Annenberg Institute
BROWN UNIVERSITY

EdWorkingPaper No. 25-1347

The Early Intervention and Early Childhood Special Education Workforce: Descriptive Evidence on Demographics and Turnover from Oregon

Aaron J. Ainsworth
University of California, Irvine

Nicholas Ainsworth
University of California, Irvine

Yujia Liu
University of Missouri

Emily K. Penner
University of California, Irvine

Early intervention (EI) and early childhood special education (ECSE) services for children with disabilities have expanded substantially across the U.S. over the past few decades, necessitating efforts to recruit and retain a qualified workforce to meet their needs. Despite widespread reports of staffing challenges in this sector, few contemporary studies provide large-scale evidence on this workforce. Using administrative data for all EI/ECSE employees in Oregon from 2008 to 2023, we provide longitudinal descriptive evidence on their composition, distribution, and stability. We show that the workforce has increased significantly, is growing more racially/ethnically diverse, and is more highly educated but less experienced than the state's K-12 workforce. Turnover remained fairly constant during this period, with the exception of paraprofessionals and non-licensed staff whose retention steadily declined to historic lows. Finally, we show that staff are distributed somewhat inequitably throughout the state, with areas serving more low-income students having the highest child-staff ratios and fewer highly-educated teachers/interventionists. Together these analyses contribute the first longitudinal portrait of an EI/ECSE workforce, providing key insights into their staffing dynamics at scale.

VERSION: November 2025

Suggested citation: Ainsworth, Aaron J., Nicholas Ainsworth, Yujia Liu, and Emily K. Penner. (2025). The Early Intervention and Early Childhood Special Education Workforce: Descriptive Evidence on Demographics and Turnover from Oregon. (EdWorkingPaper: 25-1347). Retrieved from Annenberg Institute at Brown University: https://doi.org/10.26300/chea-zc62

The Early Intervention and Early Childhood Special Education Workforce: Descriptive Evidence on Demographics and Turnover from Oregon

Aaron J. Ainsworth[†], Nicholas J. Ainsworth[†], Yujia Liu[*], and Emily K. Penner[†]

[†]University of California - Irvine

[*]University of Missouri

Author Note

Aaron Ainsworth and Nicholas Ainsworth are co-equal first authors of the paper.
We thank the Oregon Department of Education (ODE) and Office of Enhancing Student Opportunities (OESO) for providing the data for this project. Work on this project was supported by the Eunice Kennedy Shriver National Institute of Child Health and Human Development of the National Institutes of Health (R01HH094007) and the Center for Advanced Study in the Behavioral Sciences (CASBS) at Stanford University. The views expressed are those of the authors and do not reflect the views of ODE, OESO, CASBS, or the National Institutes of Health. Inquiries about this research should be directed to Aaron Ainsworth at ajainswo@uci.edu or Nicholas Ainsworth at ainsworn@uci.edu

Abstract

Early intervention (EI) and early childhood special education (ECSE) services for children with disabilities have expanded substantially across the U.S. over the past few decades, necessitating efforts to recruit and retain a qualified workforce to meet their needs. Despite widespread reports of staffing challenges in this sector, few contemporary studies provide large-scale evidence on this workforce. Using administrative data for all EI/ECSE employees in Oregon from 2008 to 2023, we provide longitudinal descriptive evidence on their composition, distribution, and stability. We show that the workforce has increased significantly, is growing more racially/ethnically diverse, and is more highly educated but less experienced than the state's K-12 workforce. Turnover remained fairly constant during this period, with the exception of paraprofessionals and non-licensed staff whose retention steadily declined to historic lows. Finally, we show that staff are distributed somewhat inequitably throughout the state, with areas serving more low-income students having the highest child-staff ratios and fewer highly-educated teachers/interventionists. Together these analyses contribute the first longitudinal portrait of an EI/ECSE workforce, providing key insights into their staffing dynamics at scale.

Keywords: early childhood special education, early intervention, early childhood workforce, educator labor markets, educator turnover

The Early Intervention and Early Childhood Special Education Workforce: Descriptive Evidence on Demographics and Turnover from Oregon

Interventions in the first few years of life have long been seen as the most promising for helping children realize their later developmental potential, especially for those with disabilities (e.g. Bruder, 2010; Heckman, 2006; Shonkoff & Phillips, 2000). Based on this understanding, policymakers in 1986 established a federal formula grant program for states to provide early childhood services for children with disabilities ages birth to 5 as a part of the re-authorization of the Individuals with Disabilities Education Act (IDEA; M. McLean et al., 2016). These programs, named for their sections in the law, are comprised of Part C early intervention (EI) services for children ages 0 to 2 and Part B 619 early childhood special education (ECSE) services for children ages 3 to 5. EI and ECSE programs have grown in size and scope since their inception, reaching almost 4% of the total population of 0 to 2 year olds and 7% of 3 to 4 year olds in the United States in 2019 (Friedman-Krauss & Barnett, 2023).[1] Notably, these programs are the only federal entitlement to early childhood education (ECE) services in the U.S. and enroll more children than other large federally-funded ECE programs like Head Start.[2]

Despite their size and potential importance to children's development, recent evidence suggests that EI and ECSE programs are facing substantial challenges. State audits, lawsuits, and investigative journalism have all revealed the difficulties states and localities are having in meeting IDEA's legally mandated service requirements. Indeed,

---

[1] Estimates of the percentage of children with disabilities potentially eligible for EI/ECSE services vary widely by state because states set the eligibility criteria for their programs (Rosenberg et al., 2013). Nevertheless, prior estimates suggest that around 13% to 14% of infants, toddlers, and preschoolers may be eligible for EI/ECSE (Paff et al., 2023; Rosenberg et al., 2008). Estimated participation rates among potentially eligible children vary anywhere from 5% to 50% (Feinberg et al., 2011; B. McManus et al., 2009; B. M. McManus et al., 2020; Rosenberg et al., 2008).

[2] Figure A1 in the appendix plots the annual enrollment in EI/ECSE programs and Head Start (comprising Head Start and Early Head Start) from 2007 to 2019. EI/ECSE services have served more children than Head Start since 2014, with the enrollment difference reaching around 300,000 children in 2019. Nevertheless, there is overlap in the populations served by both programs, with Head Start requiring programs to reserve at least 10% of their slots for children with disabilities (e.g., Zhang & Jenkins, 2022).

some places are presently using wait lists for programs while others are falling short of meeting required service minutes or failing to provide services to some children altogether (Mulvaney, 2023; Office of the New York Comptroller, 2023; Savage, 2023). In explaining the reasons for such challenges, officials have expressed a common concern: workforce shortages. States, ranging from Illinois to New York to Missouri, have reported severe shortages of providers (Grumke, 2023; Savage, 2023; WHAM, 2023). This has led some to describe the "root cause" of their program's service provision problems as "a crippling national shortage of qualified special education teachers and related personnel" (Mulvaney, 2023). Notably, existing evidence suggests that this workforce problem is a national one: in 2022, 100% of states reported shortages of staff for their Part C early intervention programs (IDEA Infant and Toddler Coordinators Association, 2022).

Nevertheless, while staffing shortages are among states' top concerns about EI/ECSE programs, there is a paucity of evidence available to fully understand this problem. This is because there are few large-scale or longitudinal analyses of the early intervention/early childhood special education workforce. Aspects of both recruitment (being able to hire enough employees to fill open positions) and retention (keeping the employees already working in the system) may influence staffing difficulties in this sector (Edwards et al., 2025; Mason-Williams et al., 2020). Further challenges arise when considering whether the EI/ECSE staff that are employed are well-qualified for their positions, match the sociodemographic characteristics of the students they serve, and are distributed equitably across service settings (Bettini et al., 2023). Understanding the problems confronting the EI/ECSE workforce therefore requires detailed information on the employees staffing this sector across geographies and over time. Yet, few studies have been able to generate population-based descriptions of the EI/ECSE workforce or provide estimates of their turnover, as has been done extensively in K-12 settings, primarily because of a lack of centralized data on these employees in state administrative data systems (Perez

& Mercier, 2022; Whitebook et al., 2018).[3] Moreover, while extant work has examined the early childhood and K-12 special education workforces separately (e.g., Bellows et al., 2022; Billingsley & Bettini, 2019; Gilmour, Feng, & Theobald, 2024), it is unclear how well these results generalize to early interventionists and early childhood special educators.

To address this lack of evidence, we conduct, to the authors' knowledge, the first longitudinal analysis of the workforce characteristics and turnover patterns for all employees working with both infants and toddlers (Part C programs) and preschoolers (Part B 619 programs) with disabilities in a state system. Using novel administrative data from Oregon over a sixteen-year period, we address aspects of both recruitment and retention for all teachers, interventionists, related service providers, and non-licensed staff employed in EI/ECSE by the state. For recruitment, we look at changes in the size of the workforce over time as well as the child-to-employee ratios to see how Oregon's staffing patterns have responded to growing enrollments (Friedman-Krauss & Barnett, 2023). We also examine the descriptive characteristics of employees, such as their race/ethnicity, education, and experience, as well as the distribution of these employees across the state to speak to current efforts to recruit and deploy a diverse and well-qualified EI/ECSE workforce. Finally, we address workforce retention directly by calculating annual turnover rates for each employee group and decomposing turnover into its sources, such as switching positions or exiting from the public education workforce completely. Throughout, we make comparisons to K-12 special education (SpEd) and general education (GenEd) employees in the state to determine whether EI/ECSE workers differ meaningfully from these other, more well studied, sectors.

With these analyses, we provide among the first large-scale longitudinal studies of

---

[3] In the United States, K-12 education is typically provided in locally-run, publicly funded schools regulated by state departments of education. By contrast, early childhood services are provided in a greater variety of settings (e.g., private child care centers, family child care homes, public schools) and under the oversight of various governmental agencies (e.g., education, health, social services). This variation across settings and regulatory agencies makes it difficult to collect the type of administrative data on all early childhood staff, including EI/ECSE employees, that have been used to study the K-12 workforce at scale (Perez & Mercier, 2022; Whitebook et al., 2018).

all employees within an early intervention and early childhood special education system, generating insights into the recruitment and retention of this workforce at a population level. In doing so, we hope to contribute to ongoing conversations among researchers, policymakers, and practitioners regarding the best ways to ensure EI/ECSE programs are adequately staffed to meet the needs of the important student populations they serve. As such, we turn now to providing more background on EI/ECSE programs and the labor market for employees working in early childhood and special education roles.

