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The Special Education Teacher Pipeline: Teacher Preparation, Workforce Entry, and Retention

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Abstract

We used data on the student teaching placements, degrees, teaching credentials, and workforce outcomes of more than 1,300 graduates of special education teacher education programs in Washington to provide a descriptive portrait of specific measures of special education teacher preparation and their relationships with workforce entry and early-career retention. Although rates of workforce entry and retention for these special education candidates were high, we documented considerably lower rates of entry into and retention in special education teaching positions for candidates who hold a dual endorsement in special education and another subject. These patterns have potential implications for the state's new dual-endorsement requirement and for dual-licensure programs more broadly. Student teaching with a cooperating teacher who is endorsed in special education was also associated with a higher likelihood of becoming a special education teacher, even when controlling for whether the placement was in a special or general education setting.

Ample evidence suggests that school systems across the country have struggled to fill special education teaching positions for many decades (e.g., Cowan et al., 2016; Mason-Williams et al., 2020; McLeskey et al., 2004). The situation in Washington state, the setting of this study, is similar, as prior work has documented special education teacher shortages in the state as measured by the number of applications to open teaching positions (Goldhaber et al., 2017), rates of workforce entry (Goldhaber et al., 2014), overall teacher production and attrition (Goldhaber et al., 2015), and emergency teaching credentials (Goldhaber et al., 2021). These shortages have historically been attributed both to an insufficient supply of special education teachers (e.g., Boe, 2006) and to lower retention rates for special education teachers (e.g., Billingsley, 2004), which more recent research has connected to the unique demands and working conditions in these teaching assignments (Bettini et al., 2017; Billingsley et al., 2020). Another potential explanation for these lower retention rates may be related to the preparation that special education candidates receive before entering the teaching profession.

Prior papers have discussed the importance of special education teacher preparation, in terms of both the ways it must differ from the preparation of general educators (e.g., Brownell et al., 2005) and how it must respond to changes in the structure of special education in K–12 schools (e.g., Brownell et al., 2010). Prior research also has illustrated the crucial importance of special education

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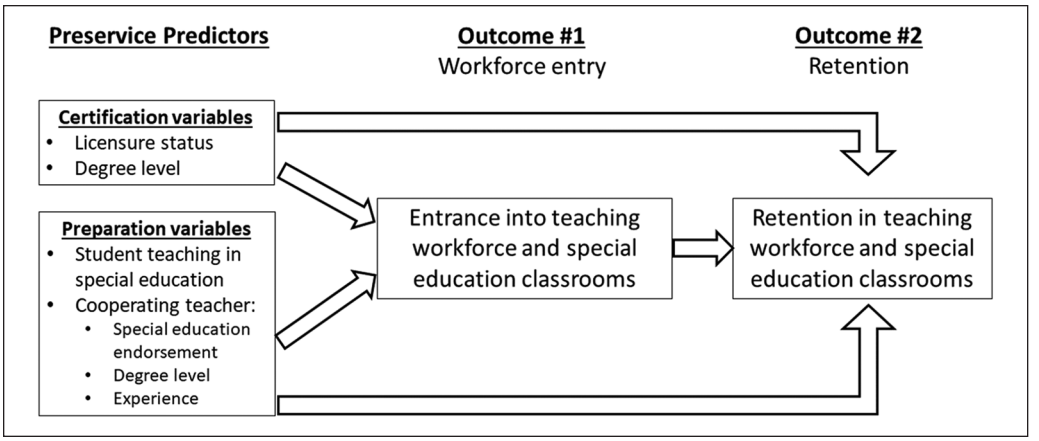

Figure 1. Theoretical framework.

candidates' preservice experiences in promoting pedagogical skills (e.g., Leko et al., 2012) and domain expertise (e.g., Brownell et al., 2009). Some prior research has connected specific measures of special education teacher preparation to later outcomes. For example, Connelly and Graham (2009) found that 1st-year special education teachers with at least 10 weeks of student teaching experience were more likely to stay in the workforce than 1st-year special education teachers with less student teaching experience. But overall, the existing research on special education preparation has been criticized as "limited and unfocused" (Sindelar et al., 2010, p. 8), partially because so little of this research uses specific measures of both preparation and outcomes. Thus Brownell et al. (2020) recommend that researchers "leverage preparation program and existing state data to better understand the characteristics of effective teacher education experiences and transition into the classroom" (p. 39).

This article addresses the criticisms of existing research on special education teacher preparation by Sindelar et al. (2010) by connecting specific measures of the preparation of special education teachers to their entry into and retention in the public teaching workforce and special education teaching positions. Specifically, we follow the recommendation of Brownell et al. (2020) and leverage a longitudinal data set from Washington state that combines data about preservice teacher candidate experiences with information about K–12 teachers and their students. This data set allows us to characterize aspects of the preparation of individual teacher candidates, such as their teaching endorsements, degrees, and student teaching placements.

The specific variables and outcomes we consider are motivated by the theoretical framework summarized in Figure 1. First, teachers' credentials likely influence both the jobs they receive initially and their eventual career paths, as credentials determine the jobs for which they are eligible and, in some cases, affect their compensation. This component of the theoretical framework is supported by prior empirical work that has connected special educators' credentials to their future workforce entry (e.g., Goldhaber et al., 2014) and retention (e.g., Boe et al., 1997; Miller et al., 1999). For example, Goldhaber et al. (2014) found that teacher candidates with a special education credential are substantially more likely to enter the public teaching workforce than candidates without this credential.

