



Untapped Potential? Understanding the Paraeducator-to-Teacher Pipeline and its Potential for Diversifying the Teacher Workforce

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Abstract

Paraeducators are among the largest categories of public education employees and are increasingly seen as a pool of potential teachers. However, little is known about paraeducator-to-teacher transitions. Using statewide administrative data, we show that while paraeducators may be more racially/ethnically diverse than the teacher workforce, Black and Hispanic paraeducators are less likely than White paraeducators to transition into teaching. We additionally show that teachers with paraeducator experience are similarly effective to teachers without paraeducator experience. Lastly, we use simulations to show that the potential for the paraeducator-to-teacher pipeline to diversify the teaching profession may be limited unless they are highly targeted. Our results have policy design implications for efforts to expand the paraeducator-to-teacher pipeline or to diversify the teacher workforce.

Keywords: paraeducators, teacher pipeline, teacher diversity, educator preparation
JEL Codes: I20, J21, J45

1. Introduction

Paraeducators, also known as instructional aides or paraprofessionals, are among the largest categories of public-school employees in the United States with nearly 900,000 full-time equivalent (FTE) paraeducators employed by U.S. public schools in the fall of 2019 (Bisht et al., 2021; National Center for Education Statistics, 2019). Individuals holding these roles are often responsible for a wide range of instructional and non-instructional duties, such as providing extra support for struggling students, preparing classroom materials, and monitoring students during non-instructional times such as recess.

Paraeducators are also among the fastest-growing categories of public-school employees. The number of paraeducator FTEs more than doubled between 1990 and 2018 (Bisht et al., 2021), far out-pacing teacher FTE growth during that same period. Despite the relatively large growth in the number of paraeducators employed by public schools, there is an absence of research examining who works in these roles, the typical career trajectories of paraeducators, and their effects on student outcomes.

While paraeducators may be underexamined in peer-reviewed literature, they have been the focus of increasingly popular policy initiatives aimed at addressing teacher staffing challenges and expanding the teacher pipeline. Grow-Your-Own (GYO) initiatives, aiming at increasing paraeducator-to-teacher transitions, have become increasingly popular with at least 21 states recently establishing such

programs (Will, 2023). Advocates and researchers alike have pointed to these policies as a potential opportunity to diversify the teaching profession (Carver-Thomas, 2018; Gist et al., 2019; Villegas & Clewell, 1998; Villegas & Lucas, 2004), which may have positive, although admittedly small, benefits for Black and Hispanic students (Dee, 2005; Egalite et al., 2015; Gershenson et al., 2022; Nielsen & Wolf, 2001; Redding, 2019).

Despite increased interest in the paraeducator-to-teacher pipeline and the recent influx of funds dedicated to training paraeducators, it remains unclear to what extent GYO initiatives may be able to train a substantial number of new teachers or make meaningful impacts on the diversity of the teacher workforce. Furthermore, there is little evidence concerning the effectiveness of teachers with prior paraeducator experience. Understanding the capacity of the paraeducator-to-teacher pipeline and the effectiveness of teachers with prior paraeducator experience can help inform the design and potential of GYO initiatives.

In this paper, we provide new evidence on the existing paraeducator-to-teacher pathway that is informative for policymakers and practitioners seeking to implement paraeducator-focused GYO initiatives. Specifically, we address the following research questions:

- (1) How common are paraeducator-to-teacher transitions absent dedicated GYO initiatives?

- (2) What individual (i.e., demographic traits and educational attainment) and district characteristics are predictive of paraeducators transitioning into teaching?
- (3) How do teachers who were former paraeducators compare to other teachers in terms of their contributions to student academic growth?
- (4) What is the capacity of the paraeducator-to-teacher pipeline to diversify the teacher workforce?

Our results indicate that former paraeducators comprise an increasing share of newly trained Arkansas teachers. We observe that a small but significant proportion of paraeducators become teachers, especially during the first two years after they enter the education workforce. In addition, teachers who were former paraeducators are similar in terms of their contributions to students' academic growth to teachers without paraeducator experience. However, transitions into teaching roles are more likely among White paraeducators than among paraeducators from Black and Hispanic backgrounds and, as a result, the capacity of the paraeducator pipeline to diversify the teaching workforce may be limited. Efforts to diversify the teacher workforce will require solving the existing barriers that Black and Hispanic individuals, with or without prior paraeducator experience, face in becoming a teacher.

Literature Review

Many recent initiatives targeting paraeducators are a type of GYO initiative and aim to provide current paraeducators with the training, education, and credentialing required to become fully licensed classroom teachers. An analysis of 94 GYO initiatives found that 40% of initiatives specifically recruit existing paraeducators or other non-certified staff for teaching roles (Edwards & Kraft, 2024). The recent expansion of paraeducator-focused GYO initiatives (Will, 2023) may, in part, be driven by a 2021 U.S. Department of Labor rule change that allowed states to use federal funds to cover tuition, textbooks, and other expenses for aspiring teachers (Employment and Training Administration, Office of Apprenticeship, 2021).

Providing more opportunities for paraeducator to enter the teaching profession may have meaningful benefits for students. Researchers have long advocated for policies to expand paraeducators' pathways into teaching positions as a way to diversify the teaching workforce (Carver-Thomas, 2018; Gist et al., 2019, 2022; Villegas & Clewell, 1998; Villegas & Lucas, 2004). For example, Villegas and Lucas (1998) argue that their greater racial/ethnic diversity relative to teachers make paraeducators an untapped pool of prospective teachers that may play a key role in diversifying the teacher workforce. Given the well-documented, though admittedly small, benefits of teacher-student race matches (Dee, 2005; Egalite et al., 2015; Gershenson et al., 2022; Nielsen & Wolf, 2001; Redding, 2019), diversifying the teacher workforce is a worthwhile policy goal.

Who Works in Paraeducator Roles?

Most recent studies examining the paraeducator workforce focus on documenting the characteristics of those in these roles. Bisht et al., (2021) use data from the National Center for Education Statistics to document the rapid growth of paraeducator positions in U.S. public schools since the early 1990s and the comparably higher levels of racial/ethnic diversity of individuals working in these roles. They also analyze collective bargaining agreements and policy documents to characterize the career opportunities provided for paraeducators, finding that paraeducators typically have fewer learning opportunities or avenues for promotion than teachers.

Theobald et al., (2023) use administrative data from Washington State to similarly document that paraeducators are more racially/ethnically diverse with increasing diversity over time. Importantly, Theobald et al., (2023) also document elevated levels of attrition among paraeducators and raise concerns about recruiting paraeducators into teaching. They note that paraeducators are not “a limitless resource” and caution that efforts to increase paraeducator-to-teacher transitions risk trading one staffing challenge for another.

Studies examining both the growth in paraeducator positions and the distribution of paraeducators across school districts have consistently found that paraeducators tend to be concentrated in schools serving higher proportions of students with disabilities and students living in poverty (Bisht et al., 2021; Cramer et al.,

2017; Theobald et al., 2023). These results indicate that paraeducators may play a significant role in staffing schools serving disadvantaged student populations.

