce. Fortner et al. (2015) find a more diverse pool of teachers with aide experience than without, but do not examine effects on statewide workforce diversity. The exception is Camp et al. (2024), who find that white aides in Arkansas convert to teaching at twice the rate of Black and Hispanic aides, a margin wide enough that aide-to-teacher transitions do not meaningfully diversify that state's workforce. Their finding suggests that racialized barriers for paraeducators mirror those in teaching more broadly.

Linking Aides-Turned-Teachers to Educational and Workforce Outcomes

[1]We use the term Hispanic rather than Latine or Latinx because it is the terminology used in the Maryland Longitudinal Data System racial/ethnic category variable.

Recent research offers some support for our central hypothesis. Scholars examining the effects of aides themselves on student success find mostly positive associations (Hemelt et al., 2021).

To our knowledge, only four papers examine the achievement effects of aides who become teachers. Studies in North Carolina and Arkansas suggest teachers with aide experience are either as effective (Bastian et al., 2026; Camp et al., 2024) or more effective in some subjects (Fortner et al., 2015) than those without aide experience. In North Carolina, former aides score lower on observation-based evaluations despite comparable value-added to student test scores, and their students substantially outperform those of emergency-licensed teachers in both ELA and math (Bastian et al., 2026). In Mississippi, Laski (2024) finds that aides handpicked by a principal for fast-tracked licensure within a school are as effective in ELA and more effective in math, suggesting potential benefits to targeted same-school hires.

A similarly small literature base examines retention among aides who become teachers. Though aide attrition is high and rising faster than teacher attrition (Camp et al., 2024; Theobald et al., 2025), the few studies of aides-turned-teachers suggest that they are more likely than other teachers to stay. In North Carolina, former aides are about nine percentage points (pp) more likely than other novices to return for a third year and 22 pp more likely than emergency-licensed teachers (Bastian et al., 2026), echoing earlier findings in the same state (Fortner et al., 2015). Laski's (2024) principal-selected aides also stay longer, though that hand-picked group may not generalize. None examines differences by race/ethnicity.

Finally, to our knowledge, no study directly tests the sub-hypothesis that conversions do not threaten the health of the aide workforce. Descriptive work in Washington State (Theobald et al., 2025) suggests that rising aide turnover, combined with existing shortages in special education, could make such conversions consequential for the availability of aides in high-need specialties.

Research Design

Data

To test our hypotheses, we use administrative data on teachers and students in Maryland public schools housed in the Maryland Longitudinal Data System (MLDS). We link teachers' certifications and experience to other K–12 staff positions held prior to their first year hired as a teacher, as well as their degree level at entry. We draw data from the 2009-10[2] through 2025-26 school years but use subsets of years when constrained by the availability of particular variables. Descriptive and retention analyses leverage the full data panel. For student achievement analyses, we link teachers to students through course roster data available from 2012-13, omitting 2019-20 and 2020-21 due to suspended testing during the COVID-19 pandemic.[3]

Defining Novice Teachers and Aides

We identify teaching aides and full-time teachers using job codes in human resources files that cleanly separate the two. Beyond classroom instructional aide roles, these codes include non-classroom instructional roles, such as library aides. Consistent with prior scholarship (Camp et al., 2024), we include these non-classroom roles in our definition of aide because they still directly assist students in learning.[4]

Because our analyses focus on the features of aides who become teachers of record, we restrict our sample to first-time teachers. This restriction applies only to teaching experience; people with prior non-teaching K-12 experience, including aides, are retained. We identify first-time teachers using two measures, each imperfect. Our main sample uses the first year we observe someone in a teaching role in state records. Because our data begin in 2007-08, this measure may misclassify as novices some teachers who taught before the panel began and later returned. Our restricted sample additionally uses

[2] MLDS began relevant administrative data collection in 2007-08, but because we need to be able to observe whether a teacher worked as an aide prior to their initial year of teaching, we begin our sample with the 2009-10 academic year.
[3] Our data system has test scores and administrative data for 2024-25 and 2025-26, but because key variables for licensure take time to update in the system, we do not include these years of data.
[4] Specifically, we include individuals with job codes of "Teacher Aide/Teaching Assistant," "Library/Media Center Aide," and "Other Aide".

a district-reported years-of-experience measure that, per state guidelines, should include only teaching experience. However, some districts also count aide experience, so restricting on this measure systematically excludes some truly novice teachers, and disproportionately former aides, from only some districts. We present results for both samples ("Restr." columns of Tables 1 and A1, Panel B of Table 2, and Appendix Figure A1) and find qualitatively similar patterns. In both, we exclude teachers holding an advanced professional certificate (awarded only after accumulated teaching experience) at first appearance in employment records and teachers who became aides later (e.g., following parental leave or as a step-down toward retirement).

Descriptive and retention analyses include all teachers. Achievement analyses focus on teachers in elementary and middle school classrooms (grades 3 to 8), where the state administers standardized math and ELA assessments. In keeping with past work (e.g., Goldhaber et al., 2017), we restrict the achievement sample to classrooms with at least five students at the grade-course level. Where students are connected to more than one math or ELA teacher in a given year, we identify the primary teacher (i.e., the teacher of the non-remedial class with the most credits) and drop student-subject observations when we cannot.[5]

Methods

We first characterize aides, teachers, and aides converting to teachers, pooling across years and examining trends over time. We use linear regression to test for statistically significant differences in means between novice teachers with and without aide experience:

$$Y_{jst} = \beta AideExp_j + X_j'\gamma + \theta_d + \tau_t + \varepsilon_{jst} \quad (1)$$

[5] For reference, students matched to two or more non-remedial math and ELA courses with different teachers in the 2023-24 school year account for 5.5% and 21.4% of all students, respectively.

where Y_{jst} is an outcome for teacher j hired into school s in district d in year t, $AideExp_j$ indicates that teacher j worked as an aide before being hired, and β is our coefficient of interest. Hire-year fixed effects (τ_t) absorb statewide labor-market shifts, while district fixed effects (θ_d) account for local labor-market conditions and local GYO policies specifically targeting aides as prospective teachers. For the descriptive comparisons in Table 1, we use a simplified form of equation (1) in which Y_{jst} is a single characteristic measured at hire (e.g., race/ethnicity, age, licensure pathway, or endorsement area) and the teacher controls X_j are omitted.

We take a similar regression-based approach to examine differences in retention rates between teachers with and without prior aide experience, where Y_{jst} is an indicator for whether teacher j remains in a given position k years after hire and X_j is a vector of teacher covariates, including teacher gender, race/ethnicity, and age at hire. Here, we replace district fixed effects θ_d with school fixed effects θ_s, accounting for sorting across buildings and differences in retention rates across schools. We apply this model across multiple levels of career longevity—at the one-, three-, five-, eight-, and ten-year marks—and for four distinct outcome measures: retention as a teacher in the same school, district, and state, as well as state-level retention in any K-12 professional role. We also estimate the model separately by race/ethnicity and by licensure pathway. Standard errors are clustered at the school level.