Second, the specific preparation experiences of special education teacher candidates—and, in particular, their student teaching experiences that have been identified as the "key component" of preservice teacher preparation (Anderson & Stillman, 2013)—also likely influence their career paths as they

often constitute the only formal experience candidates have in classrooms prior to entering the workforce. This theoretical basis is again bolstered by empirical work. Specifically, prior work not specific to special education teacher preparation has connected aspects of candidates' student teaching placements, such as characteristics of the cooperating teacher, student teaching school, and student teaching classroom, to workforce entry (Goldhaber et al., 2014), retention (Ronfeldt, 2012, 2015) and other measures of candidate development (Goldhaber et al., 2020; Ronfeldt et al., 2018). For example, Ronfeldt (2012) found that teacher candidates who student teach in a school with lower teacher turnover are themselves less likely to leave the workforce once they become teachers.

Given this theoretical and empirical basis, we measured candidates' credentials by whether they hold a master's degree and whether they hold an endorsement to teach another subject in addition to special education (i.e., are "dual endorsed"). We further measured candidates' student teaching experiences with four additional variables: whether the candidate student taught in a special education classroom (defined in the next section), whether the candidate's cooperating teacher had a special education endorsement, whether the candidate's cooperating teacher had a master's degree, and the prior teaching experience of the candidate's cooperating teacher. It is important to note that each of these six measures is broad and encompasses a wide range of specific candidate experiences. For example, candidates who student taught in a special education classroom under our definition could have experienced several different types of classroom settings. But given that these variables also are important for designing preparation and certification policies, we also believe that these are useful measures that can help guide policy making.

We then connected these teacher preparation measures to workforce outcomes identified by Billingsley and Bettini (2017) as key factors influencing special educator quality and effectiveness to address two research questions:

Research Question 1: What preservice experiences (credentials, degrees, and student teaching placements) predict whether special education teacher candidates enter the state's public teaching workforce and/or special education teaching positions?

Research Question 2: What preservice experiences (credentials, degrees, and student teaching placements) predict whether special education teacher candidates who enter the state's public teaching workforce stay in the workforce and/or in special education teaching positions?

These research questions build on recent empirical work on trends in the special education teacher labor market, but this analysis represents the first time these trends have been connected to special education teacher preparation. For instance, although recent work has documented higher workforce entry rates for special education candidates (Goldhaber et al., 2014), there is no large-scale empirical evidence about the *predictors* of whether special education teacher candidates actually become special education teachers. Likewise, although recent research documents the relationship between special educators' classroom settings and teacher attrition (Gilmour & Wehby, 2020), limited evidence is available about specific factors that make it more likely for special education teachers to stay in the profession and in special education teaching positions in particular. Thus, each of the research questions represents a unique contribution to the existing research on special education teacher preparation and the special education teacher workforce.

Method

We combined data from two sources for this study: data on K–12 students and teachers provided by the Washington State Office of the Superintendent of Public Instruction (OSPI) and data on teacher candidates collected as part of the Teacher Education Learning Collaborative (TELC). All research activities were approved by the institutional review board of participating institutions.

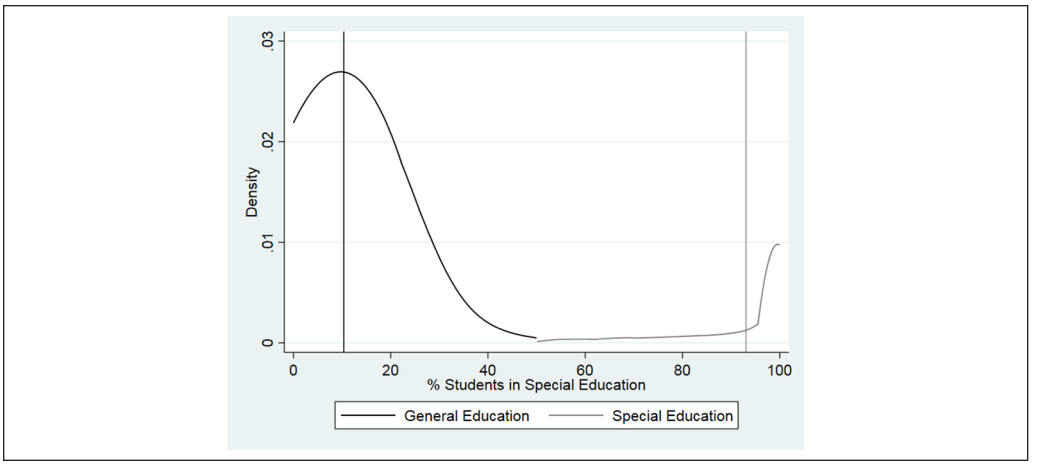

Figure 2. Distribution of special education students across classrooms.

Data Sources

The data on in-service teachers and students used in this study came from data sets maintained by OSPI. First, the state's S-275 database provides annual employment information for all public school employees in the state. We used this data set to identify individuals in public school teaching positions and further used the activity codes in the data set to identify teachers whose primary responsibilities are in special education. Second, the S-275 can be linked to the state's Credential and Endorsement database, which contains a complete history of all teaching credentials (i.e., the credentials necessary for any public school teaching position) and teaching endorsements (i.e., the subject areas teachers are endorsed to teach) in the state. As described in the next subsection, we used this database to define our analytic sample (i.e., individuals who received a Washington teaching credential with an endorsement in special education) as well as to identify candidates who also received an endorsement in something other than special education (i.e., are dual endorsed).