Paraeducator-to-Teacher Transitions

There is a notable dearth of research examining paraeducator-to-teacher transitions. Notable exceptions include Gist et al. (2019) who surveyed the existing literature and found consistent evidence that paraeducators face barriers not addressed by existing initiatives. These barriers included, among others, structural barriers like certification exams and relational issues derived from their position within the school.

Paraeducators and Students' Performance

Quantitative research documenting the effects of paraeducators on students is scant but generally finds positive associations. Cramer et al., (2017) use variation in paraeducator staffing levels in Washington State and find positive and statistically significant associations with student performance in certain subjects and grade levels. Hemelt et al., (2021) use variation in state funding for specific positions to estimate plausibly causal impacts of paraeducators on student outcomes and report consistent evidence for positive effects on academic achievement, particularly for historically disadvantaged students. In contrast, evidence from the largest U.S.-based evaluation of paraeducator impacts, a component of Tennessee's Project STAR, finds little evidence of positive effects (Gerber et al., 2001).

To our knowledge, only one paper has examined the effectiveness of teachers with paraeducator experience compared with new teachers without that experience. (Laski, 2024)) examined the effectiveness of paraeducators granted provisional licenses in Mississippi and found no detectable difference in terms of student growth from teachers who entered the profession through more traditional pathways.

2. Data

We evaluate the paraeducator-to-teacher pipeline using administrative data maintained by the Office of Education Policy and the Department of Education Reform at the University of Arkansas. These data cover the universe of traditional public and charter school employees for the 2013-14 through 2021-22 school years and allow us to track individuals throughout their time in the Arkansas education workforce.

We identify individuals' roles and role transitions using these longitudinal data. We define an individual as a paraeducator in an Arkansas school based on the specific job codes assigned to them.¹ Similarly, we define an individual as a teacher if they serve as a teacher-of-record or are a special education inclusion teacher for

¹ Specifically, we categorize job codes 758, 759, 760, 762, and 763 as paraeducator roles. A full catalogue of job codes used in the Arkansas Statewide Information System can be found at <https://adedata.arkansas.gov/jcms>.

one or more classes. We identify four mutually exclusive employment outcomes for all paraeducators at the end of each school year (t) based upon observations of those individuals in the following school year ($t + 1$). Specifically, we identify if an individual continues working in a paraeducator role during the subsequent school year, transitions into another non-teaching role, transitions into a teaching role, or exits the Arkansas public education workforce entirely.

These individual-level administrative data include demographic characteristics we use to explore heterogeneity in paraeducator-to-teacher transitions such as race/ethnicity, gender, and age. Because a bachelor's degree is required for a teacher license in Arkansas, we link paraeducator records to the universe of graduates from Arkansas post-secondary institutions from 2011 through 2021. These linked records allow us to identify which post-secondary credentials, if any, an individual held at the time they began working in the public education workforce and additional credentials earned while employed by public schools. However, individuals who obtained their post-secondary credentials outside of Arkansas or before 2011 are not observed in these data. When possible, we recover post-secondary attainment for these individuals using degree status as recorded by district staff.²

² Data quality for district-reported degree status in non-instructional roles may vary based on local norms and individual staff members responsible for the data entry. For this reason, we prioritize using administrative higher education records where available.

Summary statistics comparing the paraeducator and teacher workforce across these individual characteristics are presented in the Appendix Table A.1. In line with other studies examining the paraeducator workforce, paraeducators in Arkansas are more racially/ethnically diverse than teachers. While less than ten percent of teachers are Black, over 22% of paraeducators are. Similarly, only 1.5% of teachers in Arkansas are Hispanic as compared with 6% of paraeducators. While paraeducators in Arkansas are more diverse than teachers, a majority (70%) are White. We also find that paraeducators are more likely than teachers to be female, 91% compared to 78%, and that paraeducators are, on average, slightly older than teachers.

We merge our longitudinal individual-level data with district characteristics obtained through the Arkansas Department of Education's Data Center³ and the National Center for Educational Statistics' Common Core of Data. We include demographics of students in the district (i.e., the proportion of non-white students and the proportion who qualify for free- or reduced-price lunch⁴), discipline rate,⁵ average teacher experience and certification, urbanicity, and geographic region.

³ <https://adedata.arkansas.gov/statewide/>.

⁴ Results are qualitatively similar when using the percentage of children aged 5-17 that live in poverty in a district's attendance zone as measured by the U.S. Census Bureau's Small Area Income and Poverty Estimates.

⁵ Discipline rates for the 2019-20 and 2020-21 school years are likely affected by the COVID-19 pandemic and related remote learning (Anderson & McKenzie, 2022). To maintain consistency, we use the 2018-19 discipline rate for both years.

Additionally, we compare the effectiveness of teachers with and without experience as a paraeducator using value-added scores provided by the Arkansas Department of Education. These value-added scores were estimated using a mixed model approach controlling for up to four prior achievement scores and English-language proficiency level. Due to testing cancelations in the 2019-20 school year, we match value-added scores for the 2017-18, 2018-19, and 2020-21 school years.

3. Analytic Approach

We first explore the size of the paraeducator-to-teacher pipeline by examining the proportion of new teachers who have formerly worked as a paraeducator from 2015-16 through the 2021-22 school year.⁶ Next, we examine the prevalence of different paraeducator role transitions for five years following their entry into the Arkansas public education sector. We present results using descriptive visualizations that are pooled across cohort entry years and represent the proportion of paraeducators, on average, that remain working as a paraeducator, transition into another non-teaching role, become teachers, or exit the Arkansas public education workforce one to five years after they begin working in an Arkansas school.

⁶ As the data used in our analysis only extend backwards to the 2013-14 school year, we would not observe individuals who had worked as a paraeducator before the 2013-14 school year and returned to the education workforce in a teaching role at some point between the 2015-16 and 2021-22 school years. To avoid misleading trends caused by this left censoring, in this visualization we identify former paraeducators as those who worked in a paraeducator role during the two school years before assuming a teaching role.

We then disaggregate these trends by race/ethnicity. Given that many recent initiatives designed to recruit paraeducators into the teaching profession have a focus on teacher diversity (Melnick, 2024), we further explore heterogeneity in these transitions depending on individual and school characteristics to assess the extent to which existing paraeducator-to-teacher pipelines recruit racially/ethnically diverse teachers.