To estimate whether students learn more from teachers with prior aide experience than from other teachers, we compare, for the same student, how their math and ELA test scores change in years when they were taught by a teacher with prior aide experience to years when they were taught by teachers without it. For this analysis, we focus on teachers with five or fewer years of teaching experience. The early years of teaching are where we would most expect any differences tied to prior aide experience to emerge; however, restricting solely to first-year teachers substantially limits the

comparisons we can make in our student fixed-effects model (requiring the same student have a first-year teacher in multiple years). Specifically, we estimate:

$$A_{it} = \beta AideExp_{it} + X'_{it}\gamma + \alpha_i + \mu_s + \eta_g + \tau_t + \varepsilon_{it} \quad (2)$$

where A_{it} denotes the achievement of student i during year t, standardized within grade and year; $AideExp_{it}$ flags whether student i's teacher in year t has prior experience as an aide; and β is our coefficient of interest. X_{it} is a vector of controls, including teacher characteristics such as race/ethnicity, age at entry, years of experience, and the licensure pathway through which a teacher enters the profession, as well as time-varying student, classroom, and school characteristics. Our model also includes a set of fixed effects—school μ_s, grade η_g, and year τ_t—as well as student fixed effects α_i that allow us to compare each student's test scores across years and, thus, to partially address non-random sorting of students to teachers (Egalite et al., 2015). We cluster standard errors at the teacher level.

We estimate this model separately for math and ELA and separately for three samples. The first compares aide-experienced teachers to all other teachers. The second narrows the comparison to conditionally licensed teachers only, which better reflects the choice a principal often faces when filling a hard-to-staff vacancy: hiring one conditionally licensed candidate over another. The third is limited to non-conditionally licensed (traditional or resident) teachers. In additional specifications, we add an indicator for teaching in the same school where the teacher previously worked as an aide.

Finally, we test the hypothesis that hiring aides into teaching could deplete the available aide workforce. To do this, we conceptualize the availability of aides as the ease of replacing an aide who becomes a teacher or otherwise leaves a school. We conduct this analysis at the school-by-year level. Our independent variable of interest is the number of aides at a school who left their role to become teachers, and our outcome, $C_{s,t+1}$, is the count of aides employed at school s in year $t+1$:

$$C_{s,t+1} = \alpha + \rho C_{st} + X_{st}\gamma + Z_{st}\lambda + E_{st}\beta + \delta_d + \varepsilon_{st} \quad (3)$$

We build our model in a stepwise fashion, with all models including district fixed effects (δ_d), the number of aides employed at the school in the current year (C_{st}), and the number of special education students enrolled at the school (X_{st}), which is a strong determinant of the number of aides required in a given school and year. We similarly control for total student enrollment in all models. Our primary variable of interest is E_{st}, which in our base models includes only the number of aides converting to teachers each year; its coefficient, β, is our main parameter of interest. Next, we add grade-level and student demographic controls, Z_{st}, to test whether our estimates change. Finally, to understand the magnitude of β in context, we estimate a specification that includes a full set of turnover variables in E_{st}: aides converting to teaching in any school, moving to another school still in an aide position, taking a non-teaching and non-aide role elsewhere in the state system, and exiting the system entirely (i.e., not observed in the data the following year).

Findings

Descriptive Characteristics

The aide-to-teacher pathway has grown markedly, especially in recent years, consistent with prior work (Camp et al., 2024; Theobald et al., 2025). The share of new teachers with prior aide experience more than tripled, from 4% in 2009-10 to 13% (roughly one in eight) in 2025-26, with most of the increase after 2019-20 (Figure 1, Panel A).

Aides who convert to teaching are older (age 40 versus 32 at hire), more likely to be female, and more likely to be conditionally licensed than other first-time teachers (Table 1).[6] They are also increasingly Black, outpacing broader diversification of the Maryland teaching workforce: the Black share of converting aides rose from 18% in 2009-10 to parity with the white share by 2019-20 and has

[6] The "Restr." columns of Table 1 show characteristics of the restricted sample.

hovered around 40% since (Figure 1, Panel D). Black aides also make up nearly identical shares of first-year aides and first-year teachers with aide experience (34% each; Table 1), suggesting that—unlike in Arkansas (Camp et al., 2024)—Black aides convert to teaching at rates similar to those of white aides. By 2025-26, roughly one in seven new Black teachers was a former aide, versus one in nine white teachers (Figure 1, Panel C).

Converting aides increasingly enter through Maryland's conditional license, which—unlike often short-lived emergency licenses elsewhere—requires a bachelor's degree and active progress toward a standard professional license; it was valid for up to three years for most of our panel and for up to five years today. Fewer than a quarter of converting aides held conditional licenses at the start of our panel; by 2021-22, about two-thirds did, with conditional licensure overtaking traditional pathways in 2019-20 (Figure 1, Panel B). Black aides used conditional pathways at higher rates than white aides, consistent with statewide trends (Blazar et al., 2026), but white aides too are increasingly choosing conditional routes. Unlike in other states (Bastian et al., 2026; Camp et al., 2024), almost a quarter of converting aides hold a master's degree. Because we cannot observe degrees for aides who do not convert, we cannot tell whether converts earned these degrees on the job, as prior work suggests (Goldhaber et al., 2023).

Most consequential for staffing, converting aides gravitate toward special education, among the hardest classrooms to fill: 28% earn special education endorsements versus 11% of all novices (Table 1)—likely a continuation of the student support roles they held as aides. Their elementary and early childhood endorsement rates are similar to those of other novices, but they are far less likely to hold secondary content endorsements such as math and science.

Patterns are similar in the restricted sample (Table 1, column 5). Because the restriction, which narrows to first-year teachers as defined by the state-collected experience measure, retains only about half of former aides (2,899 of 5,836) but over two-thirds of all novices, the former aides who remain

are slightly younger at hire (38 versus 40) and less likely to be Black (23% versus 34%), consistent with the restriction excluding some genuine first-time teachers—disproportionately Black former aides—in districts that count aide service as teaching experience.

Differences in Student Achievement

Teachers with prior aide experience perform at least as well as other novices at improving students' end-of-year test scores (Table 2). In math, estimates are modest, positive, and statistically significant (0.036 SD overall), driven by teachers with non-conditional (i.e., traditional or resident) licenses (0.050 SD). In ELA, estimates are close to zero, with a marginally significant 0.019 SD advantage among non-conditionally licensed former aides. Among conditionally licensed teachers, former aides perform comparably to other conditional licensees in both subjects. The overall math estimate is unchanged in the restricted sample (0.036 SD; Panel B), though estimates within licensure groups are less precise. One explanation for the pattern by pathway is that former aides extract more benefit from non-conditional preparation because of their classroom experience, though unobserved differences among aides choosing these pathways could also contribute.