Starting in 2009–2010 through the most recent year of available data, 2018–2019, these databases can be connected to the state's Comprehensive Education Data and Research System (CEDARS), which allows teachers to be linked to their students through unique course identifiers. CEDARS data include fields designed to link students to their individual teachers, based on reported schedules. We recognize that limitations of reporting standards and practices across the state may result in ambiguities or inaccuracies around these links. That said, our primary use of the CEDARS database in this analysis was to identify teachers for whom at least 50% of their students were receiving special education services. This allowed us to define teachers in "special education teaching positions" as teachers either who were in a special education position as identified in the S-275 whose classes contained at least 50% students with disabilities. This cutoff was relatively arbitrary, but as shown in Figure 2, it was also largely inconsequential given that the majority of classrooms in the state had fewer than 40% or more than 90% students with disabilities. As a result (and as represented by the vertical lines in Figure 2), the mean percentage of students with disabilities in non–special education classrooms under this definition was about 10%, whereas the mean in special education classrooms was more than 90%. More importantly, this definition of "special education teaching position" captured both special education teachers not linked to specific classrooms of students in the state's administrative data (e.g., resource teachers) and classroom teachers whose positions may not have been funded through special education but who primarily served students with disabilities.

The aforementioned databases also are linkable to publicly available information about school-level student demographics, including the percentage of students within each race-ethnicity category, the percentage of students receiving free or reduced-priced lunch, and the percentage of students receiving special education and foster services. The state data do not include direct measures of working conditions that a review of prior research has connected to special education teacher retention (e.g., Billingsley & Bettini, 2019). We therefore followed Ronfeldt (2012, 2015) and created a measure of prior teacher turnover in a school called the "stay ratio" that is the average proportion of teachers of nonretirement age who left the school over the past 5 years. Ronfeldt (2012) shows that this measure is correlated with other measures of school climate that are not typically observed in state administrative data and considers the stay ratio in a teacher's current school as a proxy for the working conditions in the school. Note that our analysis did not consider classroom-level demographics because many special education teachers in the state (e.g., resource teachers) are not linked to student rosters in the CEDARS data.

Data on the preservice experiences of teachers were assembled as part of TELC, a partnership with 15 teacher education programs (TEPs) in Washington designed to explore the effects of teacher education experiences on in-service teacher and student outcomes. The institutions participating in TELC and that provided data for this study include Central Washington University, City University, Evergreen State College, Gonzaga University, Northwest University, Pacific Lutheran University, St. Martin's University, Seattle Pacific University, Seattle University, University of Washington Bothell, University of Washington Seattle, University of Washington Tacoma, Washington State University, Western Governors University, and Western Washington University. The six institutions that are not participating in TELC include only one relatively (for Washington) large public institution in terms of teacher supply—Eastern Washington University—and five smaller private institutions—Antioch University, Heritage University, University of Puget Sound, Walla Walla University, and Whitworth University.

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The TELC data set is unique because it includes comprehensive student teaching data (such as the specific in-service teacher, or "cooperating teacher," with whom teacher candidates did their student teaching) for these teacher candidates and allowed us to track them into the state's K–12 public school workforce. Although some institutions provided data on practicums and other types of field placements, we focused on the culminating field placement of each candidate (i.e., the placement that satisfied the state's student teaching requirement) because this was defined consistently across all 15 institutions. Further, although some institutions provided data going back to the mid-2000s (and in one case, the late 1990s), we limited the student teaching data to the years between 2009–2010 and 2015–2016 because we could identify whether candidates did their student teaching in a special education position in these years (i.e., if their cooperating teacher was a special education teacher in that year according to our definition). We could also observe other characteristics of the cooperating teachers from the S-275, such as their teaching experience and whether they have a master's degree or special education endorsement.

Measures

We used the data described previously to create six specific measures of special education teacher preparation, discussed in the introduction and summarized in Panel A of Table 1. We used the S-275 to characterize whether each candidate entered the workforce with a master's degree, and we used the credential data to identify candidates who are dual endorsed in special education and another subject. These are potentially important variables given that they characterize the level of candidates' preparation and the extent of their

Table 1. Teacher Candidate Summary Statistics.

Variable	All candidates	Not hired	Hired		
			All	General education position	Special education position
Panel A: Measures of preservice preparation					
Master's degree			0.291	0.134	0.332
Dual endorsed	0.717	0.676	0.722	0.927	0.669
ST special education position	0.677	0.709	0.673	0.567	0.701
CT special education endorsement	0.631	0.682	0.625	0.474	0.664
CT master's degree	0.720	0.730	0.719	0.733	0.715
CT experience	13.673	14.505	13.570	13.407	13.612
	(8.603)	(8.695)	(8.589)	(8.280)	(8.672)
Panel B: Outcome variables					
Enter workforce	0.890	0.000	1.000	1.000	1.000
Enter special education position	0.708	0.000	0.795	0.000	1.000
Stay in workforce after Year 1			0.931	0.947	0.927
Stay in special education position after Year 1					0.877

Note. CT = cooperating teacher; ST = student teaching.

preparation outside of special education that have been connected in prior work to special education teacher retention (e.g., Boe et al., 1997). That said, they are also relatively blunt measures that do not reflect the wide variability in both master's programs and dual-endorsement programs that has been documented in prior research (e.g., Pugach & Blanton, 2012). This motivated our analytic approach (described later) that makes comparisons both within and between TEPs to better understand the relationships between these measures and future candidate outcomes.