Identifying Heterogeneity in Paraeducator Role Transitions

We explore heterogeneity in paraeducator role transitions using a multinomial-logit discrete-time hazard model following (1) below. In this specification, Y_{ikt} is the employment decision made by individual i in school k at the end of school year t .

$$Pr(Y_{ikt} = j_{t+1} | \gamma_{ikt}, \theta_{ikt}, \ln(s_{ikt})) = \frac{\exp([\gamma'_{ikt}\beta_1^j + \theta'_{ikt}\beta_2^j + \beta_3^j \ln(s_{ikt})])}{\sum_{l=1}^4 \exp([\gamma'_{ikt}\beta_1^l + \theta'_{ikt}\beta_2^l + \beta_3^l \ln(s_{ikt})])} \quad (1)$$

$$\text{where } j = \begin{cases} 1 & \text{Remained paraeducator} \\ 2 & \text{Switched to non - instructional} \\ 3 & \text{Became teacher} \\ 4 & \text{Left AR public education} \end{cases}$$

The vector γ_{ikt} includes individual characteristics of paraeducator i in school k at the end of school year t that may impact the likelihood of these individuals entering the teaching profession (e.g., educational credentialing and initial

paraeducator role: general education, special education, or a non-instructional capacity) or otherwise reflect disproportionate transitions into teaching among paraeducators (e.g., race/ethnicity). The vector θ_{kt} indicates district characteristics for district k in year t as described in the previous section. We additionally include the natural log of the number of years that individual i has worked as a paraeducator in school k entering year t plus one ($\ln(s_{ikt})$) to better capture the dynamics of work transitions. Following estimation via maximum likelihood, we calculate average marginal effects to represent the association between each individual and school characteristic and the probability of each outcome j occurring in percentage point changes.

Comparing Classroom Effectiveness

Teacher quality is often a concern when states make policy changes to increase the new teacher supply. These concerns extend to policies targeting the paraeducator-to-teacher pipeline, such as paraeducator-focused GYO programs. One argument common among proponents of expanding paraeducator-to-teacher pipelines is that paraeducators will typically begin teaching with valuable experience working with similar students in comparable district contexts. These prior experiences may then be assets that allow paraeducators-turned-teachers to be more effective in their initial years working as main teachers than new teachers who enter without prior experience in working in schools (Gist et al., 2019).

We examine differences between the effectiveness of teachers with and without paraeducator experience by examining the distributions of value-added scores in both mathematics and ELA during teachers' first, second, and third years in the classroom. We conduct a Kolmogorov-Smirnov (KS) test for the equality of distributions between each group for each subject/experience combination. A lack of statistical significance from this KS test indicates that the value-added distribution does not differ for teachers with and without paraeducator experience.

Simulating Policy Impacts

In addition to prior analysis documenting job transitions and effectiveness of paraeducators, we conduct a series of Monte-Carlo-style simulations to explore the potential for a paraeducator-to-teacher pipeline to diversify the teaching profession. We focus on the potential for these GYO initiatives to diversify the Arkansas teacher workforce by encouraging Black and Hispanic paraeducators to transition into teaching. To conduct these simulations, we use a multinomial discrete-time hazard model similar to (1), above, and obtain predicted probabilities of different labor transitions (e.g., remaining in the same role, transitioning to teaching roles, transitioning to non-teaching roles, and exiting the public-school workforce) for all paraeducators and teachers employed by Arkansas public schools during the 2021-22 school year.

We then adjust these predicted probabilities to reflect a range of 441 different scenarios in which the likelihood of all paraeducators (a) transitioning into teaching professions increases by 0 to 20 percentage points and the likelihood of Black and Hispanic paraeducators (m) increases by 0 to 20 percentage points. These scenarios represent potential outcomes of paraeducator-focused policies ranging from “business as usual” (e.g., no adjustment to predicted probabilities of transitions) to effective targeting with large effects (e.g., Black and Hispanic paraeducators becoming 40-percentage points more likely to become teachers). We conduct these simulations for a total of five years to produce 441 different potential teacher workforces entering the 2026-27 school year. See Appendix B for full details of our simulation methodology.

To quantify the diversity of the resulting simulated teacher workforce projections, we calculate the difference in the proportion of Black and Hispanic students⁷ and teachers after five years of simulation for all values of a and m . Negative values for this metric indicate that Black and Hispanic teachers are underrepresented relative to the student population, while positive values indicate that Black and Hispanic teachers are overrepresented relative to the student population.

⁷ We use the demographic composition of Arkansas students during the 2021-22 school year as a comparison with our simulated teacher workforce. This comparison assumes that the demographics of the Arkansas student population would remain stable between the 2021-22 and 2026-27 school years.

4. Results

Paraeducators in the Arkansas Teacher Pipeline

<< Figure 1 – Proportion of New Teachers with Prior Paraeducator Experience >>

In Figure 1, we present the proportion of new teachers who have worked as a paraeducator at some point during the previous two school years. Interestingly, we observe a consistent upward trend in the proportion of new teachers who have previously worked as a paraeducator. During the 2015-16 school year, approximately 8% of new teachers had worked as a paraeducator. By the 2021-22 school year, nearly 15% of new teachers had paraeducator experience. This trend indicates that former paraeducators comprise an increasing share of the Arkansas teacher pipeline. If considered a separate educator preparation program (EPP), the paraeducator-to-teacher pipeline would be among the largest EPPs in the state, producing 480 new teachers during the 2021-22 school year alone.⁸

⁸ According to Title II data, only three EPPs had more program completers. However, not all EPP completers will go on to teach in the Arkansas teacher workforce, meaning that the paraeducator-to-teacher pipeline is at least the fourth largest EPP and potentially the largest EPP.

Paraeducator Role Transitions

<< Figure 2 – Paraeducator Role Transitions >>

We present paraeducator role transitions for the first five years following entry into the education sector overall and by race/ethnicity in Figure 2. Overall, we see that, after one year, approximately one-fifth of paraeducators leave the public education sector and approximately 6% of paraeducators have already switched to teaching roles. Over the subsequent two years relative to entry, the proportion of paraeducators who switch into teaching roles continues to increase, although at a slower pace. The proportion of paraeducators-turned-teachers peaks three years after an individual begins their career as a paraeducator and decreases in years four and five after entry due to attrition from the education sector. Five years after starting to work as a paraeducator in Arkansas schools, nearly half (47%) of paraeducators have left the Arkansas public education workforce entirely.

When disaggregated by an individual's race/ethnicity, two noteworthy trends appear. First, transitions into teaching roles appear to be at least twice as common among White paraeducators than among Black or Hispanic paraeducators. Three years after entering the education sector, 9% of White paraeducators have transitioned into teaching as compared to 3-4% of Black and Hispanic paraeducators. Second, while attrition from the education sector appears comparable between

White and Black paraeducators, Hispanic paraeducators appear more likely to exit the Arkansas education sector entirely.

Heterogeneity in Paraeducator Transitions

Table 1 presents the estimated marginal effects of models describing paraeducators' job transitions following the specification in equation (1). These results show clear and meaningful signs of heterogeneity by race/ethnicity in line with the trends presented in Figure 2. Specifically, we observe that Black and Hispanic paraeducators are 1.1 and 2.5 percentage points more likely to remain in a paraeducator role, respectively, and between 1 and 2 percentage points less likely to become teachers, all else equal. These estimates are significant at the 99% confidence level and indicate that even when controlling for an individual's education attainment, which represents an important barrier to transition, Black and Hispanic paraeducators are less likely to become teachers.