Aides hired to teach in the same school where they served as aides show no statistically significant differences from other former aides in the main sample, with point estimates negative in math and positive in ELA. This subsample is small, however (N = 466 teachers for ELA and 453 for math), and power is limited. The only statistically significant same-school estimate—a large negative math coefficient for conditionally licensed same-school hires in the restricted sample (-0.249 SD)—rests on a small group and does not appear in the main sample, so we interpret it cautiously.

Differences in Teacher Retention

While achievement differences are modest, retention differences are more pronounced. Panel A of Figure 2 compares novice teachers with and without aide experience within the same school and hire year, across four progressively broader contexts: remaining in the same school, the district, the

state as a teacher, and the state in any K–12 role (see Appendix Table A1). Retention is comparable in year one, but former aides are more likely to remain at every level of the system from year three onward. Ten years after hire, 46% of former aides are still teaching in their district of hire, versus 36% of other novices—a 10 pp advantage on a base where nearly two-thirds have left. Advantages at the ten-year mark are similar statewide (10 pp) and smaller but meaningful for remaining in the same school (4 pp). Advantages are somewhat smaller in the restricted sample (e.g., 5 versus 8 pp in the district at year three) but remain statistically significant at most horizons (Appendix Table A1). Because baseline retention is nearly identical across samples, the smaller advantages stem mainly from which former aides the restriction removes, and they may understate the advantage among aides-turned-teachers overall.

The advantage holds across licensure pathways (Appendix Figure A2) but is largest among conditionally licensed teachers—the pool from which principals increasingly staff shortage areas. Former aides are 11 pp more likely than other conditional licensees to still be teaching in their district after 10 years, 12 pp more likely to be teaching in the state, and 21 pp more likely to remain in any Maryland K–12 role—roughly a 50% improvement over that group's 43% baseline. For a principal choosing between two conditionally licensed candidates, prior aide experience is a strong signal of staying power.

Aide experience also narrows one of the most persistent inequities in the teacher workforce. Black novice teachers leave at higher rates than white novices at every time point after year one, but the retention premium of aide experience is at least as large for Black teachers as for white teachers (Figure 2, Panel B). As a result, Black former aides remain in teaching at rates comparable to—and in some contexts above—white teachers without aide experience. At year 10, aide experience among Black teachers is associated with a 7 pp higher probability of remaining in the same school and a 15 pp higher probability of remaining in the district, effectively closing the Black-white attrition gap.

Aide Workforce Impacts

Does this growing pipeline come at the cost of the aide workforce schools also depend on? Largely, no. An aide leaving for a teaching position is associated with 0.23 to 0.30 fewer aides in the school the following year (Table 3). That is, it takes three to four conversions to produce a net loss of a single aide position, implying most vacated slots are refilled. Associations are stronger in middle and high schools than in elementary schools, suggesting that aide vacancies may be harder to fill at the secondary level. More importantly, conversion to teaching is the least damaging way schools lose aides: an aide moving to another school as an aide predicts 0.78 fewer aides the next year—more than twice the association for aides converting to teachers—followed by moves to other K-12 roles (0.48) and exits from Maryland public education (0.43).

Discussion

Statewide data spanning 17 years allow us to test each element of the case for aide-to-teacher pathways: that former aides teach as effectively as, and stay longer than, other novices, and that their conversions diversify the teaching workforce without depleting the aide workforce. Our evidence is consistent with each. Former aides match other novices in student achievement—with modest math advantages among those from non-conditional pathways—and are substantially more likely to remain in teaching. These patterns mirror findings from North Carolina and Arkansas (Bastian et al., 2026; Camp et al., 2024; Fortner et al., 2015), even though Maryland spends more per pupil, has a more diverse workforce, and relies on conditional rather than emergency licensure—suggesting that hiring aides into teaching need not trade off instructional quality against retention.

These results align with the features of the aide workforce that motivated our study. The retention advantage is consistent with aides having already tested their fit with school-based work before committing to teaching (Villegas & Clewell, 1998) and with their local roots, as teachers who work near home are more likely to stay (Dominguez-Mel et al., 2026; Reininger, 2012). Former aides

are also more than twice as likely as other novices to be endorsed in special education—at a moment when half of schools nationwide report unfilled special education positions (NCES, 2024b). Given this endorsement profile and their lower turnover, former aides may be among the strongest special education hires available to many principals. The pathway is a targeted tool, however: former aides rarely hold secondary math or science endorsements, so it is unlikely to relieve shortages in secondary STEM fields.

The pathway also appears to diversify Maryland's teaching workforce at two margins. At entry, Black aides convert to teaching at rates similar to those of white aides—unlike in Arkansas, where white aides convert at twice the rate of Black and Hispanic aides (Camp et al., 2024). Through retention, aide experience effectively closes the Black–white attrition gap among novices. This second margin matters because the benefits of teachers of color for students (Blazar, 2024; Gershenson et al., 2022) depend on those teachers staying, yet teachers of color leave the profession at higher rates (Carver-Thomas, 2018). Why aides in Maryland convert more equitably than those in Arkansas remains an open question; the barriers aides of color face, such as licensure exams and program costs (Gist et al., 2019; Nettles et al., 2011), are not unique to either state.

Much of this diversification runs through conditional licensure, which also surfaces the central tension in our results. About two-thirds of converting aides in recent years have entered on conditional licenses, and teachers of color enter through alternative routes at higher rates than white teachers (Carver-Thomas, 2018). Yet former aides' math advantage is concentrated among those from non-conditional pathways. Because this advantage persists after controlling for teacher race/ethnicity and other characteristics, features of traditional preparation itself may help aides convert classroom experience into teaching skill. Conditionally licensed former aides, meanwhile, show the largest retention advantages of any group we examine. The question for programs and states, then, is not

whether to close conditional routes—sacrificing a key source of teachers who share students' backgrounds—but how to build the strengths of traditional preparation into them.

Finally, these gains do not appear to come at the expense of the aide workforce, a concern heightened by rising aide turnover (Camp et al., 2024; Theobald et al., 2025). Conversion is the least disruptive form of aide turnover we observe. Leaders worried about aide shortages would gain more from addressing why aides move between schools than from limiting aides' paths into teaching.

Our estimates are descriptive: aides who choose to become teachers may differ from other novices in unobserved ways, and our same-school analyses are underpowered. Future work should examine which recruitment and support strategies—including the design of conditional licensure—best convert aides' experience into teaching skill and, echoing Laski (2024), how hiring mechanisms shape impacts on students beyond test scores. Still, our evidence from Maryland, paired with similar findings in other states (Bastian et al., 2026; Camp et al., 2024), suggests that policymakers and school system leaders designing GYO investments (Edwards & Kraft, 2025) should treat aides as a reliable source of durable teaching talent. Aide-to-teacher pathways may be a small component of a broader GYO strategy, but they are a component that the evidence suggests should grow.