The final four variables were all drawn from the TELC data: whether the candidate student taught in a special education position ("ST special education position"), whether the candidate's cooperating teacher had a special education endorsement ("CT special education endorsement"), whether the candidate's cooperating teacher had a master's degree ("CT master's degree"), and the prior teaching experience of the candidate's cooperating teacher ("CT experience"). Notably, these are broad measures that encompass a wide range of specific candidate experiences, but these measures were motivated by prior research not specific to special education that suggests that each of these measures is plausibly related to candidates' future career paths (e.g., Goldhaber et al., 2014, 2020; Ronfeldt, 2012, 2015; Ronfeldt et al., 2018). Moreover, these measures are central to policies around preparation and licensure (e.g., requirements for student teaching placements or definitions of highly qualified teachers).

We combined these measures of preservice preparation with the OSPI in-service data to define the analytic sample and outcomes for the analysis (summarized in Panel B of Table 1). We defined the sample as all graduates of TELC programs between 2009–2010 and 2015–2016 for whom we observed student teaching data and who graduated with an endorsement to teach special education; there are 1,351 such candidates in the TELC data. These candidates were identified as entering the workforce if they ever appeared in a teaching position in the S-275. As shown in Table 1, 89.0% of all candidates in the sample eventually became public school teachers in the state, which is higher than was reported previously for Washington (Goldhaber et al., 2014) and reflects the fact that the

earlier analysis corresponded with a time period when teacher hiring was limited by the Great Recession. A lower percentage of candidates, 70.8% of all candidates in the sample, began their careers in special education positions as defined earlier.

For the teacher retention analysis, teachers were identified in the OSPI data as leaving the workforce only if they did not appear in the S-275 the following year at all. Teacher-year observations in which teachers moved into other public school positions (e.g., administrator or instructional coach) were censored because these types of outcomes are conceptually different from leaving the workforce altogether. A limitation of this measure is that teachers who left the state's public teaching workforce included teachers who moved to a private school or to a teaching position outside of the state in addition to teachers who left the profession altogether. As shown in Table 1, the 1st-year retention rate for this sample was 93.1%, which is comparable to national estimates (e.g., Gray & Taie, 2015). Finally, among teachers who began their careers in a special education position, 87.7% stayed in a special education position the following year.

Analytic Approach

Our analysis considered a series of binary outcomes (entrance into the workforce and special education teaching positions for Research Question 1 and attrition from the workforce and special education positions for Research Question 2, all summarized in Panel B of Table 1), so our primary analytic approach consisted of a series of logistic regression models. First, we define E_{ik} as a binary indicator for whether candidate i from institution k enters the workforce. The models that considered workforce entry take the form

$$\log\left(\frac{Pr\left(E_{ik}=1\right)}{Pr\left(E_{ik}=0\right)}\right)=\alpha_0+\alpha_1 X_i\left(+\alpha_k\right)+\varepsilon_{ik} \quad (1)$$

The model in Equation 1 predicts the log odds of workforce entry as a function of observable characteristics of the candidate (X_i), including indicators for whether they hold a dual endorsement, their gender, and the characteristics of their student teaching school and cooperating teacher (summarized in Panel A of Table 1). We estimated these models with and without institution effects, α_k, to explore the extent to which these patterns are due to differences within or across the different institutions that provided data for this project. We also estimated versions of the model in Equation 1 in which E_{ik} was a binary indicator for whether candidate i from institution k entered a special education teaching position, conditional on entering the workforce at all.

Next, to investigate predictors of teacher retention, we defined R_{ikt} as a binary indicator for whether candidate i from institution k in year t stayed in the teacher workforce the following year. The retention models are discrete-time hazard models of the form

$$\log\left(\frac{Pr\left(R_{ikt}=1\right)}{Pr\left(R_{ikt}=0\right)}\right) = \beta_0+\beta_1 X_i+\beta_2 X_{it}\left(+\beta_k\right)+\beta_t+\varepsilon_{ilt} \quad (2)$$

The model in Equation 2 predicts the log odds of retention in the workforce as a function of time-invariant observable characteristics of the candidate (X_i), including the same variables discussed for Equation 1, and time-variant observable characteristics (X_{it}), such as teacher experience and the characteristics of the teacher's current school (the percentage of students within each race-ethnicity category, the percentage of students receiving free or reduced-priced lunch, the percentage of students receiving special education and foster services, and the school stay ratio). As described previously, we estimated these models with and without institution (β_1) effects. We included year effects β_t in all specifications to account for time trends in the data. We accounted for multiple observations per teacher by clustering the standard errors at the teacher level. Finally, we estimated versions of the model in equation 2. in which R_{ilkt} was a binary indicator for retention in a special education teaching position, conditional on staying in the teaching workforce the following year.