Background

To support the needs of young children with disabilities and their families, the federal government contributes funding to states through formula grants for programs serving infants, toddlers, and preschoolers. The funding formulas targeting these populations are distinct and come from separate sections of IDEA, the federal law establishing special education programs for children and adolescents with disabilities in the United States. Namely, Part C of the law establishes funding for children from birth until their third birthday while Part B 619 provides for preschool services for children ages three to five. The federal government does not fund the entirety of these programs, but rather provides a portion of the funding to support states in developing their own EI/ECSE programs.[4] Once states accept funding, however, they are legally responsible for complying with IDEA's programming requirements, which compel states to serve all eligible children, develop plans tailored to children's individual needs, and deliver services in the most natural environment or to the greatest extent possible with their typically developing peers. Besides meeting these requirements, however, states are given latitude to organize programs as they see fit. States determine eligibility for programming, decide which state agencies are responsible for program oversight (for Part C), and organize how localities will carry out service provision (Early Childhood Technical Assistance Center, 2022a, 2022b).

---

[4] In 2021, for example, only about 13% of funding for early intervention programs came from the federal formula grant allocation from Part C of IDEA (IDEA Infant and Toddler Coordinators Association, 2021)

Part C programs for infants and toddlers and Part B 619 programs for preschoolers share similarities, but differ in important ways. Part C early intervention services are conceptualized as family supports and are designed to help parents support the development of their child with a disability. As such, children receive individualized family service plans (IFSPs) that specify the supports the family will receive. These can include services like family training, service coordination, and special instruction provided by an interventionist or developmental specialist, but also can include supports like speech or occupational therapy provided directly to the child (Early Childhood Technical Assistance Center, 2022b; Hebbeler et al., 2007). Because of its focus on providing family supports in a natural environment, children typically receive services in their homes (around 90%, on average; Friedman-Krauss & Barnett, 2023). Infants and toddlers may qualify for these services through meeting the state determined criteria for exhibiting a developmental delay or by having an established medical condition, such as a congenital disorder or low birth weight (Hebbeler et al., 2007; Prenatal-to-3 Policy Impact Center, 2022).

By contrast, Part B 619 services for preschoolers are conceptualized as providing educational supports for children with disabilities. Each child receives an individualized education program (IEP) that specifies the special education and related services they will receive. These services might involve instruction from a special education teacher in a self-contained pre-k classroom or supports from a paraprofessional in a general education setting. In some cases, special education staff members travel to child care centers or children's homes to provide services (Early Childhood Technical Assistance Center, 2022a; Friedman-Krauss & Barnett, 2023). Nevertheless, many preschoolers receive early childhood special education services in a classroom setting, with around half of children nationally receiving services in a regular early childhood setting and a quarter attending a separate pre-k classroom in 2020 (Friedman-Krauss & Barnett, 2023). Like Part C programs, children may also receive other related services such as speech or occupational therapy. Similarly, children in most states may qualify for services by meeting the state's

criteria for a developmental delay, though they can also be found eligible under one of 13 federally recognized disability categories (Friedman-Krauss & Barnett, 2023). Together, EI and ECSE programs give rise to a complex mix of services that involve both employees traveling to homes or centers to provide services as well as working in more traditional classroom settings.

Education Workforce Challenges and Their Impacts on Students

Understanding potential shortages of workers in EI/ECSE, as have been widely reported by states (IDEA Infant and Toddler Coordinators Association, 2022), requires devoting attention to the market dynamics producing shortages. Ultimately, shortages occur when the number of employees demanded by EI/ECSE programs is greater than the number of employees willing to supply their labor at the prevailing wage rate and working conditions (Edwards et al., 2025; Mason-Williams et al., 2020). These dynamics may be experienced by EI/ECSE providers as problems with both recruitment and retention. Given that administrators seek to fill a certain number of positions to meet the needs of the children on their caseload, efforts to achieve desired staffing levels may be hampered on several fronts. Supply-side constraints limiting the number of qualified employees may lead to competition among providers for a small pool of potential workers, restricting their ability to recruit the workforce they need. Reaching desired staffing levels can also be frustrated by retention problems. If providers experience high employee turnover, they must demand more employees to fill those positions (assuming they seek to maintain existing ratios). In fact, evidence suggests that 90% of open teaching positions result from educators exiting the profession (Carver-Thomas & Darling-Hammond, 2017). Thus, these retention problems may interact with supply constraints to leave positions vacant or filled by under-qualified workers.

To better characterize workforce challenges confronting the education sector, scholars have begun incorporating the idea of shortages into a broader framework for understanding labor market problems. Specifically, they argue that effective educational

service provision may be undermined by problems in four related areas: workforce composition, distribution, stability, and effectiveness (Bettini et al., 2023; Gilmour, Bartanen, et al., 2025; McLeskey & Billingsley, 2008). Composition refers to the overall size of the workforce but also to the characteristics of the staff employed, such as their qualifications (e.g., certification, education, years of experience) and sociodemographic characteristics (e.g., race, gender, etc.). Distribution is concerned with how staff members are allocated across schools or sites, raising questions about whether minoritized students (defined by socioeconomic status, race/ethnicity, urbanicity, or disability) have equitable access to the staff members that they need to succeed (Bettini et al., 2023). Stability refers to how often staff members stay in their sites or turn over from year to year (Gilmour, Bartanen, et al., 2025; McLeskey & Billingsley, 2008). Finally, effectiveness is conceptualized as how effective the workforce is at improving outcomes for students, with outcomes defined broadly to incorporate academic and non-academic skills (Bettini et al., 2023). Together, these four dynamics add further nuance to the study of workforce challenges as they demonstrate, for example, how shortages might exist if staff are not distributed evenly across settings (Edwards et al., 2025), or how problems like a lack of workforce diversity can undermine staff effectiveness above and beyond overall staffing shortages (Bettini et al., 2025).

Most notably, the composition, distribution, and stability of the education workforce are all important dimensions to understand at a population level because of their implications for the effectiveness of staff at improving student outcomes. Scholars have long demonstrated that some characteristics of the workforce are related to outcomes for students. In particular, more experienced teachers tend to provide higher quality instruction and produce better student outcomes (Bassok et al., 2022; Chetty et al., 2011; Feng & Sass, 2013; Papay & Kraft, 2015), though there is mixed evidence for whether this is also the case for teacher certification or for master's degree attainment (Bastian, 2019; Feng & Sass, 2013; Gilmour, 2020). A robust body of work demonstrates that racial match

between students and teachers of color improves a host of both short- and long-term outcomes (Gershenson et al., 2021). The hypothesized mechanisms for these impacts include role model effects as well as differences in teaching practices and mindsets about students (Blazar, 2024; Dee, 2004; Edmonds, 2024). Nevertheless, researchers have shown that teachers of color help improve outcomes for all students, not just racially minoritizied students (Blazar, 2024), suggesting that there are potentially broad benefits to boosting workforce diversity.

Finally, researchers have demonstrated that turnover has negative impacts on student achievement (Ronfeldt et al., 2013), even when accounting for the fact that less effective teachers turnover at higher rates (Hanushek et al., 2016). These negative effects of turnover may be especially concerning for young children (Markowitz, 2024), who rely on secure and stable attachments to their caregivers for healthy development (Sabol & Pianta, 2012), and for students with disabilities, who may be especially reliant on school staff that are knowledgeable about their needs (Kaler et al., 2025). In EI/ECSE, the negative impacts of turnover might be brought about directly through declines in the quality of the child-caregiver relationship due to new educators entering classrooms and service settings (Cryer et al., 2000) or indirectly by increasing the stress of colleagues who remain (Cassidy et al., 2011; Kwon et al., 2020).

The Labor Market for Special Education and Early Childhood Employees

Extant research on the EI/ECSE workforce has aimed to describe various elements of their labor markets to better understand problems surrounding their composition, distribution, and stability. Much of this research was conducted not long after the 1986 federal establishment of EI/ECSE programs, characterizing nationally, for example, how the overall composition of certified ECSE teachers grew over time or describing the characteristics of employees working in EI (Boe, 2006; Hebbeler et al., 2007). Other work examined turnover patterns among samples of employees (Kontos & Dunn, 1989; Palsha et al., 1990). Despite the contributions of these studies, most are limited by the fact that

they relied on aggregated national staffing counts or survey samples of employees. They may also be outdated for informing today's policy discussions.

Recent evidence helps provide a more comprehensive picture of the contemporary EI/ECSE workforce. In particular, Friedman-Krauss et al. (2024) use a national survey sample of over 4,000 EI/ECSE providers to describe the composition of this workforce and characterize the challenges they face. They show that EI/ECSE providers are generally qualified, with 71% holding a master's degree or higher and 85% being fully licensed for their position. Nevertheless, EI/ECSE providers are predominantly White (89%) and English-only speaking (85%), making them demographically mismatched from the student populations they serve (Friedman-Krauss & Barnett, 2023). When surveyed, EI/ECSE providers raised concerns about their salaries ($60,000, on average), their caseloads (18 preschoolers, 16 infants and toddlers, on average), and working conditions, with non-trivial proportions reporting intentions to leave the field within 5 years (almost 40% were "somewhat likely" or "extremely likely" to do so). While this study contributes an important national perspective on the EI/ECSE workforce, it relies upon convenience samples of respondents and may not be representative of all employees working in the EI/ECSE system. Moreover, it cannot speak to the other aspects of workforce challenges, such as recruitment, retention, and distribution, which may be better answered longitudinally and at a population level.

To overcome challenges that arise when using survey samples, researchers are increasingly recognizing the benefits of using administrative data, or data generated by schools or districts in the course of performing their normal administrative functions, to study the education workforce (Gilmour & Stiefel, 2024). Indeed, progress has been made in studying the K-12 special education and early childhood workforces, separately, through the use of administrative data. In their review of studies using administrative data to study K-12 special education teachers, Gilmour, Feng, and Theobald (2024) identified 12 studies from 7 states that, together, provided large-scale evidence on the composition of the

workforce, particularly as it relates to qualifications and certification, workforce stability, and teacher effectiveness in improving outcomes for students with disabilities. A growing body of work in this literature also considers the range of employees beyond teachers who work with students in K-12 schools, such as paraprofessionals (Bisht et al., 2021; Theobald et al., 2025) and other licensed or non-licensed staff (e.g., related service providers, administrators, secretaries; Gilmour, Aniagyei-Cobbold, & Theobald, 2025; Penner et al., 2023). For early childhood employees, researchers have overcome longstanding data challenges (see Whitebook et al., 2018) to provide novel insights into their attrition and mobility patterns, documenting high levels of turnover among teachers in publicly funded centers as well as variation in the distribution of persistently high-turnover centers (Bassok, Markowitz, et al., 2021; Bellows et al., 2022; Doromal et al., 2022).