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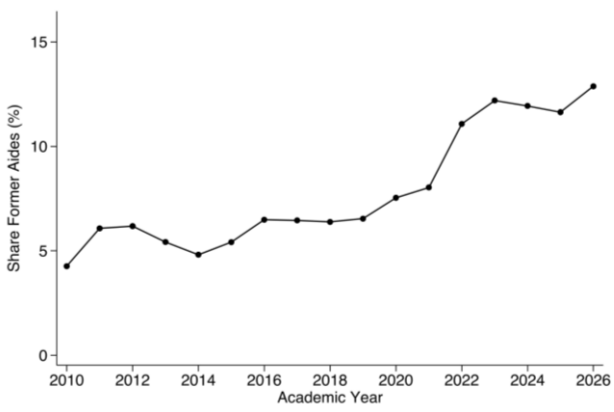
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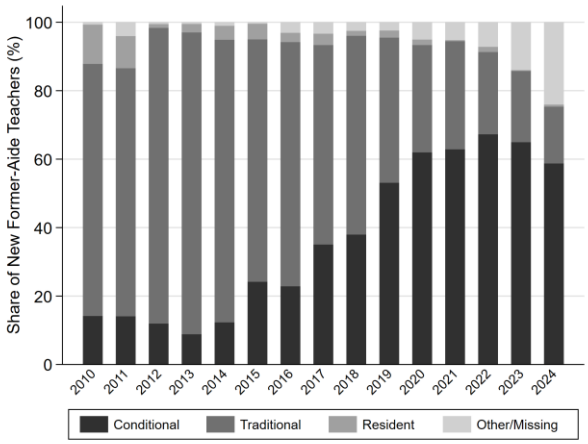
Figures and Tables

Figure 1. Trends Over Time in the Aide-to-Teacher Workforce

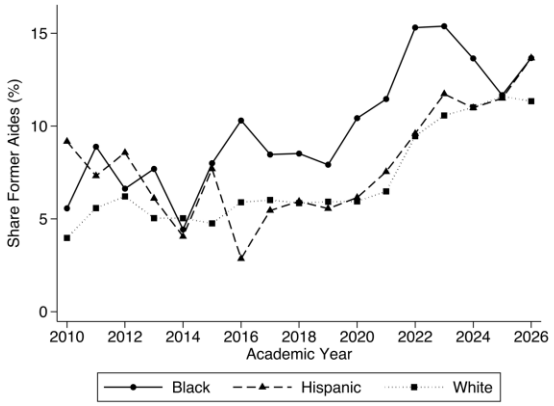
(a) Novice Teachers with Aide Experience



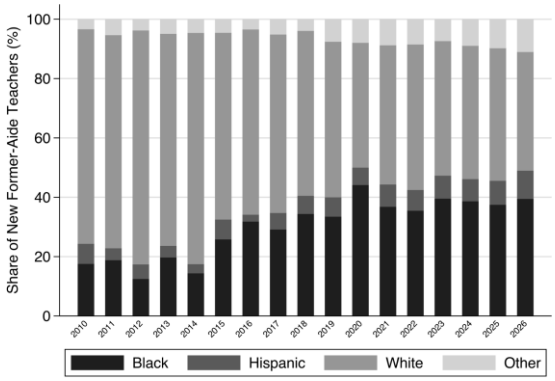
(b) Aide-to-Teacher Cohort Only, By Licensure Type



(c) Novice Teachers with Aide Experience, by Race/Ethnicity



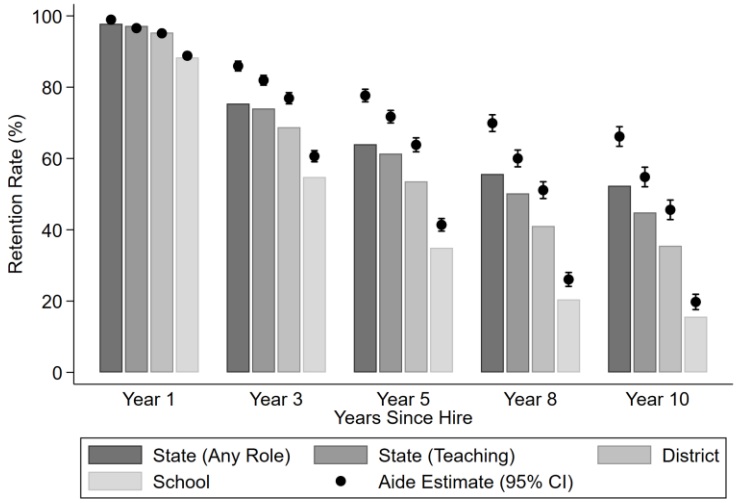
(d) Aide-to-Teacher Cohort Only, by Race/Ethnicity



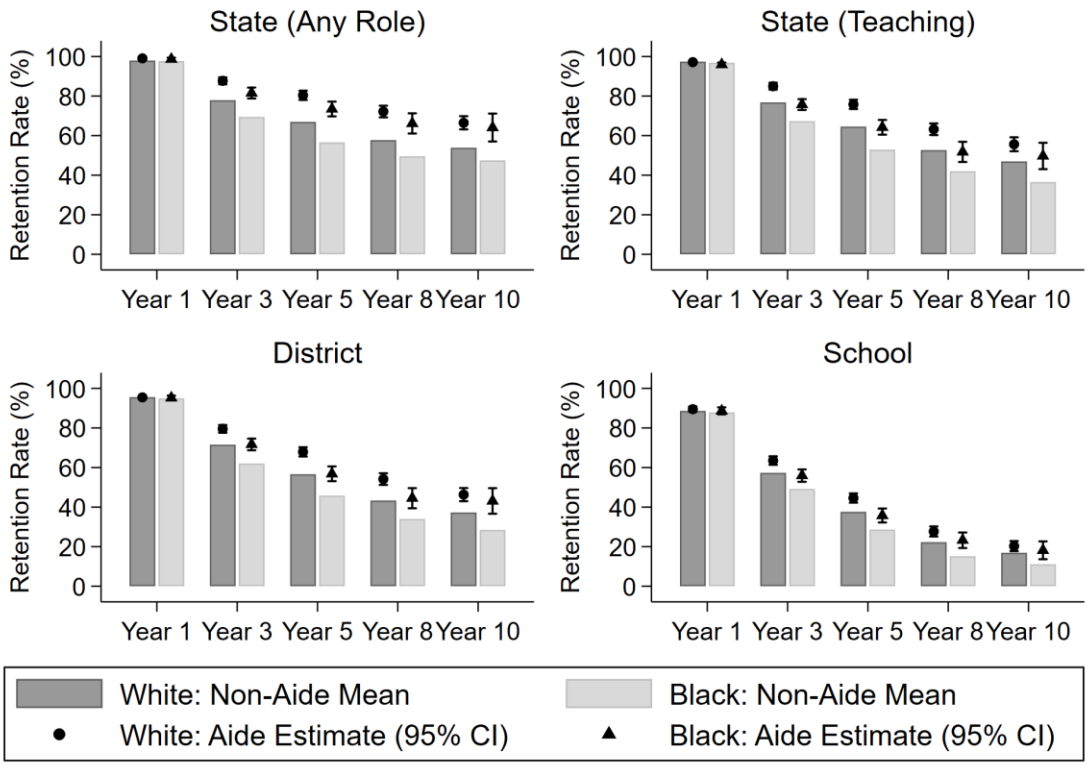
Note. The sample includes all novice (first-time) teachers hired in Maryland public schools between the 2009-10 and 2025-26 school years (N = 71,495 unique teachers). Panel (a) shows the percentage of novice teachers in each hire year with prior experience as an aide. Panel (b) limits the sample to novice teachers with aide experience and shows the share entering under conditional, traditional, and resident licensure; "Other/Missing" includes other license types and teachers without a licensure record. Panel (b) omits the 2024-25 and 2025-26 cohorts because licensure data for those years are incomplete. Panel (c) shows, within each racial/ethnic group, the percentage of novice teachers with aide experience. Panel (d) shows the racial/ethnic composition of the same group as panel (b). Panel (c) omits Asian teachers, multiracial teachers, and those without race/ethnicity information because each group is too small to yield stable annual estimates; panel (d) groups them as "Other." Years on the horizontal axes denote the spring of each school year (e.g., 2010 = 2009-10).