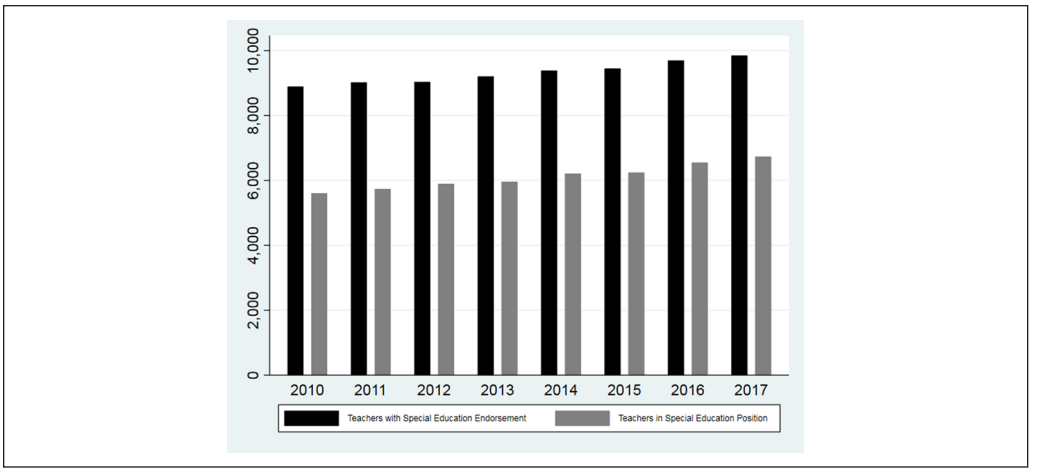

Figure 3. Washington special education public teaching workforce by endorsement and position.

The logit coefficients in Equations 1 and 2 are difficult to interpret, so we calculated average marginal effects of all coefficients of interest. These can be interpreted as the expected change in the probability of a given outcome associated with a one-unit change in the given predictor variable for the average teacher in the sample. Importantly, despite the extensive controls and fixed effects in these analytic models, we did not interpret these marginal effects as causal effects on candidate outcomes given that candidates nonrandomly sort into different teacher preparation and teaching experiences. For example, candidates who were more committed to teaching special education may have sought out different endorsements and student teaching placements than candidates who were less committed and may subsequently have been more likely to enter the teaching workforce. We therefore described the results from the aforementioned models in descriptive terms in the next section.

Results

Before addressing the two research questions in the introduction, we used the data described earlier to provide some descriptive information about the special education teacher workforce in Washington. We then discuss results for each of the research questions.

Descriptive Analysis

Figure 3 shows the number of teachers in the state's public teaching workforce who had an endorsement to teach special education in each year of available data as well as the number of special education teachers according to our definition presented previously. In each year, the number of teachers with a special education endorsement was more than 50% larger than the number of special education teachers in the state. In other words, thousands of teachers in the state each year were deemed eligible by the state (in terms of their qualifications) to be special education teachers but were not serving in special education teaching positions.

Figure 4 shows the percentage of special education candidates who entered the state's public teaching workforce within 3 years of graduation for each graduating cohort. More than 75% of special education candidates from each graduating cohort entered the state's public teaching workforce within 3 years of graduation. For reference, we included the comparable figures for candidates in the TELC data without a special education endorsement; the comparison between those with and without a special education endorsement shows that the hiring rates of special education candidates were higher for every cohort but were dramatically higher

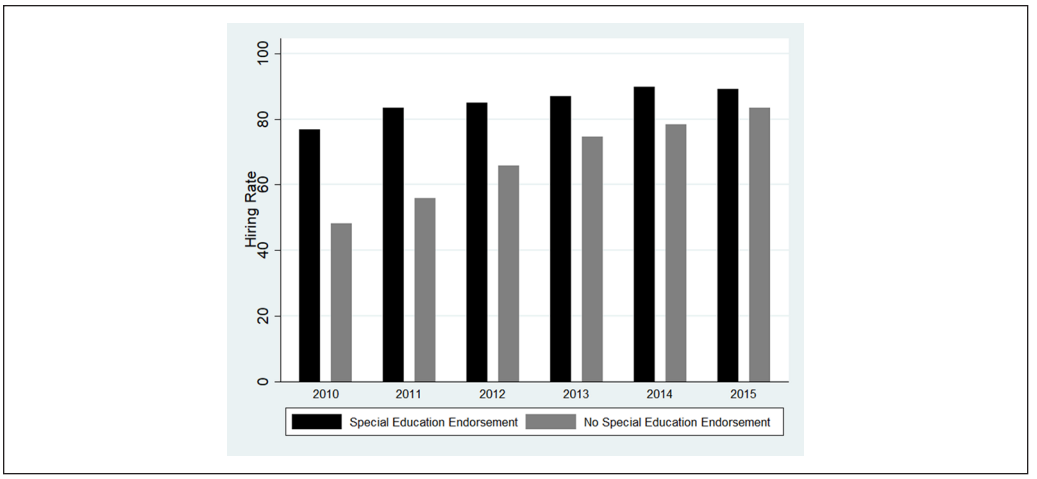

Figure 4. Public teaching workforce entry rates for Teacher Education Learning Collaborative candidates with and without special education endorsements.