Nevertheless, the extent to which emerging evidence from these two workforces generalizes to the EI/ECSE workforce is unclear. Notably, annual turnover rates differ remarkably between them, with estimates of 17% to 28% for K-12 SpEd teachers (Billingsley & Bettini, 2019; Penner et al., 2023) and 26% to 46% for ECE teachers (Bassok, Markowitz, et al., 2021). Moreover, the ECE and K-12 SpEd workforces differ dramatically in their levels of education, pay, and diversity (see, for example, Gilmour et al., 2023; Smith et al., 2021). In the absence of direct evidence on the characteristics of the EI/ECSE workforce, it is unclear along which dimensions they are similar to or distinct from the ECE, K-12 SpEd, or even K-12 GenEd workforces and, consequently, how distinct their labor markets might be.

Research Questions

In summary, EI/ECSE programs may confront staffing challenges that arise from issues surrounding the composition, distribution, and stability of the workforce, all of which have implications for staff effectiveness and outcomes for students. At present, there is only limited evidence on the labor market dynamics for EI/ECSE employees, including the characteristics of the employees hired or their turnover rates. The evidence that does

exist may be outdated for today's policy conversations or incomplete in characterizing the population of workers. Finally, while early childhood and K-12 SpEd employees are areas of active research, it is unclear whether findings for these populations generalize to early intervention or early childhood special education employees, as no studies to date have leveraged longitudinal administrative data to study the EI/ECSE workforce at scale. As such, this paper seeks to address the following research questions:

1. What is the composition (e.g. race/ethnicity, education levels, experience) of the EI/ECSE workforce in Oregon?
2. How is the EI/ECSE workforce in Oregon distributed across the state based on student sociodemographic characteristics (race/ethnicity, socioeconomic status, disability identification rates, and urbanicity)?
3. What are the rates and sources of mobility and attrition for this workforce?
4. How do the characteristics of and attrition rates among the EI/ECSE workforce compare to the K-12 special education and general education workforces?

Data and Methods

Setting: The State of Oregon

To answer these questions, we study EI/ECSE staffing in the state of Oregon. Oregon provides a particularly useful setting to study the EI/ECSE workforce because aspects of its governance are unique among states. In Oregon, the Department of Education is the lead agency for providing Part C EI services which means that services for both EI and ECSE are governed by the same agency. Notably, less than 1 in 5 states designate their Department of Education as their lead agency for EI (IDEA Infant and Toddler Coordinators Association, 2022; Twardzik et al., 2017). Even among states who designate their lead agencies as education for both services, Oregon is unique in that they contract with eight intermediary administrative units called Education Service Districts (ESDs) and one school district that are responsible for providing both EI and ECSE services to children within their region (Early Childhood Technical Assistance Center,

2023). This creates a level of centralization that has implications both for the continuity of service provision across the birth to 5 period but also for capturing staffing dynamics, as all staff working in both programs are employed or contracted by a single agency (the ESD) who reports to a single governing body (the Department of Education).

Despite the unique governance structure, Oregon's EI/ECSE programming is similar to other states in many ways. As of 2021, a slightly smaller percentage of the total Oregon population under 3 received EI services (2.6% in Oregon versus 3.2% nationally) while a higher percentage of 3 and 4 year olds received ECSE services (6.8% in Oregon compared to 5.2% nationally). Like the rest of the U.S., most children who participated in EI received services in their homes (94% in Oregon versus 89% nationally in 2020). For ECSE, Oregon served a higher percentage of participating children in their homes (10% versus 2% nationally). A slightly larger proportion received services in a regular early childhood classroom (48% versus 44% nationally), whereas Oregon served the same proportion of their EI/ECSE students in separate special education classrooms as the national average (24%; Friedman-Krauss & Barnett, 2023). State funding and policies in Oregon are also similar to other states. For example, like most states, state and local dollars are the primary funding source for programs (Early Childhood Technical Assistance Center, 2023; IDEA Infant and Toddler Coordinators Association, 2021). Additionally, like approximately 70% of other states, Oregon does not set caseload caps for service providers (Early Childhood Technical Assistance Center, 2023). Thus, despite the somewhat unique governance structure, EI/ECSE programs in Oregon are not entirely unlike programs operating in other states, making Oregon a suitable context for studying statewide staffing dynamics for an EI/ECSE workforce.

Data

We use statewide longitudinal administrative data from the 2007-08 to 2022-23 school years for the universe of public school employees in the state of Oregon, which include staff employed in the EI/ECSE workforce. IDEA requires that states report

staffing levels to the federal government in order to receive grant funding (Office of Special Education Programs, 2020). The Oregon Department of Education (ODE) includes flags in their data for employees whose primary jobs are working with children with disabilities. Because SpEd services for different age groups are mandated through different sections of IDEA (Part C for infants and toddlers, Part B 619 for preschoolers, and Part B 611 for K-12 students), the state of Oregon faces different reporting requirements for each group. Important for our purposes, this leads the state to generate identifiers for employees who work with these different age groups and allows us to identify the staff working in early intervention/early childhood special education. Moreover, given that all EI/ECSE staff are public employees, these data include the universe of employees working in this sector and enable population-level analyses of the workforce.[5]

The data contain information about individuals that, while common for K-12 teachers, is unusually detailed for the early childhood workforce in general (Bellows et al., 2022), and the EI/ECSE workforce in particular (Perez & Mercier, 2022). We observe professional characteristics of employees, including their employer, job position, salaries, full-time status, level of education and years of experience.[6] In addition, we observe personal characteristics such as gender, age, and race/ethnicity of employees. There are approximately forty position codes within the data that specify each employee's job title, which we collapse into three broad categories based on job functions: teachers/interventionists (Tch/Int), related service providers and other licensed staff (RPS/OLS), and paraprofessionals and other non-licensed staff (Para/NLS). There are also position comments that we use to further classify individuals into the three categories (see Appendix Table A1 for more details on our classification scheme).

The teacher and interventionist category comprises individuals who are working

---

[5] Indeed, comparisons of the number of observations in our data to what Oregon reports to the federal government confirm that we have a complete dataset of employees working in the ECSE sector in the state.

[6] We have years of experience data for all teachers but only for some of the other staff, particularly those in some licensed positions. We do not have information on experience for paraprofessionals and other non-licensed staff.

directly with children and who are responsible for coordinating services through Individualized Family Service Plans for children receiving EI and Individualized Education Programs for children enrolled in ECSE.[7] These individuals may be working in preschools as special education teachers and co-teachers or traveling directly to children's homes to provide intervention services (called EI/ECSE specialists in Oregon). The other licensed staff category is comprised of related service providers such as speech language pathologists, physical therapists, and occupational therapists that provide direct services to children with particularized needs. This group also includes psychologists who evaluate children for eligibility, nursing or medical staff, and administrators, among others, who all require specialized licenses to do their work.[8] The final group of non-licensed staff is mostly comprised of paraprofessionals, but also includes other non-licensed staff such as administrative secretaries and assistants to related service providers. In total, the data contain over 23,000 person-year observations of 4,000 unique EI/ECSE employees.[9] The three employee groups are approximately equal sized with around 500 employees in each category per year.

Measures of Turnover

In order to answer our second and third research questions, we construct measures of turnover unique to this workforce. We build on past measures of turnover developed in both the K-12 (Carver-Thomas & Darling-Hammond, 2017; Penner et al., 2023) and early childhood (Bassok, Markowitz, et al., 2021) contexts. Specifically, we distinguish sources of

[7] Some other staff such as speech language pathologists may also serve as the case manager for a child's IEP/IFSP. However, we are not able to distinguish between which of these staff are case managers and for how many children. Since this is the primary job of the EI/ECSE teachers and interventionists employed by the state, we keep them in their own category and separate out the related service providers even if they may manage some IFSPs/IEPs.

[8] Ideally, we would examine administrators as a separate category, however, due to small sample sizes that make inferring general patterns for this group difficult, we elect to include them with the other licensed staff category.

[9] For comparisons to the K-12 workforce, we utilize approximately 220,000 employee-year observations of K-12 SpEd employees and over 1 million employee-year observations for K-12 GenEd staff. See Appendix Table A2 for more information on the K-12 comparison sample sizes by position group and descriptive characteristics.

turnover as they relate to an employee's position (i.e., teacher/interventionist, related service provider/other licensed staff, or paraprofessional/non-licensed staff), sector (EI/ECSE or K-12), employer (i.e., EI/ECSE contractor), and presence in the public education system. This leads us to construct five mutually exclusive turnover categories. For an employee observed in time t, they are defined as turning over in time $t+1$ if they: 1) switch positions within EI/ECSE (between the three broad categories), 2) switch from EI/ECSE to K-12 SpEd, 3) switch from EI/ECSE to K-12 GenEd, 4) switch employers or 5) exit the public education system entirely. Employees are defined as exiting public education when they are no longer observed in the administrative data from ODE.[10] Employees that do not meet any of these definitions of turnover are defined as "stayers" for the purposes of these analyses.

In this context, employers are one of nine contractors that Oregon designates to provide EI/ECSE services. As discussed, these are most often specific Education Service Districts, a unique administrative unit in the Oregon public education governance structure that coordinates and provides special education services across sets of counties, though some contractors are specific school districts. Of note, the measures of turnover we construct do not capture employees that switch centers or school sites within the EI/ECSE sector. Unlike with the K-12 administrative data in Oregon, which list the school where an individual works in addition to their employer (typically a district), we do not have information on EI/ECSE employees' specific work sites.[11] This may be a selective reporting decision, meaning that employees are actually assigned to school sites but those assignments are not captured in the data. It is also possible that this is due to the nature of their jobs; because contractors send them to multiple sites during the year or directly to children's homes, they would not record a specific site assignment. To the extent that it is

---

[10] Because we are able to access the records for all public school employees in Oregon, we can be reasonably confident that employees no longer observed in the data have, indeed, exited the public education workforce.

[11] Only 16% are assigned to a specific school site in the data and the rest list contractors in place of site assignment.

the former and we are missing out on switching within employers, these estimates of turnover will be conservative. To the extent that it is the latter, then movement between contractors is the primary option for switching sites and will already be captured by the employer turnover measure.