Figure 2. Prior Aide Experience and Retention

(a) Differences in Retention Rates, by Destination



(b) Differences in Retention Rates, by Destination and Race



Note. Estimates use the main sample of novice (first-time) teachers. Bars show the share of novice teachers without aide experience who remained in each position 1, 3, 5, 8, and 10 years after hire. Points show the retention rate for teachers with aide experience, computed as the bar plus the estimated difference from models with school and hire-year fixed effects and controls for teacher gender, race/ethnicity, and age at hire (Appendix Table A1); 95% confidence intervals (CI) are for that difference. Positions are teaching in the same school, teaching in the same district, teaching anywhere in Maryland (State, Teaching), and holding any K–12 role in Maryland public schools (State, Any Role). Panel (b) estimates the models separately for white and Black teachers.

Table 1

Teacher and Aide Summary Statistics, Main and Restricted Samples

Characteristic	First Year in Role					Full Population	
	All Aides	All Teachers		Teachers w/ Aide Exp.		All Aides	All Teachers
		Main	Restr.	Main	Restr.		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Demographics							
Female	0.812	0.761	0.763	0.790***	0.775	0.874	0.780
Asian	0.051	0.043	0.038	0.042**	0.040	0.039	0.039
Black	0.344	0.249	0.199	0.336***	0.225***	0.331	0.186
Hispanic	0.094	0.065	0.062	0.067**	0.075	0.066	0.035
White	0.483	0.612	0.669	0.523***	0.628***	0.547	0.716
Age at hire	38.80	32.42	29.77	39.60***	37.99***	48.95	42.69
Degree Attainment							
Assoc.'s or less		0.017	0.014	0.076***	0.089***		0.005
Bachelor's		0.706	0.755	0.690	0.673***		0.280
Master's		0.277	0.230	0.235***	0.237		0.716
Certification							
Traditional		0.536	0.568	0.363***	0.440***		0.396
Conditional		0.220	0.199	0.375***	0.372***		0.098
Resident		0.053	0.069	0.018***	0.018		0.028
Endorsement Area							
Special Ed.		0.107	0.096	0.281***	0.311***		0.097
Elem Ed.		0.232	0.249	0.217	0.234		0.296
Early Childhood		0.114	0.120	0.118	0.103***		0.143
ELA		0.068	0.070	0.030***	0.035***		0.071
ELL		0.017	0.015	0.026***	0.029***		0.014
CTE		0.029	0.027	0.026	0.025		0.032
Social Sciences		0.049	0.052	0.026***	0.033***		0.055
Health		0.035	0.037	0.023***	0.024***		0.052
Art		0.067	0.072	0.022***	0.027***		0.073
Math		0.055	0.059	0.019***	0.024***		0.056
Science		0.049	0.052	0.017***	0.020***		0.053
Comp. Science		0.003	0.003	0.003	0.004		0.002
Observations	32,930	71,495	50,247	5,836	2,899	46,675	142,788

Note. Columns marked "Main" use the main sample of Maryland public school personnel between the 2009-10 and 2025-26 school years. Columns marked "Restr." use the restricted sample, which excludes first-time teachers with more than one year of experience according to the experience indicator in state data. The restriction applies only to first-time teachers, so columns 1, 6, and 7 do not differ by sample. Columns 1–5 describe aides and teachers in their first year in role: first-year aides (column 1), all first-year teachers, inclusive of those with aide experience (columns 2–3), and first-year teachers with aide experience, in their year of conversion (columns 4–5). Stars in columns 4 and 5 denote statistically significant differences from first-year teachers without aide experience in the same sample, estimated from equation (1) with district and hire-year fixed effects and no teacher controls. Columns 6 and 7 show all unique aides and teachers in the dataset. Degree, certification, and endorsement information are not available for aides who do not convert to teaching. Certification shares do not sum to one because other license types and missing records are not shown. *$p < .10$. **$p < .05$. ***$p < .01$.

Table 2

Associations Between Aide Experience and Student Math and ELA Achievement, Main and Restricted Samples

	Math						ELA					
	Full Population		Cond. Cert.		Non-Cond. Cert.		Full Population		Cond. Cert.		Non-Cond. Cert.	
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
						Panel A: Main Sample						
Aide Exp.	0.036**	0.044***	0.007	-0.015	0.050***	0.063***	0.009	0.003	-0.010	-0.017	0.019*	0.020
	(0.014)	(0.016)	(0.043)	(0.050)	(0.018)	(0.021)	(0.011)	(0.014)	(0.045)	(0.063)	(0.011)	(0.013)
Aide in		-0.027		0.058		-0.047		0.022		0.022		-0.006
Same School		(0.028)		(0.070)		(0.036)		(0.018)		(0.073)		(0.020)
N	392,685	392,685	22,604	22,604	303,403	303,403	327,279	327,279	20,524	20,524	247,856	247,856
						Panel B: Restricted Sample						
Aide Exp.	0.036**	0.048***	0.031	0.123	0.031	0.051**	0.005	0.007	-0.069	-0.084	0.012	0.019
	(0.016)	(0.016)	(0.071)	(0.077)	(0.020)	(0.021)	(0.015)	(0.017)	(0.099)	(0.113)	(0.015)	(0.017)
Aide in		-0.037		-0.249***		-0.069*		-0.014		0.099		-0.030
Same School		(0.034)		(0.085)		(0.042)		(0.027)		(0.189)		(0.030)
N	251,863	251,863	9,391	9,391	206,061	206,061	209,058	209,058	7,229	7,229	169,810	169,810

Note. Estimates in each column are from separate regression models (equation 2) where the dependent variable is students' end-of-year math or ELA test score, standardized within grade and year. The sample includes students in grades 3–8 taught by teachers with five or fewer years of experience. All models include student, school, grade, and year fixed effects; teacher controls for race/ethnicity, age at entry, years of experience, and licensure pathway (in columns that pool pathways); time-varying student characteristics (eligibility for special education services and free or reduced-price meals, and classification as a multilingual learner); and time-varying classroom and school characteristics. Panel A uses the main sample. Panel B uses the restricted sample, which excludes first-time teachers with more than one year of experience according to the experience indicator in state data. Even-numbered columns add an indicator for teaching in the same school where the teacher previously worked as an aide. Columns 1–6 report math and columns 7–12 ELA. Columns 3–4 and 9–10 limit the sample to conditionally licensed teachers, and columns 5–6 and 11–12 to non-conditionally licensed (traditional or resident) teachers. N is the number of student-year observations. Standard errors clustered at the teacher level are in parentheses. *$p < .10$. **$p < .05$. ***$p < .01$.