In contrast with the results presented in Figure 2, however, we observe that after controlling for other factors such as education, age, and school characteristics Hispanic paraeducators are 1.3 percentage points less likely than White paraeducators to exit the Arkansas public education workforce. However, this result is only marginally significant at the 90% confidence level.

<< Table 1 – Heterogeneity in Paraeducator Role Transitions >>

We also explore the association between paraeducators' post-secondary attainment when they begin working in an Arkansas public school and later role transitions. We find that those paraeducators with some postsecondary enrollment, but no earned degree, are approximately 3 percentage points less likely to remain working as a paraeducator and 2.3 percentage points more likely to later become teachers than those paraeducators with no history of enrollment at an Arkansas postsecondary institution. While we do not observe meaningful patterns in the association between holding an associate degree and various transitions, we find that those individuals who begin working as a paraeducator with a non-education (i.e., non-CIP-13) bachelor's degree or higher are nearly 14 percentage points less likely to remain working as a paraeducator, 10 percentage points more likely to eventually become a teacher, and 3.3 percentage points more likely to exit the Arkansas public education workforce than an individual with no history of postsecondary enrollment. These estimates are significant at the 99% confidence level or higher.

Unsurprisingly, those individuals who begin working as a paraeducator while holding an education-related bachelor's or higher degree (i.e., a CIP-13 degree) are 17 percentage points less likely to remain working as a paraeducator and 20 percentage points more likely to become teachers than individuals without a history of post-secondary enrollment. These estimates are significant at the 99% confidence level and indicate that some individuals who meet the requirements for

provisional or full teaching licenses begin their careers in teaching-adjacent roles. This is a phenomenon that has been documented in prior research (Goldhaber et al., 2023).

Relatedly, we observe that earning a post-secondary degree while already working as a paraeducator is associated with a 7.5 percentage point increased probability of switching to a teaching position in the following school year with corresponding decreases in the probability of remaining a paraeducator or exiting the Arkansas public education workforce. These estimates are significant at the 99% confidence level. Overall, these results suggest that getting a bachelor's degree is a major step in paraeducators' transitions into main teaching roles.

Finally, while there were few consistent associations between school characteristics and paraeducator transitions, we observe a meaningful relationship between paraeducator role transitions and the percentage of fully certified teachers in a school. Specifically, as shown in Table 1, a 10-percentage point increase in the proportion of teachers who are fully certified within a school is associated with a nearly 1 percentage point increase in the likelihood of an individual remaining in a paraeducator role and a half of a percentage point decrease in the likelihood of an individual exiting the education sector entirely. Surprisingly, we do not find any statistically significant relationship between the percentage of teachers who are fully certified and the probability of paraeducators becoming a teacher. This may

indicate that schools facing staffing challenges are not actively recruiting new teachers from their existing pool of paraeducators.

Former Paraeducator Effectiveness

We compare the effectiveness of teachers both with and without prior paraeducator experience by studying the distributions of value-added scores for teachers in their first three years of teaching in Figure 3. This figure also presents the results of Kolmogorov-Smirnov (KS) tests for the equality of the value-added distributions between teachers with and without prior paraeducator experience for ELA and Math scores separately. Visually, it appears that paraprofessionals have an advantage in terms of value-added for ELA. However, in all cases, the KS tests fail to reject the null hypothesis that the distributions of value-added are statistically different for teachers with and without prior paraeducator experience.

<< Figure 3 – Value-Added of Beginning Teachers by Prior Paraeducator Experience >>

As a robustness check, we also study whether paraeducators who become teachers experience different effectiveness growth as they gain years of experience than those who come from a more traditional pathway. These results are in line with the descriptive results above, as we find no evidence that teachers with paraeducator

experience have meaningfully different average value-added scores at the beginning of their careers or experience different returns to experience over time. Full results of this analysis are available in Appendix C.

The Potential Impacts of GYO Initiatives

Finally, we investigate the potential for GYO initiatives to contribute to teacher diversity through the policy simulation exercise described in the previous section. While current initiatives in Arkansas are not focused on certain schools, policymakers may wish to target efforts to expand the paraeducator-to-teacher pipeline in schools facing staffing challenges. To inform this scenario, we perform the simulation exercise for both all public schools in Arkansas and for schools facing acute staffing challenges, which we define as districts in which more than 10% of teachers are not fully certified for at least half the classes they teach. In total, the sample of schools we include in this targeted scenario enroll 31% of statewide enrollment, 62% of Black and Hispanic students, and 50% of free-or-reduced priced lunch eligible students. Panel A of Figure 4 shows the results of these simulated changes across all Arkansas districts, while Panel B presents results if only districts with acute staffing challenges are targeted.

<< Figure 4 – >>

The bottom-left corner of Panel A represents simulated racial disproportionalities between Arkansas's teachers and students after five years if the likelihood of becoming teachers remains the same as we observe today. This scenario results in a disproportionality of -19%, indicating that teachers are nearly 20 percentage points less likely than students to be Black or Hispanic.

Moving across the x-axis corresponds to an increase in the likelihood of all paraeducators, irrespective of racial/ethnic identity, transitioning into teaching roles. Examining points along the x-axis, we find that the simulated racial disproportionality between Black and Hispanic students and teachers is unchanged at -19% for all values of increases in the probability of transitioning to teaching roles (a). Increasing the likelihood of paraeducators transitioning into teaching roles by as much as 20 percentage points has little to no effect on the racial and ethnic diversity of the Arkansas teacher workforce. This is a result of both the higher probability of White paraeducators becoming teachers compared to Black or Hispanic paraeducators that was documented above and the reality that the paraeducator workforce in Arkansas is majority White.

Moving up the y-axis, we illustrate scenarios in which we increase the rate at which Black and Hispanic paraeducators become teachers. We show that transition probabilities for Black and Hispanic paraeducators must be increased substantially to have meaningful impacts on the diversity of the Arkansas teacher workforce. Changes in the likelihood of all paraeducators transitioning into teaching (a)

and the likelihood of Black or Hispanic paraeducators transitioning into teaching (m) must exceed 11 and 10 percentage points, respectively, for changes in our racial disproportionality measure of at least 3 percentage points to occur.

In Panel B, we present results when only schools with teacher shortages are targeted. In this case, the simulated racial disproportionality measure under the “no-change” scenario (i.e., $a = 0, m = 0$) is significantly larger at -28% than the one observed in Panel A which includes simulations for all schools. This difference is driven by the higher concentration of Black and Hispanic students in districts experiencing staffing challenges. However, we observe larger reductions in the racial disproportionality measure with smaller changes in the probability of transitioning into teaching roles for all teachers as well as when Black and Hispanic teachers are targeted.

Specifically, an increased probability of transitioning into the teaching profession for all paraeducators of approximately 7 percentage points and an additional increased probability of 5 percentage points for Black and Hispanic paraeducators appears sufficient to reduce the racial disproportionality in the teacher workforce by 6 percentage points to -22%. We also observe that similar gains in representation might occur with large increases in the probability of all paraeducators transitioning into teaching roles ($a > 0.16$) and no additional increase in the probability of Black or Hispanic paraeducators changing roles.