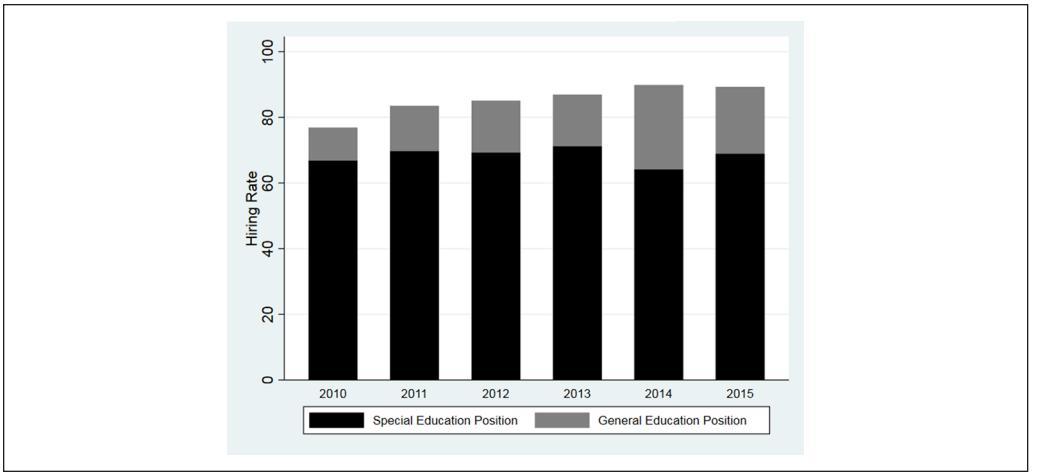

Figure 5. Three-year workforce entry rates of special education candidates by graduating cohort and initial teaching assignment.

near the end of the Great Recession (i.e., in 2010 and 2011).

Figure 5 breaks the 3-year hiring rates for special education candidates from Figure 4 into hiring rates into special education and general education teaching positions (as defined earlier). The majority of special education candidates in each cohort entered special education teaching positions, but a significant and growing share began their careers in general education positions. As a result, fewer than 70% of special education candidates in each cohort entered special education teaching positions in the state's public teaching workforce.

Figure 6 tracks one cohort of special education candidates (the 2010 graduating cohort). We focused on this cohort because we can track all candidates who enter the workforce within 3 years for up to 6 years in the workforce, but the results were qualitatively similar for other cohorts. The black line in Figure 6 represents the percentage of this graduating cohort who were teaching in public schools

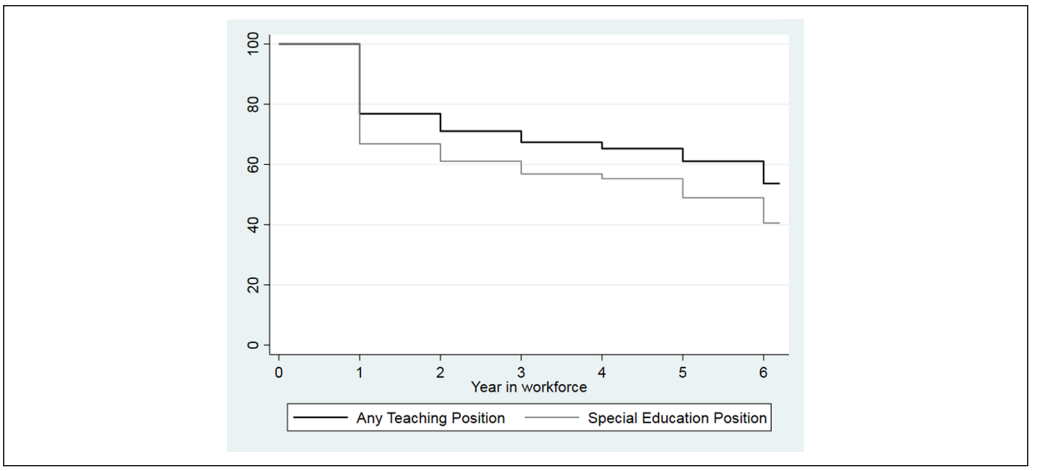

Figure 6. Entry rates and retention rates by year of experience for 2010 graduating cohort in Teacher Education Learning Collaborative data.

(either elementary or secondary) in each subsequent year, and the gray line represents the percentage who were teaching in special education teaching positions. The initial drop from the full sample to the 1st year of experience is identical to what was reported in the first bar of Figure 5, but then the remainder of the figure illustrates the cumulative effects of teacher attrition from the workforce and from special education teaching positions over time. Most notably, although more than half of this graduating cohort reached their 6th year of teaching by the end of our data panel, only about 40% were still teaching in special education teaching positions in this year.

Regression Analysis

Columns 1 and 2 of Table 2 present estimates from different specifications of the model in Equation 1 in which the outcome is whether each candidate enters the state's public teaching workforce. We found little evidence in Table 2 of a relationship between any of the specific measures of the preparation of special education candidates and the probability of entering the state's public teaching workforce. Importantly, these findings were precisely estimated; for instance, for all of the binary measures of teacher candidate preparation, we could rule out effects of greater than about 6 percentage points in either direction.

Columns 3 and 4 of Table 2 limit the sample to teachers who entered the workforce and present estimates from the model in Equation 1 in which the outcome is whether each candidate began their career in a special education teaching position. Two variables were consistently predictive of this outcome across model specifications. First, dual-endorsed candidates were dramatically (about 20 percentage points, all else equal) less likely to enter special education teaching positions than candidates with only an endorsement in special education. Second, special education candidates who student taught with a cooperating teacher endorsed in special education were more likely to enter special education teaching positions, all else equal. This also could reflect patterns of nonrandom sorting, in this case, into student teaching positions (e.g., candidates who were more interested in teaching special education may have been more likely to student teach with a cooperating teacher endorsed in special education). That said, the relationship is conditional on the candidates' own endorsements and other measures of their student teaching placement (including whether this student teaching placement was in a special education position). It was also robust to models with institution fixed effects, which means this relationship does not simply reflect patterns of student teaching placements across different institutions; in other words, if two candidates from

Table 2. Analytic Models (Marginal Effects From Logit Models).