Table 3

Associations Between Count of Aides and Prior-Year Aide Turnover

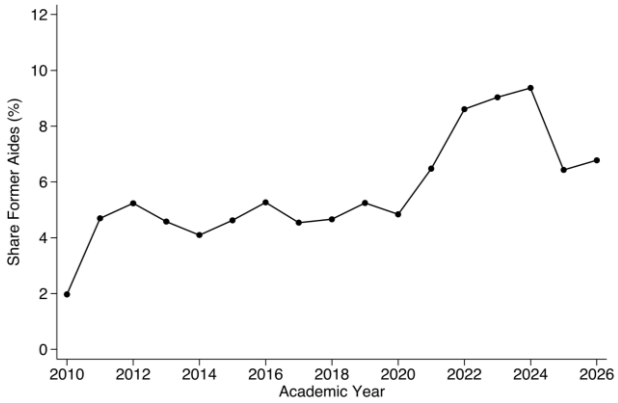
	All Schools			Elementary Only			Middle Schools Only			High Schools Only		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Aides to Teachers	-0.228***	-0.236***	-0.296***	-0.136***	-0.157***	-0.253***	-0.244***	-0.273***	-0.350***	-0.258***	-0.284***	-0.296***
	(0.026)	(0.026)	(0.023)	(0.034)	(0.034)	(0.031)	(0.063)	(0.063)	(0.056)	(0.064)	(0.064)	(0.059)
To Aide in Different School			-0.780***			-0.758***			-0.752***			-0.648***
			(0.011)			(0.015)			(0.026)			(0.035)
To Other K–12 Roles			-0.476***			-0.350***			-0.670***			-0.481***
			(0.030)			(0.042)			(0.067)			(0.064)
Exiting System			-0.433***			-0.417***			-0.393***			-0.385***
			(0.011)			(0.015)			(0.027)			(0.028)
Observations	24,458	24,458	24,458	14,046	14,046	14,046	3,850	3,850	3,850	3,198	3,198	3,198

Note. Estimates in each column are from separate regression models (equation 3) where the dependent variable is the count of aides employed at the school in the following school year. All models include district fixed effects and control for the number of aides employed at the school in the current year, the number of special education students, and total student enrollment. Model 2 adds controls for student demographics and the grade levels the school serves. Model 3 adds the other forms of aide turnover: moving to an aide position in another school, moving to another K–12 role, and exiting the Maryland public school system. Turnover variables count aides who left the school in the current year, by destination. Columns 1–3 include all schools; columns 4–6, 7–9, and 10–12 are limited to elementary, middle, and high schools, respectively. Observations are school-years. Standard errors clustered at the school level are in parentheses. *$p < .10$. **$p < .05$. ***$p < .01$.

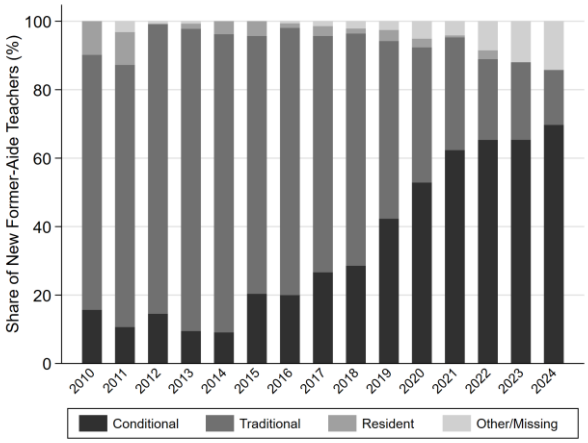
Supplemental Appendix

Figure A1. Trends Over Time in the Aide-to-Teacher Workforce, with Restriction for Years of Experience

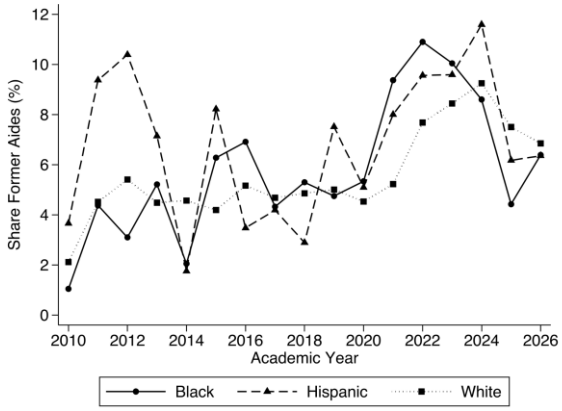
(a) Novice Teachers with Aide Experience



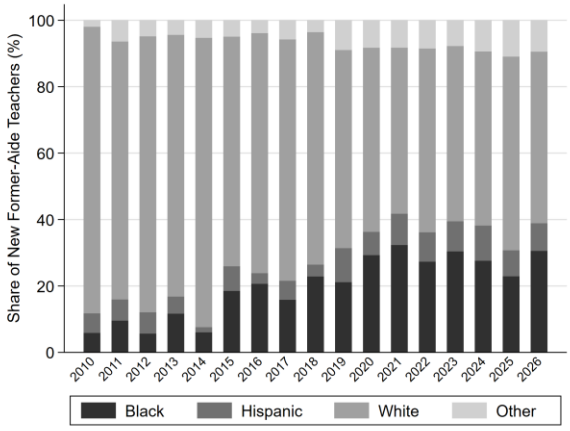
(b) Aide-to-Teacher Cohort Only, By Licensure Type