Analysis

To get a better sense for the composition and employment patterns of the EI/ECSE workforce, we present key descriptive statistics about the groups of employees in this sector. We also present the staffing levels and turnover rates for each of the employee groups. Further, we compare the characteristics and behaviors of the EI/ECSE sector to their counterparts working in K-12 special education and K-12 general education in the state of Oregon. We do this in order to understand the extent to which the EI/ECSE workforce is unique in comparison to other education employees. Previous work documents that both special education (Penner et al., 2023) and early childhood employees (Bassok, Markowitz, et al., 2021) appear distinct from their general education counterparts in terms of composition and turnover patterns. However, it is unclear how the intersection of these characteristics, as represented by EI/ECSE, will compare. Thus, we include the K-12 SpEd and GenEd comparisons to assist with interpretation of the figures we present for the EI/ECSE workforce.

First, we document the levels of staffing within the EI/ECSE sector. We plot the number of licensed staff and the number of students served between the 2007-08 and 2022-23 school years.[12] We elect to examine licensed staff, which we define as the combination of the teacher/interventionist category and related service provider/other licensed staff category, because these professionals are most likely to serve as case managers or direct service providers working with children. In addition to these raw counts, we plot

[12] We do not possess student data for the 2022-2023 academic year but use the publicly available student counts from the state to construct counts and ratios for this year only (Oregon Department of Education, 2023). Because the student data pull we receive from ODE is for the purpose of constructing these counts and because our data match the publicly reported counts for previous years almost exactly, we are confident that the 2022-2023 count is comparable to the other years of the data.

the child-to-licensed-staff ratio over time to explore whether changes in the number of employees are simply commensurate to changes in the student population or reflect actual changes in staffing levels.[13]

Next, we explore several demographic patterns in the EI/ECSE workforce that previous work has demonstrated are relevant for student outcomes. We first explore the qualifications of the teachers working in EI/ECSE. Specifically, we plot the percent of teachers/interventionists who have master's degrees and the percent who have more than 10 years of experience, both potential, but incomplete, markers of quality. The difference between those with and without more than 10 years of experience has been shown in previous work to be a relevant distinction for student long-term outcomes (Chetty et al., 2011), so we use 10 years as a cutoff to distinguish more versus less experienced teachers. We plot these characteristics for K-12 SpEd and GenEd teachers in Oregon for comparison. Besides qualifications, we also examine the racial/ethnic diversity of the EI/ECSE workforce. We plot the proportion of each employee group that identifies as a person of color, defined as those identifying as Black, Hispanic, Asian/Pacific Islander, American Indian/Alaska Native, or Multi-racial, from 2010-2011 to 2022-2023.[14] We explore how the racial/ethnic diversity of the workforce compares to the K-12 SpEd and GenEd workforces and how it aligns with the students served. We also highlight the diversity of paraprofessionals and non-licensed staff in addition to licensed staff because paraprofessionals are typically among the most diverse groups of K-12 employees and are often seen as an important potential source of future teachers (Bisht et al., 2021).

After examining the levels of staffing and demographics of the EI/ECSE workforce,

---

[13] For one of the service areas, area 8, it appears that we are missing data from the 2020 school year. Counts of Tch/Int drop from 67 to 3 and for Para/Int drop from 110 to 5 in that year. In the subsequent year, the numbers rebound and there are no comparable drops in the other areas in 2020, leading us to suspect missing data or a reporting error. For the staff counts we linearly interpolate the number of staff. For turnover, we exclude area 8 when calculating average turnover measures and exclude them entirely from estimates of long-term retention.

[14] We present data on race/ethnicity starting in 2010-2011 because that is the first year in our data with near complete race/ethnicity information for all employees.

we examine turnover patterns in this sector. We first document the annual turnover rate for the three staff groups and decompose turnover into its sources. We report turnover separately in the pre-pandemic (2008-2019) and pandemic (2020-2022) periods to examine whether turnover meaningfully changed after the onset of the pandemic, as has been reported for the K-12 workforce across several states due to worsening working conditions and changes in outside options in the labor market (Bastian & Fuller, 2023; Camp et al., 2023; Goldhaber & Theobald, 2023). We then plot the 3, 5, and 10 year retention rates within the EI/ECSE sector (i.e., by comparing the position, sector, and employer in time t to time $t+3$, $t+5$, and $t+10$) for each employee group to see how long-term retention of this workforce is changing over time.

We also compare EI/ECSE employee turnover rates to those in K-12 SpEd and GenEd. Here we opt to compare the rates of exiting (leaving public education in the state) of employee groups due to the fundamentally different nature of the working environments across sectors. As discussed earlier, there are nine employers in the EI/ECSE sector and employees most often do not have site assignments, partly due to working in multiple sites or in children's homes. On the other hand, approximately 75% of K-12 employees are assigned to a specific school site and there are 197 school district employers in the state, plus additional employers through the Education Service Districts mentioned above. Given these differences in site assignments and the number of employers, we instead examine exit as it is more directly comparable across the sectors. We do so by regressing a binary exit variable on indicators for sector with EI/ECSE as the omitted category. We estimate these models for each of the three employee groups separately and plot the turnover rates and corresponding confidence intervals. We again do this for the pre- and post-pandemic years to determine whether patterns differ during these two time periods.

Finally, we examine the distribution of EI/ECSE employees across the state. A large body of work documents how teachers are inequitably distributed in K-12 schools based on student socioeconomic status, race/ethnicity, and urbanicity (Goldhaber et al.,

2015; Lankford et al., 2002), including for special education teachers (Cooc & Yang, 2016; Mason-Williams, 2015). However, there is little evidence to confirm whether a similar pattern holds for the EI/ECSE sector due to the limited availability of data for conducting sub-state analyses. To look at how the workforce is distributed across Oregon's 9 service areas, we first calculate the percent of teachers/interventionists with master's degrees, the percent with more than 10 years of experience, the percent teachers/interventionists of color, and the turnover rate for teachers/interventionists in each area averaged across 2011 to 2022.[15] We also calculate the ratio of children served to licensed staff to comport with Figure 1. Next, to examine how these characteristics relate to the demographics of children served in the service areas we plot these teacher attributes, turnover rates, and ratios by levels of student economic disadvantage, levels of proportions of students of color, levels of students receiving special education, and levels of rurality arrayed from least to greatest. Although we have the individual-level data on program participation for children in EI/ECSE, we do not have demographic information for these children. Thus, we use the kindergartners enrolled in public school in that service area to proxy for demographics of the EI/ECSE population including economic disadvantage (measured by receipt of free-or-reduced-price lunch), special education enrollment, and race/ethnicity. For rurality, we calculate the percent of K-12 schools in the service area that are rural.

Results

Trends in Staffing and Ratios

Figure 1 plots the number of students served by EI/ECSE and the size of Oregon's licensed workforce for EI/ECSE (left side of the y-axis) from the 2008 to 2023 school years.[16] Between 2008 and 2019, the number of children served in EI/ECSE grew from slightly less than 8,000 to more than 13,000, an increase of 70%. This is a relatively large

[15] We selected these years because they are the years where we have complete information for each of the variables. For race/ethnicity we have complete information starting in 2011.

[16] We refer to the latter part of the year when indicating the academic year. For example, 2008 represents the 2007-2008 school year. We follow this convention throughout when reporting on school years.

increase and reflects a true expansion in program reach and service provision as opposed to secular child population increases, as Oregon has served a growing share of the age-eligible population over time (Friedman-Krauss & Barnett, 2023). During this period, we also observe an increase in the number of licensed staff employed in EI/ECSE from 416 full-time employees in 2008 to almost 800 in 2019, an increase of 91%. Thus, while the student population increased, the licensed staff population increased at a faster rate. This led to an overall decline in the child-to-licensed staff ratio (right side of the y-axis in Figure 1) from 18.6 in 2008 to 16.5 in 2019. While these ratios are only a rough proxy for caseload size, they match national estimates of reported caseloads among licensed EI/ECSE employees of between 16 to 18 children (Friedman-Krauss et al., 2024). As such, at a time when Oregon expanded EI/ECSE services, they simultaneously decreased the number of children per licensed staff member by 11% or a little over two children per staff member.

After the onset of the pandemic, the patterns in enrollment and staffing changed. As shown in Figure 1, EI/ECSE enrollments plummeted in 2021, declining from a historic high of around 13,350 children in 2019-2020 to 10,600 the next year. By 2023, enrollments had recovered somewhat but were still more than 1,500 children below their 2020 levels. By contrast, while licensed staff experienced a small decline in 2020, their levels continued an increasing trend throughout the pandemic period, reaching an all-time high of 974 full-time employees by 2023. Given the declining student enrollments and increasing staffing levels, child-staff ratios declined dramatically starting in 2021, dropping to 12.2 children per licensed staff member and remaining at that level through 2023.

Composition of the Workforce

As we observe that the EI/ECSE workforce has expanded over time, it is important to examine the qualifications and characteristics of these employees to understand who is being attracted to the field and who remains in this workforce. Table 1 presents descriptive statistics for the population of EI/ECSE employees by position group for 2008-2023 (for comparison, Appendix Table A2 displays the same descriptive statistics for K-12

employees). Most of the employees identify as white (over 83%) and female (around 95%) while most are native English speakers (around 97%). In terms of gender, the EI/ECSE workforce is more similar to other ECE programs than the K-12 workforce, where, for example, in Oregon only 77% of K-12 SpEd teachers and 70% of K-12 GenEd teachers are women (see Appendix Table A2). By contrast, around 98% of ECE teachers nationally are women (C. McLean et al., 2024). About one-fourth of Tch/Int and one-third of RSP/OLS hold multiple positions in a year (i.e., have multiple entries in the administrative data) but for both groups about 95% of employees have all of their FTE in the EI/ECSE sector.