	Teaching workforce entry		Special education classroom entry		Teaching workforce retention		Special education classroom retention	
Outcome	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Master's degree			.091**	.029	−.001	.014	.003	.003
			(.031)	(.035)	(.010)	(.011)	(.010)	(.013)
Dual endorsed	.020	.015	−.219***	−.177***	.014	.005	−.051**	−.054**
	(.020)	(.022)	(.039)	(.039)	(.010)	(.012)	(.014)	(.015)
ST special education classroom	.001	−.005	-.047	-.025	−.002	−.003	.019	.021
	(.027)	(.028)	(.033)	(.032)	(.013)	(.013)	(.013)	(.013)
CT special education endorsement	−.012	.004	.125***	.102**	.002	−.002	−.006	−.006
	(.026)	(.027)	(.031)	(.032)	(.013)	(.013)	(.013)	(.013)
CT master's degree	−.003	−.002	−.020	-.031	.008	.008	−.005	−.005
	(.019)	(.019)	(.025)	(.025)	(.010)	(.010)	(.009)	(.009)
CT experience	−.001	−.001	.002	.002	.000	.000	.000	.000
	(.001)	(.001)	(.001)	(.001)	(.000)	(.000)	(.000)	(.000)
Institution fixed effects		X		X		X		X
Observations	1,284	1,284	1,154	1,154	3,758	3,758	2,747	2,747

Note. CT = cooperating teacher; ST = student teaching. Models in columns 1 to 4 control for internship year and school characteristics. Models in columns 5 to 8 also control for experience indicators, current school characteristics, and special education classroom placement, with standard errors clustered at the teacher level.
*$p < .05$. **$p < .01$. ***$p < .001$ (two-sided t test).

the same institution had identical student teaching placements except for the endorsements of the cooperating teacher, the candidate whose cooperating teacher has a special education endorsement was more likely to enter a special education teaching position.

In columns 5 and 6 of Table 2, we report estimates from the discrete-time hazard models from Equation 2 that predict workforce retention of special education teachers in the sample. As with workforce entry in columns 1 and 2, we found little evidence that the specific measures of special education teacher preparation that were considered in this analysis were predictive of whether they stayed in the state's public teaching workforce. Finally, columns 7 and 8 of Table 2 limit the sample to teachers in special education teaching positions who stayed in the workforce and present estimates from the model in Equation 2 in which the outcome is whether each teacher stays in a special education teaching position (relative to moving to a general education classroom). Again, with one notable exception, we found little evidence relating the specific measures of teacher candidate preparation considered in this study to the retention of special education teachers in special education teaching positions. The notable exception is that dual-endorsed teachers in special education teaching positions were considerably more likely to move to general education positions than teachers with only an endorsement in special education, all else equal.

Discussion

We draw three primary conclusions from the regression results discussed previously. First, we found little evidence that the specific measures of teacher preparation considered in this analysis were predictive of the probability of entering and remaining in the state's public teacher workforce. These null findings may reflect the lack of variation in the outcomes of these models (i.e., because the rates of workforce entry and retention are so high).

Second, we found strong negative relationships between dual licensure in a subject other than special education and the probability that candidates enter and remain in special education teaching positions specifically. These findings are likely due to the fact that the state's licensure policies imply that only

dual-endorsed teachers should be eligible to teach outside of special education teaching positions. Moreover, it is possible that candidates who were less committed to teaching special education were also more likely to pursue a dual endorsement in another subject, so part of this relationship may be due to nonrandom sorting into these different endorsement areas.

Finally, completing student teaching under the supervision of a cooperating teacher endorsed in special education was predictive of special education teachers beginning their careers in special education teaching positions, even when controlling for whether the placement was in a special or general education setting. We interpret this result as suggestive evidence supporting the view (e.g., Anderson & Stillman, 2013) that student teaching experiences, and the preparation of cooperating teachers in particular, may matter in their student teachers' career decisions.

Completing student teaching under the supervision of a cooperating teacher endorsed in special education was predictive of special education teachers beginning their careers in special education teaching positions

Limitations

This analysis of special education teacher workforce entry and retention is, to our knowledge, the first study of its kind that leverages statewide data on the preservice experiences of special education teacher candidates and their workforce outcomes. It also has important limitations that can motivate future research on the special education teacher pipeline. For example, and as discussed throughout the article, the specific measures of special education candidates' preparation considered in this analysis are broad, and each captures a wide range of specific candidate experiences. Future research could consider more nuanced measures (e.g., more specific measures of student teaching classroom settings), additional program factors (e.g., the structure of a candidate's dual-endorsement program), candidate survey data (e.g., their intent to teach in special education), or more nuanced measures of school climate (e.g., derived from teacher surveys) as predictors of special education teacher candidates' career paths.