Together, Panels A and B indicate that while the paraeducator-to-teacher pipeline may have limited capacity to diversify the teaching workforce, larger gains in diversification may be possible if policies target schools facing staffing challenges.

5. Discussion

Our analyses provide valuable insights into the paraeducator-to-teacher pipeline, an understudied but sizeable group of educators who are also the focus of new Grow-Your-Own policy initiatives throughout the United States. Using administrative data from Arkansas, we find that paraeducators are not only more diverse than teachers but also comprise an increasing share of the Arkansas teacher pipeline. However, like results from Washington State (Theobald et al., 2023), we find relatively high levels of attrition from the public education sector among newly hired paraeducators. Despite this attrition, a small but significant proportion of paraeducators become teachers within their first three years of entering the public education workforce.

Our results also show that, on average, teachers with experience as a paraeducator exhibit similar value added to those without prior paraeducator experience. This finding implies that recruiting new teachers from the paraeducator workforce may be an effective strategy to expand the teacher workforce without negative effects on student outcomes. Additionally, we find evidence that educational

attainment, particularly holding a bachelor's degree, is a significant component of paraeducator-to-teacher transitions, which GYO initiatives may be well suited to address.

Nevertheless, we find that White paraeducators are twice as likely to become teachers than Black or Hispanic paraeducators. Using simulations, we show that the capacity of such programs to diversify the teaching profession may be limited with even large increases in the probabilities of Black and Hispanic paraeducators becoming teachers, resulting in little, if any, changes in the racial disproportionality between teachers and students in Arkansas. Our simulations also suggest that targeting efforts toward schools that face acute staffing challenges may be a more effective way to increase the racial/ethnic diversity of teachers working in schools with diverse student populations. Additionally, our results indicate that efforts to diversify the teaching profession by recruiting from the existing pool of paraeducators may be limited in contexts, such as Arkansas, that lack racial/ethnic diversity in their paraeducator workforces.