To better understand qualifications, in Figure 2 we plot the proportion of EI/ECSE teachers/interventionists with a master's degree or higher and the proportion with more than 10 years of experience. For comparison, we also plot the corresponding figures for K-12 SpEd and GenEd teachers and 95% confidence intervals comparing their rates to the EI/ECSE sector. Figure 2 demonstrates that EI/ECSE teachers simultaneously have the greatest incidence of master's degree holding but the least experience. While 81.4% of EI/ECSE teachers/interventionists have at least a master's degree, 80.9% percent of their K-12 SpEd and 70.3% percent of their K-12 GenEd peers do. The 11 percentage point differences between EI/ECSE and K-12 GenEd teachers is statistically significant ($p<.001$) but the difference between EI/ECSE and K-12 SpEd teachers is not (as indicated by the overlapping 95% confidence intervals). The pattern is reversed for experience. Specifically, 45.9% of EI/ECSE teachers have more than 10 years of experience while 46.1% of K-12 SpEd and 52.1% of K-12 GenEd teachers do. Again, the difference is only statistically significant between EI/ECSE and K-12 GenEd teachers ($p<.001$) where the EI/ECSE workforce is 6 percentage points less likely to be experienced. Both of these differences in education and experience for EI/ECSE teachers are relatively large given that they represent a 15 and 12 percent difference from the K-12 GenEd rates, respectively.

The patterns we document are also consistent across years. In Appendix Figure A2 we plot the percentage of teachers with advanced degrees and more than 10 years of

experience each year between 2008 and 2023. We document increases in advanced degree holding and experience for all groups from 2008 through 2018, with EI/ECSE teachers experiencing the largest increases. All groups began to decline around 2018 for degrees and experience but EI/ECSE teachers had the largest declines in experience levels, dropping from 53% of teachers having more than 10 years of experience to only 40% in 2023. In every year, however, EI/ECSE teachers had higher education levels and lower experience levels compared to K-12 GenEd teachers with K-12 SpEd teachers sometimes falling above or below EI/ECSE teachers depending on the year. Thus, while generally comparable in qualifications and experience to K-12 SpEd teachers, EI/ECSE teachers are more highly educated but less experienced than K-12 GenEd teachers, on average.

Another area of interest is the demographic match between this expanding workforce and student populations in EI/ECSE. Figure 3 plots the proportion of each staff group that identifies as a person of color from 2011 to 2023. During this period, the state made progress in diversifying all employee groups. For EI/ECSE, the percent of RSP/OLS of color doubled from 5.9% to 11.9% while the percent of Para/NLS of color increased by almost 10 percentage points to 23%. Significant gains were also made for EI/ECSE teachers and interventionists who increased from 6.2% in 2011 to 15.3% in 2023, making them the most diverse teacher group compared to the K-12 SpEd and GenEd sectors. For both RSP/OLS and Para/NLS, the diversity of EI/ECSE staff in 2023 was lower than K-12 GenEd employees but higher than K-12 SpEd, though the differences were small in magnitude (around 1 to 3 percentage points). Despite the progress made in diversifying the workforce, there is nevertheless a racial/ethnic mismatch between EI/ECSE staff and students, with 37% of EI/ECSE students identifying as students of color in 2023 (Oregon Department of Education, 2023). Generally, we see that the EI/ECSE workforce is not fully representative of the students they serve, though given their demographic similarity to the K-12 workforce and the documented mismatch between K-12 educators and students (e.g., King et al., 2016), they do not appear exceptional in this regard.

Turnover

We next turn from understanding the supply of individuals electing to work in EI/ECSE to looking at one of the greatest determinants of demand: employee turnover (Carver-Thomas & Darling-Hammond, 2017). Table 2 displays the average one-year turnover rates for teachers/interventionists, related service providers/other licensed staff, and paraprofessionals/non-licensed staff during the pre-pandemic (2008-2019) and pandemic (2020-2022) periods. Prior to the pandemic, Tch/Int were the most stable group, with 16.4% turning over each year, on average, compared to 18.3% for RSP/OLS and 22.4% for Para/NLS. During the pandemic period, turnover declined somewhat for Tch/Int and RSP/OLS (to 14.3% and 16.6% respectively) but increased sharply among paraprofessionals, rising 8 percentage points to 30.4% post-pandemic.[17] The declines in turnover among teachers during the pandemic period are somewhat surprising given that this was also a time when experience was decreasing among this group and less experienced teachers tend to turn over at higher rates (see Appendix Figure A2).

We further disaggregate turnover into various sources in Table 2. For each group, the majority of turnover results from employees exiting the public education workforce in Oregon altogether. For Tch/Int, exit is about half of turnover, whereas for the other groups, exit is about two-thirds of total turnover. Virtually no employees switch between the service areas in EI/ECSE but a meaningful number switch positions, particularly Tch/Int and Para/NLS.[18] Notably, each year, approximately 3 to 7 percent of employees in each group transition into the K-12 sector, either in special education or general education roles. This implies that the EI/ECSE sector is losing dozens of employees per year to the K-12 system.[19]

---

[17] Plots displaying one-year turnover rates by group in Appendix Figure A3 from 2008 to 2022 show a similar pattern to K-12 teachers during the pandemic for EI/ECSE Tch/Int with a sharp drop in turnover in 2020 and then increases in 2022.

[18] These may represent promotion of Tch/Int into more supervisory roles or of Para/NLS into teaching or interventionist positions.

[19] In Appendix Figure A3 we plot the one-year turnover rate by type for each group of employees in each

The turnover rates presented so far capture an average of annual rates, but turnover may be more dynamic over time and from a longitudinal perspective. In Figure 4 we plot the three-, five-, and ten-year retention rates in the EI/ECSE sector over time for each of the three employee groups. Again, Tch/Int appear to be the most stable group with generally higher long-term retention rates at each threshold compared to their colleagues. On average, about 75% of Tch/Int employed in EI/ECSE in a given year are still observed working in EI/ECSE three years later. The same is true for about 68% of RSP/OLS and 62% of Para/NLS, on average. Five-year retention drops to an average of 60% for Tch/Int, 58% for RSP/OLS, and 50% for Para/NLS. Looking even further out, 45% of Tch/Int, 40% of RSP/OLS, and 33% of Para/NLS are still observed working in EI/ECSE in Oregon ten years later. These long-term retention patterns have been relatively stable for RSP/OLS and more dynamic for Tch/Int and Para/NLS. Most notably, long-term retention rates for Para/NLS have declined steadily over time. While 70% of Para/NLS remained in the sector three years later in 2009, this number dropped to 51% by 2020. Five-year retention also declined by 20 percentage points for Para/NLS from 2009 to 2020, dropping from 60% to 40%. In the appendix materials (Figure A4) we look at exit from the Oregon public education system and find similar, but slightly less pronounced patterns of long-term retention in the state.

While we observe that meaningful numbers of EI/ECSE employees are turning over each year, is EI/ECSE unique in this regard? We compare the rates of exiting public education in the state (attriting from the workforce) of EI/ECSE employees to their K-12 SpEd and GenEd counterparts. Figure 5 plots the average exit rates by employee type (Tch/Int, RSP/OLS, and Para/NLS) and sector (EI/ECSE, K-12 SpEd, K-12 GenEd) during the pre-pandemic and pandemic periods. The 95% confidence intervals are calculated using the standard errors from regressions testing whether K-12 SpEd or GenEd employees are significantly different from their EI/ECSE counterparts (see Appendix Table

---

year between 2008 and 2022 by source of turnover.

A3 for more details). In the pre-pandemic period, the exit rates among Tch/Int and RSP/OLS employees in K-12 were not significantly different from those in EI/ECSE. However, during the pandemic period, K-12 SpEd teachers had higher exit rates (9.6% vs. 7.7%) and K-12 GenEd Licensed staff had lower exit rates (9.5% vs. 11.5%) relative to EI/ECSE. At both time points, EI/ECSE Para/NLS had higher exit rates than their K-12 SpEd counterparts. In the pre-pandemic period, Para/NLS turnover among EI/ECSE employees was lower than GenEd Para/NLS but during the pandemic period, the exit rates were statistically indistinguishable, though EI/ECSE rates surpassed those of GenEd Para/NLS. While EI/ECSE paraprofessionals and non-licensed staff seem to have consistently higher exit rates relative to K-12 SpEd Para/NLS, there are not consistent patterns otherwise. Thus, it appears that the attrition patterns we observe for the EI/ECSE workforce are not exceptional when put into the context of what is observed for their K-12 counterparts.

Distribution of the Workforce

So far, we have examined the composition and stability of the EI/ECSE workforce, making comparisons both across groups within the sector and to their counterparts in K-12 schools. However, an equally important consideration is how these employees are distributed across different contexts *within* the state (Bettini et al., 2023). Figure 6 plots the percent of teachers/interventionists that have a master's degree, more than ten years of experience, and that identify as a person of color by levels of kindergarten economic disadvantage, racial/ethnic diversity, special education receipt and school rurality in each of the nine service areas. The first number on the x-axis is the service area number. We refer to the areas by a consistent number to maintain anonymity so they do not reflect actual names of the areas. The number below the service area is the average demographic composition of that area. For example, the first panel of Figure 6 arrays the nine service areas from least to greatest based on average levels of kindergarten economic disadvantage. Area 9, to the far left, has the lowest levels of economic disadvantage at 36.6% whereas area

3 to the far right has the highest level with 75.5% of students identified as economically disadvantaged. The y-axis plots the percent of teachers with a given attribute. For example in area 9, 85% of teachers have master's degrees whereas in area 3, 74% have master's degrees. Each of the subsequent panels arrays the nine areas based on other demographic characteristics of children in the region and plots the same teacher characteristics.

Of note, there is meaningful variation across the service districts in terms of teacher/interventionist attributes. While on average 81% of EI/ECSE teachers have a master's degree, in the service areas this figure ranges between 67% to 93%. The proportion of teachers with more than 10 years of experience also varies, ranging from 35% to 65%. Looking across the distribution of student characteristics there are few clear patterns in teacher attributes, with the exception of two notable patterns. For one, in service areas with the most economically disadvantaged students, fewer teachers have master's degrees. The three service areas with the fewest master's degree holders are also the three areas with the most economically disadvantaged students. Additionally, it appears that there is some mismatch between children and staff of color. While the proportion of teachers/interventionists of color ranges from 4% to 17% in the service areas, it is not the case that the areas with more students of color have more staff of color.

Besides teacher attributes, we also examine differences across EI/ECSE service areas in terms of teacher/interventionist average turnover and child-to-licensed-staff ratios. Figure 7 plots these two measures by the same kindergarten and school rurality characteristics as before. Again there is meaningful variation across service areas on these dimensions. Turnover among teachers/interventionists ranges from 10% to 21% and child-staff ratios range from 12.7 to 24.4. Notably, the highest poverty areas have the highest child-to-staff ratios, with the three areas having a ratio above 20 to 1 also being the three highest in terms of student economic disadvantage. Turnover is also somewhat higher for the top four economically disadvantaged areas compared to the bottom five. Furthermore, as shown at the bottom of Figure 7, the two areas with the highest turnover

rates are also the most rural. Together, in examining the distribution of teacher attributes and stability across service areas, the results provide suggestive evidence that EI/ECSE employees may be distributed inequitably in ways similar to their K-12 counterparts, though the patterns are more tentative given fewer units to compare.