(c) Novice Teachers with Aide Experience, by Race/Ethnicity

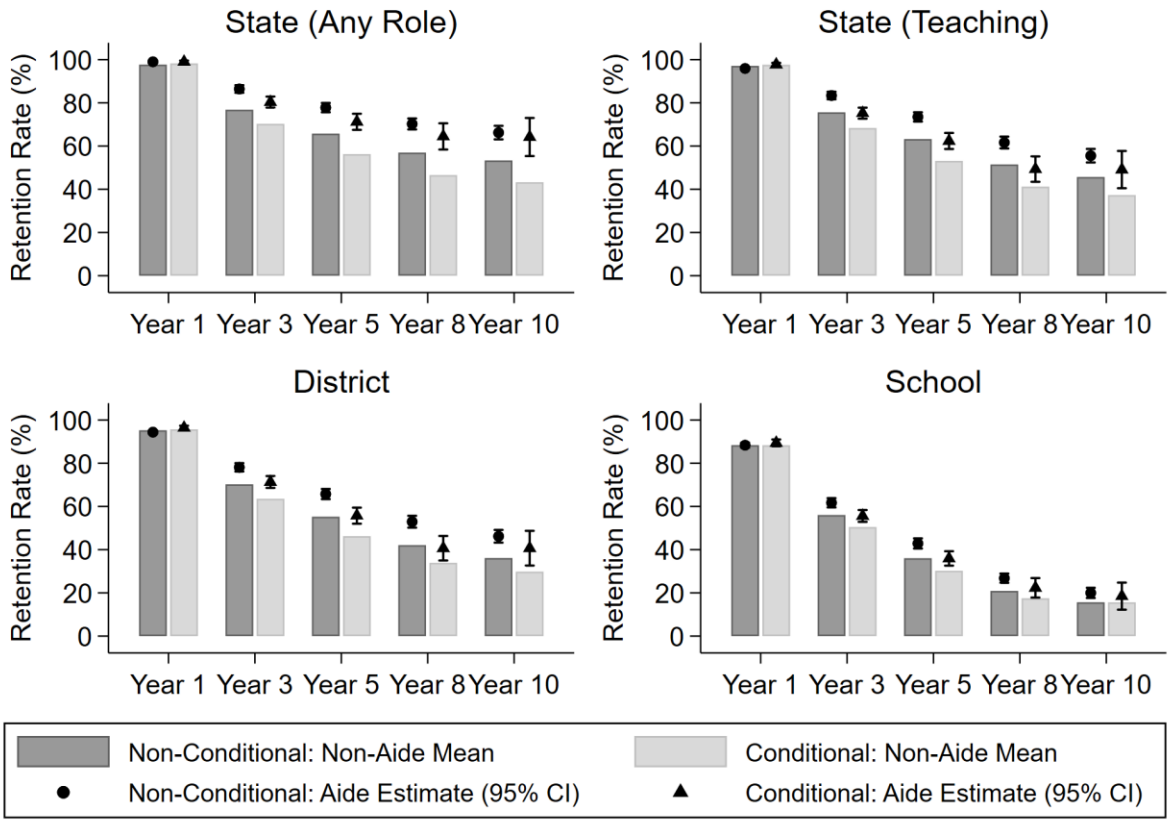


(d) Aide-to-Teacher Cohort Only, by Race/Ethnicity



Note. The sample includes all novice (first-time) teachers hired in Maryland public schools between the 2009-10 and 2025-26 school years, excluding those with more than one year of experience according to the experience indicator in state data (N = 50,247 unique teachers). Panel (a) shows the percentage of novice teachers in each hire year with prior experience as an aide. Panel (b) limits the sample to novice teachers with aide experience and shows the share entering under conditional, traditional, and resident licensure; "Other/Missing" includes other license types and teachers without a licensure record. Panel (b) omits the 2024-25 and 2025-26 cohorts because licensure data for those years are incomplete. Panel (c) shows, within each racial/ethnic group, the percentage of novice teachers with aide experience. Panel (d) shows the racial/ethnic composition of the same group as panel (b). Panel (c) omits Asian teachers, multiracial teachers, and those without race/ethnicity information because each group is too small to yield stable annual estimates; panel (d) groups them as "Other." Years on the horizontal axes denote the spring of each school year (e.g., 2010 = 2009-10).

Figure A2. Associations Between Prior Aide Experience and Retention, by Licensure Pathway



Note. Each panel shows a different position: teaching in the same school, teaching in the same district, teaching anywhere in Maryland, and holding any K–12 role in Maryland public schools. Bars show the share of first-time teachers without aide experience who remained in that position 1, 3, 5, 8, and 10 years after hire, separately for non-conditionally and conditionally licensed teachers. Points show the retention rate for teachers with aide experience in each group, computed as the bar plus the estimated difference from models with school and hire-year fixed effects and controls for teacher gender, race/ethnicity, and age at hire (Appendix Table A1); 95% confidence intervals (CI) are for that difference. Non-conditional includes both traditional and resident licensure pathways. Estimates use the main sample, without the years-of-experience restriction.

Table A1

Associations Between Prior Aide Experience and Retention, Main and Restricted Samples