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Figures

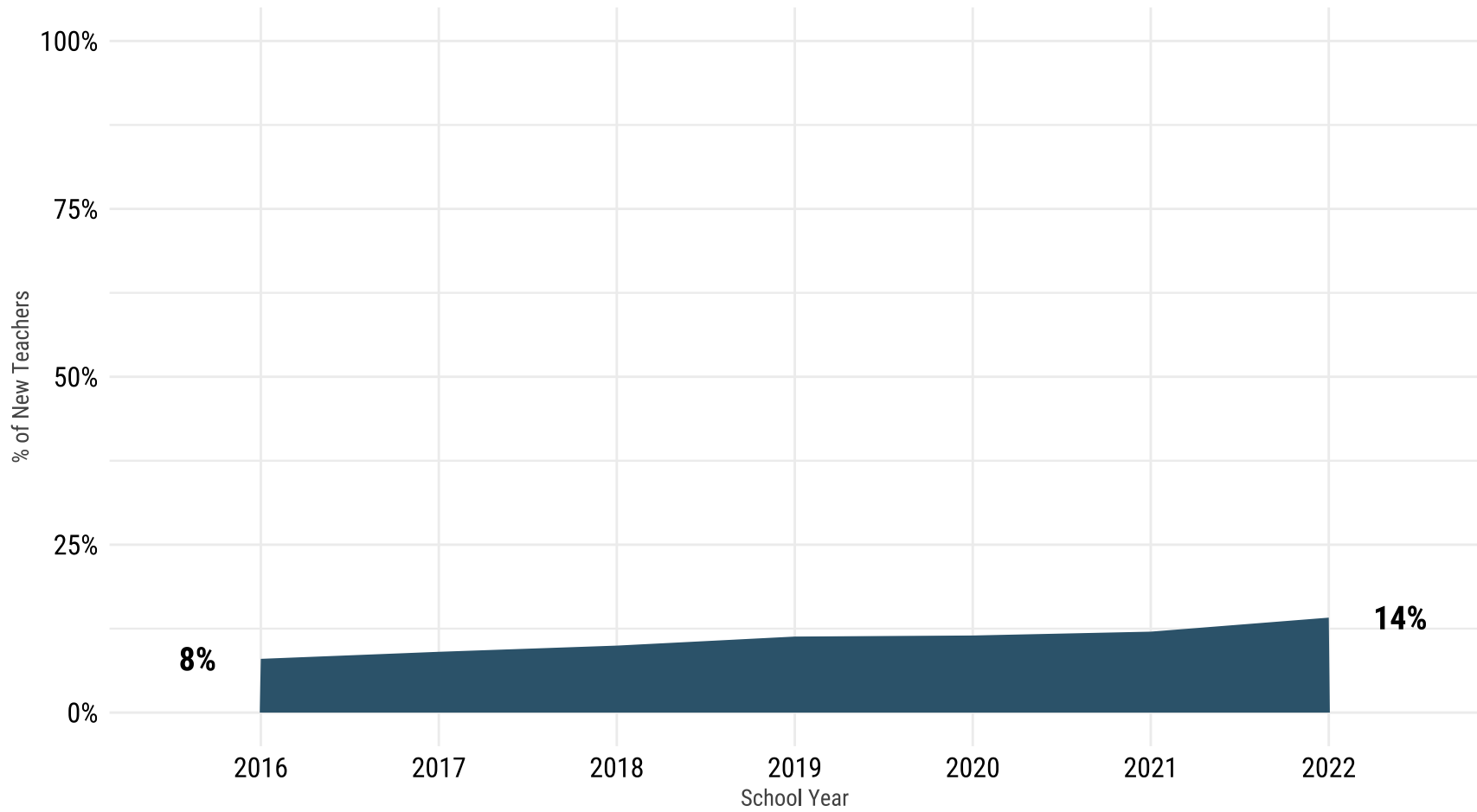


Figure 1 – Proportion of New Teachers with Prior Paraeducator Experience

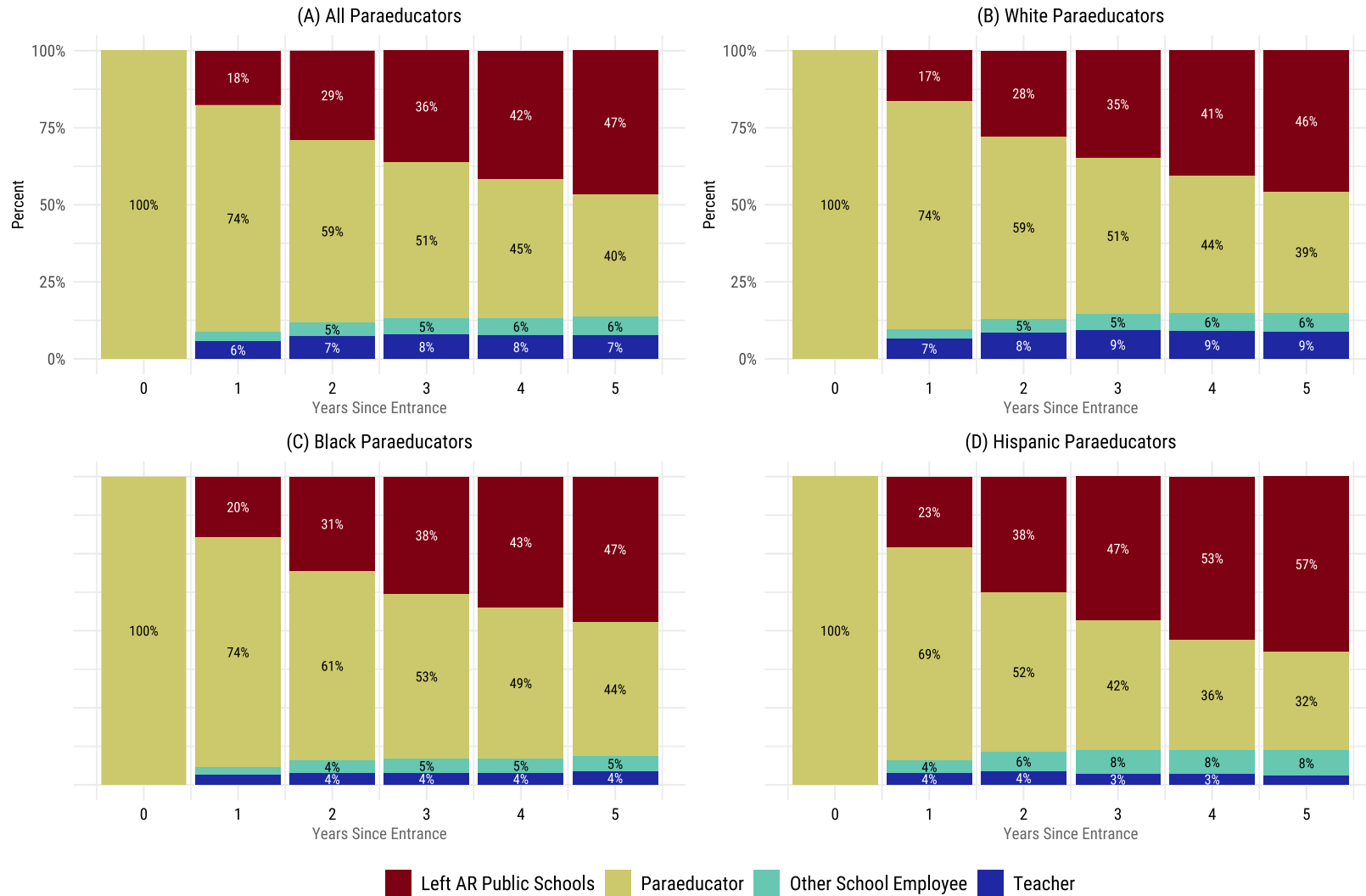


Figure 2 – Paraeducator Role Transitions

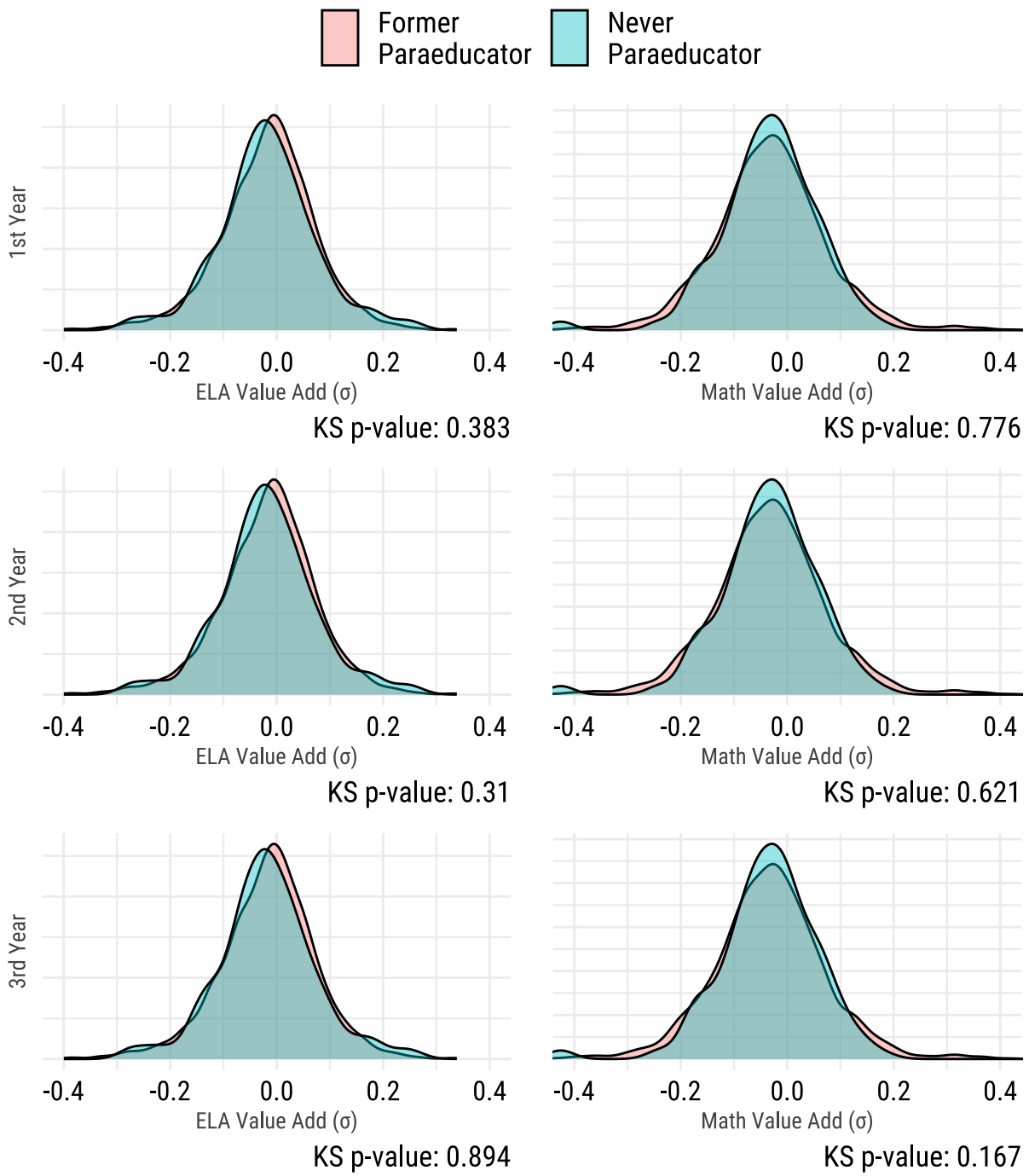


Figure 3 – Value-Added of Beginning Teachers by Prior Paraeducator Experience

How to Read This Figure

The heatmaps shown in figure 4 represent the racial representation gap (i.e., the difference between the percent of students who are Black or Hispanic and the percent of teachers who are Black or Hispanic) under a variety of simulated scenarios (see Appendix B for details). Moving right along the x-axis corresponds to an increased likelihood of all paraeducators, regardless of race/ethnicity, becoming teachers. Moving up along the y-axis indicates an increased probability of Black or Hispanic paraeducators becoming teachers. More negative values, represented by lighter (yellow) colors, indicate a larger gap in racial representation while less negative values, represented by darker (purple) colors, indicate a smaller gap in racial representation.