Discussion

Amidst widespread concern that states are unable to staff the workforce needed to serve all children birth to five who have a disability, understanding the labor market dynamics in the early intervention and early childhood special education sector is critical. Leveraging uniquely rich administrative data for the universe of EI/ECSE employees in the state of Oregon from 2008 to 2023, our analyses shed light on aspects of supply and demand for these workers. We find that while Oregon rapidly expanded their provision of services in the state over this period, they were able to hire employees at an even faster rate, leading to meaningful declines in child-to-licensed-staff ratios. The teachers/interventionists that have been hired are among the most highly educated in the state; greater than 80% of them have master's degrees. Although they are the highest educated sector, EI/ECSE teachers are simultaneously less experienced, on average, than their K-12 GenEd colleagues.

Similar to the K-12 workforce in Oregon, and nationally, there are substantially fewer teachers of color compared to students of color, but paraprofessionals/non-licensed staff in the sector represent a more diverse group that could be drawn upon to diversify the teaching force. Indeed, Oregon has been working to increase the diversity of the teaching force by creating scholarships for teaching candidates of color and by recruiting paraprofessionals and other staff to become teachers through Grow-Your-Own programs (Educator Advancement Council, 2025). Given the well-documented impacts of teachers of color on students of color (Blazar, 2024; Gershenson et al., 2021), including among young learners (Dee, 2004), increasing the diversity of the workforce could stand to improve the outcomes of young children of color with disabilities. This is particularly salient given that

much of the achievement disparities between white students and children of color are already present in kindergarten upon school entry (Reardon & Portilla, 2016).

On the demand side, we provide the first estimates of turnover among the EI/ECSE workforce at a state-level. Approximately 1 in 6 employees leave their specific jobs each year in EI/ECSE. Looking further out, slightly more than half of employees are still working in EI/ECSE five years later and slightly more than one third are still in the sector ten years later. These estimates using administrative data comport surprisingly well with previous survey-based estimates. Friedman-Krauss et al. (2024) find that 40% of the EI/ECSE teachers and service providers they surveyed nationally indicated that they were somewhat or extremely likely to leave the field in the next five years. When we look at five-year retention rates for teachers/interventionists and related service providers in Oregon, approximately 60% remain after five years, aligning with these survey estimates. This suggests the potential utility of surveys about job intentions to understand turnover in this workforce, particularly when considering longer-term turnover behavior (Harbatkin et al., 2025).

Another contribution of this work is that we are able to examine turnover patterns before and after the pandemic. While research on K-12 teachers documents sharp increases in turnover during the pandemic (Camp et al., 2023; Goldhaber & Theobald, 2023), we find that turnover was stable pre- and post-pandemic for EI/ECSE related service providers but followed a similar drop then increase in 2022 for teachers/interventionists. Paraprofessionals and non-licensed staff, on the other hand, witnessed continued increases in turnover before and after the onset of the pandemic with large but steady declines in long-term retention across the 16 year period we study. The increasing instability among paraprofessionals in EI/ECSE at a time when enrollment is growing may hamper efforts to include young children with disabilities as paraprofessionals are often tasked with supporting inclusion (Bisht et al., 2021). While most of the turnover across groups is due to exit from the public education system, meaningful numbers of employees do switch to

the K-12 sector each year. The attrition patterns observed for EI/ECSE employees, however, do not systematically differ from those in the K-12 SpEd or K-12 GenEd sectors. On balance, we do not find strong evidence that the EI/ECSE workforce is altogether distinct from the rest of the public education workforce in the state.

Finally, we are the first to document the distribution of EI/ECSE employees across different contexts and student populations, highlighting a somewhat inequitable distribution as is the case with K-12 educators. In particular, service providers with more low-income students have higher child-to-staff ratios and teachers with lower qualifications. They also tend to have higher teacher turnover. While there are only a few service areas in the state, making it somewhat difficult to draw definitive conclusions about the differences in staff characteristics, these potential inequities in the distribution of EI/ECSE employees raise concerns. For K-12 students the inequitable distribution of qualified teachers (Lankford et al., 2002) and special educators (Mason-Williams, 2015) contributes to disparities between students of different backgrounds. Additionally, because teacher and special educator turnover can harm student achievement and development (Kaler et al., 2025; Markowitz, 2024; Ronfeldt et al., 2013), differences in turnover across areas may further widen disparities and diminish service quality for young children with disabilities. Better understanding potential distributional differences in EI/ECSE employee characteristics at a finer grained level is an important area for future research.

Although this study contributes to the field's broader understanding of the EI/ECSE workforce, it has several important limitations. First, the availability of data to study the universe of employees in the state of Oregon may have implications for the generalizability of these findings. Oregon's data system for EI/ECSE is considered more well-developed than many other states across a host of measures (Perez & Mercier, 2022). To the extent that data availability also reflects aspects of program structure and quality that may be related to turnover and staff characteristics, these findings may not generalize to other states with more limited data infrastructures. Researchers should seek to replicate

these analyses in other states to determine whether the findings align with or diverge from the patterns we observe in Oregon.

Second, while the availability and quality of data in Oregon permit rich descriptive analyses, more information is needed to generate further insights into this workforce and their impacts. For one, we are not able to track what happens to the employees who exit the system and whether they are still a part of the EI/ECSE workforce in other states or doing another related job in Oregon. Additionally, data linking case managers and related service providers to the children they serve would enable more accurate characterizations of their caseloads and work settings (in children's homes, in traditional classrooms, etc.), both of which are potential measures of employee working conditions. These data would also enable more nuanced examinations of the distribution of staff members across student characteristics and open up potential avenues for exploring their effectiveness, an element of the workforce we were not able to address in this paper. Future research on EI/ECSE employees should attempt to move from describing their composition to understanding their role in promoting positive outcomes for students and understanding how policies can ameliorate the challenges confronting this workforce (e.g., Gilmour, Feng, & Theobald, 2024).

Despite these limitations, our analyses hold several implications for policymakers seeking to ease the workforce challenges of their early intervention and early childhood special education programs. Importantly, assessing the similarities between the EI/ECSE workforce and other education workforces for which policy interventions have been attempted may help generate hypotheses about what can work to reduce EI/ECSE shortages. As one example, policymakers are increasingly turning to recruitment and/or retention bonuses to address staffing problems. Recent evidence from the state of Hawai'i demonstrates that a $10,000 bonus for K-12 special educators significantly reduced shortages in this area (Theobald et al., 2025). By contrast, much smaller bonuses of $1,500 reduced turnover among child care teachers, but not school-based preschool teachers, in the

state of Virginia (Bassok, Doromal, et al., 2021). Given the similarities observed in both the demographic characteristics and turnover levels between EI/ECSE and K-12 SpEd employees, policy responses that have proven effective at reducing K-12 SpEd staffing shortages (e.g., Gilmour, Theobald, & Jones, 2024) may be most promising for employees working in EI/ECSE, as opposed to those deemed effective with child care employees whose demographic profiles are distinct. That the EI/ECSE workforce appears to be more like the K-12 special education, as opposed to the general early childhood, workforce is itself a key takeaway for policymakers thinking about approaches to best support the EI/ECSE workforce in their state.

Conclusion

Employees in EI/ECSE programs are essential to ensuring quality early learning experiences for young children with disabilities. Yet, workforce shortages threaten program stability and may undermine their potential benefits for children's development (e.g., Markowitz, 2024). As such, determining the policy levers that can be used to recruit and retain the employees that comprise this critical workforce is of the utmost importance, especially if we hope to ensure infants, toddlers, and preschoolers with disabilities have access to the high quality early life experiences that help them and their families thrive.

References

Annie E. Casey Foundation. (2022). Head Start enrollment by age group | KIDS COUNT Data Center. Retrieved February 10, 2023, from https://datacenter.kidscount.org/data/bar/9786-head-start-enrollment-by-age-group/share/loc=1~loct=2/2~39~false~871~1830,558,559,1831,122~19059#2/39/false/871/1830,558,559,1831,122/19059

Bassok, D., Bellows, L., Markowitz, A., & Shapiro, A. (2022). Do Early Educators Improve over Time? New Findings from the Universe of New Child Care, Head Start, and Pre-K Teachers in Louisiana. Retrieved November 6, 2023, from https://appam.confex.com/appam/2022/meetingapp.cgi/Paper/44783

Bassok, D., Doromal, J. B., Michie, M., & Wong, V. C. (2021). The Effects of Financial Incentives on Teacher Turnover in Early Childhood Settings: Experimental Evidence from Virginia.

Bassok, D., Markowitz, A. J., Bellows, L., & Sadowski, K. (2021). New Evidence on Teacher Turnover in Early Childhood. *Educational Evaluation and Policy Analysis*, *43*(1), 172–180. https://doi.org/10.3102/0162373720985340

Bastian, K. C. (2019). A degree above? The value-added estimates and evaluation ratings of teachers with a graduate degree. *Education Finance and Policy*, *14*(4), 652–678.

Bastian, K. C., & Fuller, S. C. (2023). Educator Attrition and Mobility During the COVID-19 Pandemic. *Educational Researcher*, *52*(8), 516–520. https://doi.org/10.3102/0013189X231187890

Bellows, L., Bassok, D., & Markowitz, A. J. (2022). Teacher Turnover in Early Childhood Education: Longitudinal Evidence From the Universe of Publicly Funded Programs in Louisiana. *Educational Researcher*, *51*(9), 565–574. https://doi.org/10.3102/0013189X221131505

Bettini, E., Scott, L., Meyer, K., Mathews, H., & Shaheen, T. (2023). Challenges facing the special education teacher workforce: Composition, distribution, and effectiveness. *Handbook of Special Education*.