	1 Year		3 Years		5 Years		8 Years		10 Years	
	Main	Restr.	Main	Restr.	Main	Restr.	Main	Restr.	Main	Restr.
Position	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
					All					
School	0.005	-0.005	0.058***	0.030***	0.064***	0.045***	0.056***	0.032**	0.041***	0.017
	(0.005)	(0.007)	(0.008)	(0.011)	(0.009)	(0.013)	(0.010)	(0.013)	(0.011)	(0.014)
Mean	0.884	0.888	0.548	0.562	0.350	0.360	0.205	0.210	0.156	0.158
District	-0.002	-0.008**	0.081***	0.049***	0.103***	0.071***	0.100***	0.073***	0.101***	0.086***
	(0.003)	(0.004)	(0.008)	(0.010)	(0.010)	(0.013)	(0.012)	(0.016)	(0.014)	(0.018)
Mean	0.953	0.957	0.688	0.704	0.536	0.551	0.411	0.420	0.355	0.361
State	-0.006***	-0.007**	0.079***	0.051***	0.104***	0.077***	0.098***	0.073***	0.099***	0.087***
	(0.002)	(0.003)	(0.007)	(0.009)	(0.009)	(0.012)	(0.012)	(0.016)	(0.014)	(0.018)
Mean	0.972	0.976	0.740	0.759	0.614	0.634	0.502	0.517	0.449	0.457
State Any	0.011***	0.008***	0.105***	0.072***	0.137***	0.109***	0.143***	0.112***	0.138***	0.121***
	(0.002)	(0.003)	(0.007)	(0.009)	(0.009)	(0.012)	(0.012)	(0.016)	(0.014)	(0.018)
Mean	0.978	0.981	0.754	0.770	0.640	0.657	0.557	0.570	0.524	0.533
N	66,428	47,211	56,119	40,756	46,540	34,270	33,386	25,477	24,850	19,430
					White					
School	0.009	-0.004	0.062***	0.041***	0.070***	0.062***	0.054***	0.040**	0.034***	0.020
	(0.007)	(0.008)	(0.011)	(0.014)	(0.012)	(0.016)	(0.013)	(0.016)	(0.013)	(0.016)
Mean	0.886	0.890	0.573	0.586	0.376	0.385	0.223	0.226	0.169	0.170
District	-0.001	-0.011**	0.080***	0.056***	0.113***	0.090***	0.108***	0.087***	0.090***	0.091***
	(0.004)	(0.005)	(0.010)	(0.012)	(0.012)	(0.016)	(0.015)	(0.018)	(0.017)	(0.021)
Mean	0.956	0.960	0.715	0.729	0.566	0.578	0.433	0.442	0.373	0.378
State	-0.002	-0.006	0.082***	0.060***	0.112***	0.090***	0.106***	0.080***	0.087***	0.078***
	(0.003)	(0.004)	(0.009)	(0.011)	(0.012)	(0.015)	(0.015)	(0.018)	(0.018)	(0.021)
Mean	0.974	0.978	0.768	0.784	0.646	0.662	0.527	0.540	0.469	0.478
State Any	0.011***	0.006	0.098***	0.072***	0.135***	0.114***	0.145***	0.124***	0.126***	0.122***
	(0.003)	(0.004)	(0.009)	(0.011)	(0.012)	(0.015)	(0.015)	(0.018)	(0.017)	(0.021)
Mean	0.979	0.982	0.779	0.793	0.669	0.683	0.577	0.590	0.539	0.549
N	41,379	31,956	36,549	28,614	31,305	24,777	23,898	19,390	18,561	15,219
					Black					
School	0.007	0.011	0.068***	0.058**	0.071***	0.081**	0.081***	0.071**	0.070***	0.056
	(0.009)	(0.016)	(0.016)	(0.028)	(0.018)	(0.033)	(0.020)	(0.036)	(0.023)	(0.041)
Mean	0.879	0.880	0.491	0.489	0.286	0.279	0.151	0.139	0.111	0.097
District	0.002	0.017	0.097***	0.087***	0.110***	0.081**	0.105***	0.059	0.147***	0.119*
	(0.006)	(0.011)	(0.015)	(0.027)	(0.019)	(0.036)	(0.026)	(0.049)	(0.033)	(0.061)
Mean	0.949	0.951	0.620	0.622	0.458	0.456	0.340	0.328	0.284	0.266
State	-0.009*	0.002	0.084***	0.069***	0.113***	0.098***	0.098***	0.076	0.132***	0.171***
	(0.005)	(0.008)	(0.014)	(0.025)	(0.019)	(0.035)	(0.026)	(0.051)	(0.034)	(0.066)
Mean	0.968	0.972	0.673	0.683	0.529	0.539	0.420	0.420	0.365	0.351
State Any	0.010**	0.010	0.121***	0.098***	0.169***	0.173***	0.166***	0.126**	0.166***	0.122*
	(0.004)	(0.007)	(0.014)	(0.025)	(0.019)	(0.035)	(0.026)	(0.052)	(0.036)	(0.069)
Mean	0.976	0.979	0.695	0.701	0.566	0.571	0.495	0.490	0.475	0.468
N	15,850	8,972	12,158	6,926	9,409	5,312	5,621	3,177	3,555	2,062
					Conditional					
School	0.011	0.006	0.052***	0.039*	0.057***	0.032	0.049**	0.039	0.029	0.029
	(0.008)	(0.012)	(0.014)	(0.021)	(0.017)	(0.027)	(0.023)	(0.036)	(0.032)	(0.048)
Mean	0.883	0.879	0.504	0.503	0.302	0.299	0.175	0.170	0.156	0.148
District	0.007	0.006	0.078***	0.063***	0.095***	0.080***	0.068**	0.075*	0.109***	0.125**
	(0.005)	(0.008)	(0.014)	(0.021)	(0.019)	(0.029)	(0.029)	(0.044)	(0.041)	(0.061)
Mean	0.957	0.956	0.636	0.636	0.462	0.456	0.339	0.328	0.298	0.290
State	0.001	0.006	0.069***	0.059***	0.092***	0.077***	0.081***	0.093**	0.118***	0.128**
	(0.004)	(0.006)	(0.013)	(0.020)	(0.019)	(0.029)	(0.030)	(0.046)	(0.044)	(0.065)

Mean	0.976	0.976	0.684	0.691	0.531	0.536	0.412	0.410	0.373	0.369
State Any	0.008**	0.007	0.101***	0.083***	0.150***	0.149***	0.179***	0.189***	0.209***	0.197***
	(0.003)	(0.005)	(0.013)	(0.020)	(0.019)	(0.029)	(0.031)	(0.047)	(0.045)	(0.067)
Mean	0.982	0.982	0.703	0.706	0.563	0.564	0.465	0.459	0.433	0.431
N	15,346	9,652	12,803	7,873	8,717	5,155	4,062	2,233	2,143	1,154
					Non-Conditional					
School	0.000	-0.010	0.057***	0.030**	0.068***	0.051***	0.059***	0.035**	0.043***	0.021
	(0.006)	(0.008)	(0.011)	(0.014)	(0.012)	(0.015)	(0.011)	(0.015)	(0.012)	(0.015)
Mean	0.884	0.890	0.560	0.576	0.360	0.371	0.209	0.214	0.156	0.159
District	-0.009**	-0.015***	0.079***	0.045***	0.105***	0.069***	0.108***	0.075***	0.101***	0.091***
	(0.004)	(0.005)	(0.010)	(0.013)	(0.012)	(0.015)	(0.014)	(0.017)	(0.015)	(0.019)
Mean	0.952	0.958	0.702	0.720	0.552	0.568	0.421	0.430	0.361	0.366
State	-0.012***	-0.013***	0.078***	0.045***	0.103***	0.070***	0.101***	0.071***	0.099***	0.090***
	(0.003)	(0.004)	(0.009)	(0.011)	(0.011)	(0.014)	(0.014)	(0.018)	(0.016)	(0.020)
Mean	0.971	0.976	0.756	0.775	0.632	0.652	0.515	0.528	0.456	0.464
State Any	0.013***	0.008**	0.096***	0.059***	0.121***	0.085***	0.133***	0.098***	0.129***	0.117***
	(0.003)	(0.004)	(0.009)	(0.011)	(0.011)	(0.014)	(0.013)	(0.017)	(0.016)	(0.020)
Mean	0.977	0.980	0.768	0.784	0.657	0.674	0.569	0.581	0.533	0.541
N	50,950	37,366	43,144	32,650	37,593	28,834	29,092	22,976	22,454	18,029

Note. Each cell reports the coefficient on prior aide experience from a separate linear probability model (equation 1) in which the dependent variable is an indicator for whether a first-time teacher hired in year *t* remains in the given position 1, 3, 5, 8, or 10 years later. Columns marked "Main" use the main sample of first-time teachers; columns marked "Restr." use the restricted sample, which excludes first-time teachers with more than one year of experience according to the experience indicator in state data. Rows vary the position from narrowest to broadest: teaching in the same school, teaching in the same district, teaching anywhere in Maryland (State), and holding any K–12 role in Maryland (State Any). The first panel includes all first-time teachers; the remaining panels estimate the model separately for white, Black, conditionally licensed, and non-conditionally licensed (traditional or resident) teachers. All models include school and hire-year fixed effects and controls for teacher gender, race/ethnicity, and age at hire. Mean is the retention rate among first-time teachers without aide experience. N is the number of first-time teachers and declines at longer horizons because recent cohorts are not yet observed for that many years. Standard errors clustered at the school level are in parentheses. *$p < .10$. **$p < .05$. ***$p < .01$.