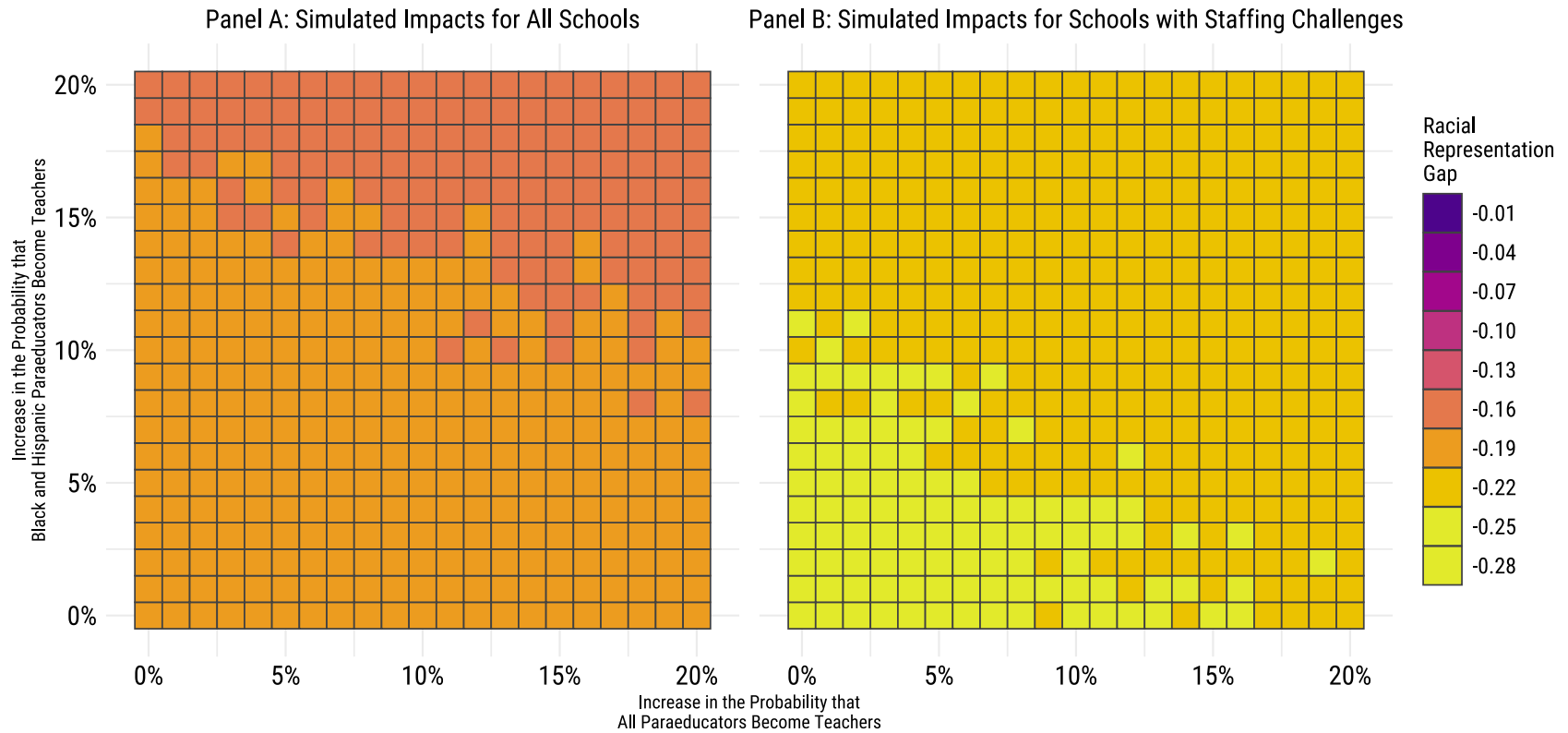


Figure 4 – Simulated Impacts of Increasing the Probability of Paraeducators Becoming Teachers on the Difference Between Student and Teacher Race/Ethnicity Composition

Tables

Table 1 – Heterogeneity in Paraeducator Role Transitions

	Role Outcome			
	Paraeducator	Other	Teacher	Exit
Black	0.011** (0.005)	-0.002 (0.002)	-0.010*** (0.002)	0.002 (0.005)
Hispanic	0.025*** (0.008)	0.009** (0.004)	-0.021*** (0.002)	-0.013* (0.007)
Other Race/Ethnicity	0.001 (0.015)	-0.004 (0.006)	-0.008 (0.006)	0.011 (0.014)
Non-Instructional	-0.051*** (0.006)	0.012*** (0.002)	-0.020*** (0.002)	0.059*** (0.005)
Special Education	0.015*** (0.004)	-0.004** (0.002)	-0.011*** (0.002)	0.000 (0.004)
Some Postsecondary	-0.030*** (0.005)	-0.001 (0.002)	0.023*** (0.003)	0.007* (0.005)
Associate Degree	-0.009 (0.011)	-0.002 (0.004)	0.008 (0.006)	0.003 (0.009)
Non-CIP-13 Degree	-0.137*** (0.012)	0.000 (0.004)	0.104*** (0.009)	0.033*** (0.009)
CIP-13 Degree	-0.173*** (0.015)	-0.005 (0.004)	0.198*** (0.013)	-0.020** (0.009)
Postsecondary Grad.	-0.037*** (0.014)	-0.002 (0.006)	0.075*** (0.009)	-0.037*** (0.010)
% Fully Certified Teachers	0.068*** (0.026)	-0.017* (0.010)	-0.005 (0.011)	-0.046** (0.023)
Ln(Spell Length)	0.019*** (0.001)	-0.001*** (0.000)	-0.004*** (0.001)	-0.014*** (0.001)
Observations		45,535		
Pseudo R ²		0.119		

* p < 0.1, ** p < 0.05, *** p < 0.01

Appendix A: Summary Statistics

Table A.1 – Demographics of Paraeducator and Teacher Workforces (2021-22 School Year)

	Paraeducators	Teachers
	(N = 7,707)	(N = 32,411)
Age (years)	45.1	42.0
<i>Race/Ethnicity</i>		
Asian	0.9%	0.5%
Black	22.1%	9.3%
Hispanic	6%	1.5%
Native American	0.5%	0.5%
Other Race/Ethnicity	0.4%	0.4%
White	70.1%	87.7%
<i>Gender</i>		
Female	90.9%	77.9%
Male	9.1%	22.1%
<i>Degree Status</i>		
BA or Higher	5.9%	93.8%
Some Postsecondary	2.8%	0.1%
Unknown	91.3%	6.0%
<i>Paraeducator Type</i>		
General Education	54.7%	
Special Education	13.9%	
Non-Instructional	31.4%	