Bettini, E., Nguyen, T. D., Ellis-Robinson, T., Mason-Williams, L., Allen-Barrett, A., & Bass, A. (2025). Ethnoracial Diversity of the Special Educator Workforce Over Time. *Exceptional Children*, *91*(2), 144–165. https://doi.org/10.1177/00144029241300526

Billingsley, B. S., & Bettini, E. (2019). Special Education Teacher Attrition and Retention: A Review of the Literature. *Review of Educational Research*, *89*(5), 697–744. https://doi.org/10.3102/0034654319862495

Bisht, B., LeClair, Z., Loeb, S., & Sun, M. (2021). Paraeducators: Growth, Diversity and a Dearth of Professional Supports. EdWorkingPaper No. 21-490. *Annenberg Institute for School Reform at Brown University*.

Blazar, D. (2024). Why Black Teachers Matter. *Educational Researcher*, *53*(8), 450–463. https://doi.org/10.3102/0013189X241261336

Boe, E. E. (2006). Long-Term Trends in the National Demand, Supply, and Shortage of Special Education Teachers. *The Journal of Special Education*, *40*(3), 138–150. https://doi.org/10.1177/00224669060400030201

Bruder, M. B. (2010). Early Childhood Intervention: A Promise to Children and Families for Their Future. *Exceptional Children*, *76*(3), 339–355. https://doi.org/10.1177/001440291007600306

Camp, A., Zamarro, G., & McGee, J. (2023). Teacher Turnover During the COVID-19 Pandemic. *Education Reform Faculty and Graduate Students Publications*. https://scholarworks.uark.edu/edrepub/143

Carver-Thomas, D., & Darling-Hammond, L. (2017). *Teacher Turnover: Why It Matters and What We Can Do about It* (tech. rep.). Learning Policy Institute. Retrieved March 18, 2023, from https://eric.ed.gov/?id=ED606805

Cassidy, D. J., Lower, J. K., Kintner-Duffy, V. L., Hegde, A. V., & Shim, J. (2011). The Day-to-Day Reality of Teacher Turnover in Preschool Classrooms: An Analysis of Classroom Context and Teacher, Director, and Parent Perspectives. *Journal of Research in Childhood Education*, *25*(1), 1–23. https://doi.org/10.1080/02568543.2011.533118

Chetty, R., Friedman, J. N., Hilger, N., Saez, E., Schanzenbach, D. W., & Yagan, D. (2011). How Does Your Kindergarten Classroom Affect Your Earnings? Evidence from Project Star. *The Quarterly Journal of Economics*, *126*(4), 1593–1660. https://doi.org/10.1093/qje/qjr041

Cooc, N., & Yang, M. (2016). Diversity and Equity in the Distribution of Teachers With Special Education Credentials: Trends From California. *AERA Open*, *2*(4), 2332858416679374. https://doi.org/10.1177/2332858416679374

Cryer, D., Hurwitz, S., & Wolery, M. (2000). Continuity of caregiver for infants and toddlers in center-based child care: Report on a survey of center practices. *Early Childhood Research Quarterly*, *15*(4), 497–514. https://doi.org/10.1016/S0885-2006(01)00069-2

Dee, T. S. (2004). Teachers, Race, and Student Achievement in a Randomized Experiment. *The Review of Economics and Statistics*, *86*(1), 195–210. https://doi.org/10.1162/003465304323023750

Doromal, J. B., Bassok, D., Bellows, L., & Markowitz, A. J. (2022). Hard-to-staff centers: Exploring center-level variation in the persistence of child care teacher turnover. *Early Childhood Research Quarterly*, *61*, 170–178. https://doi.org/10.1016/j.ecresq.2022.07.007

Early Childhood Technical Assistance Center. (2022a). *Part B, Section 619 of IDEA* (tech. rep.). FPG Child Development Institute of the University of North Carolina at Chapel Hill. https://ectacenter.org/~pdfs/sec619/ecta-sec619-overview.pdf

Early Childhood Technical Assistance Center. (2022b). *Part C of IDEA* (tech. rep.). FPG Child Development Institute of the University of North Carolina at Chapel Hill. https://ectacenter.org/~pdfs/partc/ecta-part-c-overview.pdf

Early Childhood Technical Assistance Center. (2023). ECTA Center: Part B, Section 619 National Survey 2021. Retrieved August 22, 2025, from https://ectacenter.org/sec619/sec619survey-2021.asp

Edmonds, L. (2024). Which Match Matters? HBCUs, Same-Race Teacher Effects, and Black Student Achievement.

Educator Advancement Council. (2025). Grow Your Own Educator Partnerships Initiative. Retrieved September 2, 2025, from https://eac.ode.state.or.us/page/grow-your-own-2023-25

Edwards, D. S., Kraft, M. A., Christian, A., & Candelaria, C. A. (2025). Teacher Shortages: A Framework for Understanding and Predicting Vacancies. *Educational Evaluation and Policy Analysis*, *47*(3), 703–729. https://doi.org/10.3102/01623737241235224

Feinberg, E., Silverstein, M., Donahue, S., & Bliss, R. (2011). The Impact of Race on Participation in Part C Early Intervention Services. *Journal of Developmental & Behavioral Pediatrics*, *32*(4), 284–291. https://doi.org/10.1097/DBP.0b013e3182142fbd

Feng, L., & Sass, T. R. (2013). What makes special-education teachers special? Teacher training and achievement of students with disabilities. *Economics of Education Review*, *36*, 122–134. https://doi.org/10.1016/j.econedurev.2013.06.006

Friedman-Krauss, A. H., & Barnett, W. S. (2023). *The State(s) of Early Intervention and Early Childhood Special Education: Looking at Equity* (Research Report). National Institute for Early Education Research. New Brunswick, NJ.

Friedman-Krauss, A. H., Barnett, W. S., Jost, T. M., & Garver, K. (2024). *Early Intervention and Early Childhood Special Education National Workforce Survey*

Results (Research Report). National Institute for Early Education Research. New Brunswick, NJ.

Gershenson, S., Hansen, M. J., & Lindsay, C. A. (2021). *Teacher diversity and student success: Why racial representation matters in the classroom* (Vol. 8). Harvard Education Press Cambridge, MA.

Gilmour, A. F. (2020). Teacher Certification Area and the Academic Outcomes of Students With Learning Disabilities or Emotional/Behavioral Disorders. *The Journal of Special Education*, *54*(1), 40–50. https://doi.org/10.1177/0022466919849905

Gilmour, A. F., Aniagyei-Cobbold, E., & Theobald, R. (2025). Special Education Personnel Attrition in Pennsylvania. *Exceptional Children*, 00144029251350069. https://doi.org/10.1177/00144029251350069

Gilmour, A. F., Bartanen, B., Bettini, E., Feng, L., Klinenberg, J., Mason-Williams, L., Redding, C., Scott, L. A., & Theobald, R. (2025). *The Composition, Distribution, and Stability of the Special Education Teacher Workforce in Seven States* [SPARC Center Working Paper No. 01-1025].

Gilmour, A. F., Feng, L., & Theobald, R. (2024). Leveraging Administrative Data to Study the Special Education Teacher Workforce. *Remedial and Special Education*, 07419325241262971. https://doi.org/10.1177/07419325241262971

Gilmour, A. F., Nguyen, T. D., Redding, C., & Bettini, E. (2023). The Shifting Context of Special Education Teachers' Work. *Remedial and Special Education*, *44*(3), 171–183. https://doi.org/10.1177/07419325221113016

Gilmour, A. F., & Stiefel, L. (2024). Leveraging Large Administrative Data for Special Education Policy Analysis: Recent Contributions and Future Directions. *Remedial and Special Education*, 07419325241268858. https://doi.org/10.1177/07419325241268858

Gilmour, A. F., Theobald, R., & Jones, N. D. (2024). Economic Interventions as Policy Levers For Attracting and Retaining Special Education Teachers. In *Handbook of Research on Special Education Teacher Preparation* (2nd ed.). Routledge.

Goldhaber, D., Lavery, L., & Theobald, R. (2015). Uneven Playing Field? Assessing the Teacher Quality Gap Between Advantaged and Disadvantaged Students. *Educational Researcher*, *44*(5), 293–307. https://doi.org/10.3102/0013189X15592622

Goldhaber, D., & Theobald, R. (2023). Teacher Turnover Three Years into the Pandemic Era: Evidence from Washington State. *American Institute for Research; CALDER*. Retrieved March 3, 2023, from https://caldercenter.org/publications/teacher-turnover-three-years-pandemic-era-evidence-washington-state

Grumke, K. (2023). Pandemic led to drop in special education services for young kids in Missouri and nationwide. Retrieved November 6, 2023, from https://www.kcur.org/news/2023-05-28/pandemic-led-to-drop-in-special-education-services-for-young-kids-in-missouri-and-nationwide

Hanushek, E. A., Rivkin, S. G., & Schiman, J. C. (2016). Dynamic effects of teacher turnover on the quality of instruction. *Economics of Education Review*, *55*, 132–148. https://doi.org/10.1016/j.econedurev.2016.08.004

Harbatkin, E., Nguyen, T. D., Strunk, K. O., Burns, J., & Moran, A. J. (2025). Should I Stay or Should I Go (Later)? Teacher Intentions and Turnover in Low-Performing Schools and Districts before and during the COVID-19 Pandemic. *Education Finance and Policy*, 1–61. https://doi.org/10.1162/edfp_a_00447

Hebbeler, K., Spiker, D., Bailey, D., Scarborough, A., Mallik, S., Simeonsson, R., Singer, M., & Nelson, L. (2007). Early Intervention for Infants and Toddlers With Disabilities and Their Families: Participants, Services, and Outcomes, 116.

Heckman, J. J. (2006). Skill Formation and the Economics of Investing in Disadvantaged Children. *Science*, *312*(5782), 1900–1902. https://doi.org/10.1126/science.1128898

IDEA Infant and Toddler Coordinators Association. (2021). *2021 ITCA finance survey. Part 1: Executive Summary* (tech. rep.). https://www.ideainfanttoddler.org/pdf/Part-I-2021-Executive-Summary.pdf

IDEA Infant and Toddler Coordinators Association. (2022). *2022 Tipping Point Survey: Demographics, Challenges, and Opportunities* (tech. rep.). https://www.ideainfanttoddler.org/pdf/2022-Tipping-Points-Survey.pdf

Kaler, L., Theobald, R., Jones, N., & Bettini, E. (2025). *Impacts of Staff Turnover on Test Scores for Students with and without Disabilities* (Working Paper No. 319-0525). National Center for Analysis of Longitudinal Data in Education Research. Retrieved July 21, 2025, from https://eric.ed.gov/?id=ED673313

King, J. B., McIntosh, A., & Bell-Ellwanger, J. (2016). The state of racial diversity in the educator workforce. *Washington: US Department of Education, Office of Planning, Evaluation and Policy Development, Policy and Program Studies Service*.