Another limitation endemic to this line of research is that the findings from the specific setting of this study, Washington state, may not be generalizable to other settings. As one specific example, Washington is somewhat unique in that the state offers only a single special education teacher endorsement that covers all grade levels and student disabilities, whereas many other states offer more specific special education teacher licenses that cover only certain grade levels (e.g., separate K–8 or 6–12 special education licenses in Tennessee) and disabilities (e.g., separate moderate disabilities and severe disabilities special education licenses in Massachusetts). Future work can explore the extent to which these findings generalize to other states with different special education teacher licensure systems.

Finally, the use of observational data in this analysis implies that the descriptive relationships in this article may not represent causal relationships between the specific measures of special education teacher preparation and special educators' career paths. For example, the relationship between cooperating teacher endorsement area and special education classroom entry could reflect nonrandom sorting of candidates to student teaching positions (e.g., if candidates who were more interested in teaching in a special education classroom were also more likely to seek out a cooperating teacher with a special education endorsement). Future research could leverage policy changes that impact any of these measures—for example, the recent change to require dual endorsements for all special education teacher candidates in Washington (Dual Endorsement Requirement, 2018)—to push this research further and potentially uncover causal relationships that can further motivate special education policy.

Policy Implications

Despite the limitations described previously, this study still has several important implications for special education teacher preparation and the staffing of special education classrooms in U.S. public schools. Importantly, we showed that thousands more teachers in the state were endorsed to teach special education than were actually serving in special education teaching positions. This finding is consistent with the notion suggested in prior work (e.g., Mason-Williams et al., 2020; McLeskey & Billingsley, 2008) that there may not actually be a special education teacher shortage but rather there is a shortage of teachers endorsed in special education who are actually teaching special education. At a high level, this finding suggests that policy makers and practitioners struggling to staff special education classrooms may want to consider policies (such as differential pay or formal job rotations) to make these teaching positions more desirable and entice teachers who are already in the public teaching workforce with the necessary qualifications to teach special education to move into these difficult-to-staff teaching positions.

There may not actually be a special education teacher shortage but rather there is a shortage of teachers endorsed in special education who are actually teaching special education.

We found little evidence that the specific aspects of the preparation of teacher candidates considered in this study, such as their student teaching experiences, degrees, and credentials, were predictive of overall workforce entry. However, completing student teaching under the supervision of a cooperating teacher endorsed in special education was predictive of special education teachers beginning their careers in special education teaching positions. Given that this relationship was conditional on student teaching in a special education classroom, we believe that this finding is potentially important because although Washington does have some requirements for candidates' student teaching placements (e.g., the cooperating teacher must have at least 3 years of teaching experience), we are not aware of any requirements about the types of classrooms in which different candidates can student teach or the endorsements that cooperating teachers must hold. Indeed, only 66% of the special education candidates in our sample did their culminating student teaching experience in a special education classroom, and only 61% were supervised in this placement by a cooperating teacher who was endorsed in special education. In a narrow sense, if the state's goal is to recruit special education teachers from the pool of candidates endorsed in special education, this analysis provides preliminary evidence that the endorsements of the cooperating teacher can matter for these special education candidates' future career decisions.

Finally, we found strong evidence that being dual endorsed in special education and another subject was negatively related to the likelihood that graduates of special education TEPs enter and stay in special education teaching positions. These findings are based on observational data and may reflect the fact that candidates who chose to get a dual endorsement may have been more interested in supporting students with disabilities in a general education classroom (Billingsley & Cross, 1991a) and thus more likely to transfer to general education classrooms (Billingsley & Cross, 1991b) than candidates who chose to get only a special education endorsement. These patterns may also reflect the greater labor market flexibility of candidates with dual endorsements to select different types of teaching assignments. But these relationships also have potential implications for state policy given that special education endorsement requirements are an active area of policy in Washington, and the state just transitioned to requiring dual endorsements for all special education teacher candidates (Dual Endorsement Requirement, 2018).

The dual endorsement findings also highlight an aspect of education policy that has received very little empirical attention: the

role that states may play in influencing within-profession mobility through credentialing requirements. Although credentialing is generally framed as a means of ensuring proper preparation, it also serves to restrict the grades and subjects that prospective and current teachers are eligible to teach. Dual-endorsement programs have not historically been viewed as a means of addressing special education teacher shortages (e.g., Blanton & Pugach, 2011), nor is the dual endorsement policy in Washington framed as an attempt to change the subjects that teachers are allowed to teach. The policy was cited in the state's equity plan as addressing the special education teachers' "need for expertise in content area(s) and . . . special education program(s)" (Pauley, 2015, p. 62). But scholars have noted the potential trade-offs of different special education teacher licensure policies (e.g., Blanton et al., 2017). Our results raise the possibility that the state's dual-endorsement policy also may influence the hiring and mobility patterns of special education teachers. We are, however, cautious about this conclusion given the descriptive nature of our models.

Our results raise the possibility that the state's dual-endorsement policy also may influence the hiring and mobility patterns of special education teachers.

We also are cautious because we do not know how the requirement and associated training will affect the front end of the teacher pipeline (i.e., who pursues a teaching license or special education endorsement) or, ultimately, student achievement. The requirement could, for example, induce more candidates to pursue a special education endorsement and could lead to better instruction in both general education and special education classrooms. So, although our findings raise concerns about potential unanticipated effects of a dual-endorsement requirement on the state's ability to staff special education classrooms, future research that explicitly studies this policy change is necessary to establish whether these concerns will play out in practice or perhaps will be offset by benefits for students with disabilities.

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