Appendix B: Details of Simulation Approach

To conduct these simulations, we first obtain predicted probabilities for all paraeducators and teachers (i) and outcome (j), at the end of the 2021-22 school year, using a multinomial-logit discrete-time-hazard model as specified by (2).

$$Pr(Y_{ikt} = j_{t+1} | race_{ikt}, ln(s_{ikt})) \quad (2)$$

$$= \frac{\exp(race_{ikt}\beta_0^j + para_{ikt}\beta_1^j + race_{ikt} \times para_{ikt}\beta_2^j + \beta_3^j \ln(s_{ikt}))}{\sum_{l=1}^4 \exp(race_{ikt}\beta_0^l + para_{ikt}\beta_1^l + race_{ikt} \times para_{ikt}\beta_2^l + \beta_3^l \ln(s_{ikt}))}$$

$$\text{where } j = \begin{cases} 1 & \text{Remained in role} \\ 2 & \text{Switched to other role} \\ 3 & \text{Became teacher} \\ 4 & \text{Left AR public education} \end{cases}$$

Next, we study the effects of altering the estimated predicted job transition probabilities of paraeducators. Specifically, we reduce the predicted probability of remaining a paraeducator and increase the predicted probability of switching into teaching by a given value a within the range $[0.00, 0.20]$. Then, we simulate specific paraprofessionals labor transition outcomes entering the 2022-23 school year, using the predicted probabilities, adjusted accordingly for different scenarios defined by a . For example, if a paraeducator in our sample has predicted (adjusted) probabilities of remaining a paraeducator, switching to another role, becoming a teacher, or leaving public education of 0.4, 0.1, 0.2, and 0.3, respectively. We randomly assign a specific job transition outcome to this paraeducator using these predicted probabilities as weights so there is a 40% chance that the random assignment will result in that paraeducator remaining a paraeducator, 10% chance of switching to another role, 20% chance of becoming a teacher and 30% chance

of leaving public education. The different changes in predicted probabilities for each value of $a \in [0.00, 0.20]$ result in a range of scenarios corresponding to the potential outcomes of increasing the probability of all paraeducators in the Arkansas public education workforce becoming teachers while decreasing the probability that they remain working as paraeducators by the same amount.

We similarly use the predicted probabilities for teachers⁹, estimated with model (2) above, to simulate teachers' workforce transitions out of the classroom (i.e., switching into non-instructional positions or exiting the Arkansas public education workforce). However, in contrast with paraeducators, we do not alter the predicted probabilities of teachers transitioning out of the classroom. As a result, our simulations represent the potential effect of recruiting new teachers from the pool of individuals who were likely to continue working in paraeducator roles.

After simulating these different outcomes across the range of paraeducator-to-teacher probabilities a , with increments of 1 percentage point at a time, from 0.00 to 0.20, we are left with 21 different possible combined paraeducator and teacher workforces. As these simulated workforces are naturally depleted by regular attrition (i.e., those individuals who were assigned to an outcome of leaving the education workforce), we simulate regular hiring by drawing random samples of paraeducators and teachers who entered the public education workforce between the 2014-15 and 2021-22 school years. Here, we are implicitly assuming that the composition of new paraeducators and teachers will remain stable over time. After replacing regular attrition, we repeat this process to simulate switches, exits, and remaining in the same role for a second school year with the same change in predicted probability of paraeducator-to-teacher transitions, a . We

⁹ As the outcomes for teachers do not map perfectly onto the outcomes defined for paraeducators (i.e., existing teachers cannot switch into teaching), teachers in our data are only ever observed as remaining a teacher somewhere in Arkansas public schools, switching to another position in Arkansas public schools, or exiting the public education workforce entirely.

repeat this process a total of three more times so that we are left with a set of simulated paraeducator and teacher workforces after five years (i.e., through the 2026-27 school year). We then study the diversity of these simulated paraeducator and teacher workforces.

In addition to the simulations described above, where the predicted probabilities of all paraeducators transitioning are uniformly altered, we also simulate changes to the composition of the paraeducator and teacher workforce if GYO initiatives were to specifically target paraeducators with certain observable characteristics. More specifically, we alter the predicted probabilities of Black and Hispanic paraeducators transitioning into teaching roles by some value of $m \in [0.00, 0.20]$. This change is in addition to the change of a in predicted probabilities for all paraeducators described above. In total, this simulation procedure produces 2,205 different paraeducator and teacher workforce samples we then use to study the diversity of resulting teaching profession.¹⁰

¹⁰ 441 different combinations of a and m over five years.

Appendix C: Value-Added and Returns to Experience

As a robustness check, we further study the relationship between value-added score measures of teacher effectiveness and years of experience and whether we observe differences by prior paraeducator status following the specification, below.

$$\begin{aligned} VAM_{ist} = & \beta_0 + \beta_1 Exp_{ist} + \beta_2 Exp_{ist}^2 + \sum_{k=1}^2 Exp_{ist=k} + \beta_5 Para_i \\ & + \beta_6 Para_i \cdot Exp_{ist} + \beta_7 Para_i \cdot Exp_{ist}^2 \\ & + \sum_{k=1}^2 Para_i \cdot Exp_{ist=k} + \varepsilon_{ist} \end{aligned}$$

We follow Wiswall (2013) and allow for a flexible relationship between years of experience and teacher quality. We then regress the value-add score of teacher i in subject s during year t on experience, experience squared, indicators for teachers in their first or second year of experience, an indicator variable for having been a paraeducator before teaching, and the interaction of the paraeducator indicator variable with the previously mentioned experience variables.

Results from this regression allow us to compare not just the overall effectiveness of teachers who entered the profession through different pathways but also whether the dynamics of teacher quality evolve differently for traditionally prepared and former paraeducators working in teaching roles. The results of this analysis are presented in Table C.1 below. In line with existing research on teacher effectiveness (Wiswall, 2013), we find evidence of positive returns to teaching experience. However, we do not find evidence that teachers with paraeducator experience enter the teacher workforce with meaningfully different average value-add scores or experience different returns to experience than teachers without prior paraeducator experience.

Table C.1 – Relationship Between Value-Add and Experience by Prior Paraeducator Status

	(A)	(B)	(C)
Experience	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)
Experience ²	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
First Year	-0.019*** (0.002)	-0.019*** (0.002)	-0.019*** (0.002)
Second Year	-0.012*** (0.002)	-0.012*** (0.002)	-0.012*** (0.002)
Paraeducator		-0.002 (0.002)	0.005 (0.005)
Experience × Paraeducator			-0.001 (0.001)
Experience ² × Paraeducator			0.000 (0.000)
First Year × Paraeducator			-0.006 (0.007)
Second Year × Paraeducator			-0.002 (0.007)
Observations	45,844	45,844	45,844
Adjusted R ²	0.013	0.013	0.013

* p < 0.1, ** p < 0.05, *** p < 0.01