Kontos, S., & Dunn, L. (1989). Characteristics of the Early Intervention Workforce: An Indiana Perspective. *Early Education and Development*, *1*(2), 141–157. https://doi.org/10.1207/s15566935eed0102_5

Kwon, K.-A., Malek, A., Horm, D., & Castle, S. (2020). Turnover and retention of infant-toddler teachers: Reasons, consequences, and implications for practice and policy. *Children and Youth Services Review*, *115*, 105061. https://doi.org/10.1016/j.childyouth.2020.105061

Lankford, H., Loeb, S., & Wyckoff, J. (2002). Teacher Sorting and the Plight of Urban Schools: A Descriptive Analysis. *Educational Evaluation and Policy Analysis*, *24*(1), 37–62. https://doi.org/10.3102/01623737024001037

Markowitz, A. J. (2024). Within-Year Teacher Turnover in Head Start and Children's School Readiness. *AERA Open*, *10*, 23328584241245094. https://doi.org/10.1177/23328584241245094

Mason-Williams, L. (2015). Unequal Opportunities: A Profile of the Distribution of Special Education Teachers. *Exceptional Children*, *81*(2), 247–262. https://doi.org/10.1177/0014402914551737

Mason-Williams, L., Bettini, E., Peyton, D., Harvey, A., Rosenberg, M., & Sindelar, P. T. (2020). Rethinking Shortages in Special Education: Making Good on the Promise of an Equal Opportunity for Students With Disabilities. *Teacher Education and Special Education*, *43*(1), 45–62. https://doi.org/10.1177/0888406419880352

McLean, C., Austin, L. J. E., Powell, A., Jaggi, S., Yoonjeon, K., Knight, J., Munoz, S., & Schlieber, M. (2024). *Early Childhood Workforce Index 2024* (tech. rep.). Center for the Study of Child Care Employment, UC Berkeley. https://cscce.berkeley.edu/workforce-index-2024/

McLean, M., Sandall, S. R., & Smith, B. J. (2016). A History of Early Childhood Special Education. In B. Reichow, B. A. Boyd, E. E. Barton, & S. L. Odom (Eds.), *Handbook of Early Childhood Special Education* (pp. 3–19). Springer International Publishing. Retrieved October 20, 2023, from https://doi.org/10.1007/978-3-319-28492-7_1

McLeskey, J., & Billingsley, B. S. (2008). How Does the Quality and Stability of the Teaching Force Influence the Research-to-Practice Gap?: A Perspective on the Teacher Shortage in Special Education. *Remedial and Special Education*, *29*(5), 293–305. https://doi.org/10.1177/0741932507312010

McManus, B., McCormick, M. C., Acevedo-Garcia, D., Ganz, M., & Hauser-Cram, P. (2009). The Effect of State Early Intervention Eligibility Policy on Participation Among a Cohort of Young CSHCN. *Pediatrics*, *124*(4), S368–S374. https://doi.org/10.1542/peds.2009-1255G

McManus, B. M., Richardson, Z., Schenkman, M., Murphy, N. J., Everhart, R. M., Hambidge, S., & Morrato, E. (2020). Child characteristics and early intervention

referral and receipt of services: A retrospective cohort study. *BMC Pediatrics*, *20*(1), 84. https://doi.org/10.1186/s12887-020-1965-x

Mulvaney, K. (2023). 'Systemic failures' in Providence school special education lawsuit alleges. Retrieved October 24, 2023, from https://www.providencejournal.com/story/news/education/2023/07/17/providence-ride-named-in-special-education-lawsuit-alleging-systemic-failure/70421209007/

Office of Special Education Programs. (2020). IDEA Part B Personnel for School Year 2018-2019. https://www2.ed.gov/programs/osepidea/618-data/collection-documentation/data-documentation-files/part-b/personnel/idea-partb-personnel-2018-19.pdf

Office of the New York Comptroller. (2023). Department of Health: Oversight of the Early Intervention Program.

Oregon Department of Education. (2023). 2022-2023 EI/ECSE SECC Media File. https://www.oregon.gov/ode/reports-and-data/SpEdReports/Documents/SECCMediaFiles/2022eimediafile.xlsx

Paff, M. L., Harrison, A. J., Erickson, S. R., Ferster, A. E., & Neuharth-Pritchett, S. M. (2023). Calculating "At-Risk" rates and service utilization disparities in early intervention and early childhood special education services. *Adversity and Resilience Science*, *4*(1), 57–70.

Palsha, S. A., Bailey, D. B., Vandiviere, P., & Munn, D. (1990). A Study of Employee Stability and Turnover in Home-Based Early Intervention. *Journal of Early Intervention*, *14*(4), 342–351. https://doi.org/10.1177/105381519001400405

Papay, J. P., & Kraft, M. A. (2015). Productivity returns to experience in the teacher labor market: Methodological challenges and new evidence on long-term career improvement. *Journal of Public Economics*, *130*, 105–119. https://doi.org/10.1016/j.jpubeco.2015.02.008

Penner, E. K., Liu, Y., & Ainsworth, A. J. (2023). *Revolving School Doors? A Longitudinal Examination of Teacher, Administrator and Staff Contributions to School Churn* (EdWorkingPaper: No. 23-777). Annenberg Institute at Brown University. https://www.edworkingpapers.com/index.php/ai23-777

Perez, N., & Mercier, B. (2022). 2021 DaSy Data Systems (or State of the States) Survey Findings. *SRI International*.

Prenatal-to-3 Policy Impact Center. (2022). Prenatal-to-3 policy clearinghouse evidence review: Early Intervention services (ER 11C.0922). https://pn3policy.org/policy-clearinghouse/early-intervention-services/

Reardon, S. F., & Portilla, X. A. (2016). Recent Trends in Income, Racial, and Ethnic School Readiness Gaps at Kindergarten Entry. *AERA Open*, *2*(3), 2332858416657343. https://doi.org/10.1177/2332858416657343

Ronfeldt, M., Loeb, S., & Wyckoff, J. (2013). How Teacher Turnover Harms Student Achievement. *American Educational Research Journal*, *50*(1), 4–36. https://doi.org/10.3102/0002831212463813

Rosenberg, S. A., Robinson, C. C., Shaw, E. F., & Ellison, M. C. (2013). Part C Early Intervention for Infants and Toddlers: Percentage Eligible Versus Served. *Pediatrics*, *131*(1), 38–46. https://doi.org/10.1542/peds.2012-1662

Rosenberg, S. A., Zhang, D., & Robinson, C. C. (2008). Prevalence of Developmental Delays and Participation in Early Intervention Services for Young Children. *Pediatrics*, *121*(6), e1503–e1509. https://doi.org/10.1542/peds.2007-1680

Sabol, T. J., & Pianta, R. C. (2012). Recent trends in research on teacher–child relationships. *Attachment & Human Development*, *14*(3), 213–231. https://doi.org/10.1080/14616734.2012.672262

Savage, C. (2023). A workforce crisis is damaging families' access to therapies for babies with developmental delays. Retrieved November 5, 2023, from

https://abcnews.go.com/Health/wireStory/toddlers-developmental-delays-missing-hurt-long-term-103813661

Shonkoff, J. P., & Phillips, D. A. (2000). *From Neurons to Neighborhoods: The Science of Early Childhood Development*. National Academy Press. Retrieved November 8, 2022, from https://eric.ed.gov/?id=ED446866

Smith, L. K., McHenry, K., Morris, S., & Chong, H. (2021). Characteristics of the Child Care Workforce. Retrieved November 7, 2023, from https://bipartisanpolicy.org/blog/characteristics-of-the-child-care-workforce/

Theobald, R., Kaler, L., Bettini, E., & Jones, N. D. (2025). A Descriptive Portrait of the Paraeducator Workforce in Washington State. *Exceptional Children*, *91*(2), 166–186. https://doi.org/10.1177/00144029241300518

Twardzik, E., MacDonald, M., & Dixon-Ibarra, A. (2017). The Relationship Between State Lead Agency and Enrollment Into Early Intervention Services. *Journal of Early Intervention*, *39*(3), 253–263. https://doi.org/10.1177/1053815117708999

U.S. Department of Education. (2017a). IDEA Section 618 State Part B Child Count and Educational Environments. Retrieved February 8, 2023, from https://data.ed.gov/dataset/idea-section-618-state-part-b-child-count-and-educational-environments/resources?resource=2cb35a62-38bd-4d81-bdc2-2d59ef8bb1a5

U.S. Department of Education. (2017b). IDEA Section 618 State Part C Child Count and Settings. Retrieved February 8, 2023, from https://data.ed.gov/dataset/idea-section-618-state-part-c-child-count-and-settings/resources?resource=19bb38c2-e95c-45bc-92cb-46aa81ed3789

WHAM. (2023). Local lawmakers call on Hochul to increase rate of funding for early intervention services. Retrieved November 6, 2023, from https://13wham.com/news/local/local-new-york-state-lawmakers-lunsford-call-on-hochul-to-increase-rate-of-funding-for-early-intervention-services-for-children

Whitebook, M., McLean, C., & Austin, L. J. E. (2018). The Workforce Data Deficit. *Center for the Study of Child Care Employment, University of California, Berkeley.* https://cscce.berkeley.edu/files/2018/04/%20The-Workforce-Data-Deficit.pdf

Zhang, Q., & Jenkins, J. M. (2022). Did State Pre-Kindergarten Programs Affect the Head Start Enrollment of Children with Disabilities? A Quasi-Experimental Analysis. *Exceptional Children*, 001440292211102. https://doi.org/10.1177/00144029221110241

Table 1

Descriptive Statistics for EI/ECSE Employees in Oregon, 2008-2023

	Tch/Int	RSP/OLS	Para/NLS
Gender (%)			
Female	95.2	93.4	94.5
Male	4.8	6.5	5.5
Non-binary	0.1	0.1	0.1
Age			
Median	45	47	47
Standard Deviation	11.2	11.3	12.4
Native Language (%)			
English	97.3	98.1	94.8
Other language	2.7	1.9	5.2
Race/Ethnicity (%)			
Asian/Pacific Islander	1.8	2.6	1.4
Black	0.2	0.3	0.4
Hispanic	5.0	4.4	13.5
American Indian/Alaskan Native	0.9	0.3	0.8
Multi-racial	1.3	1.5	1.3
White	90.7	91.0	82.6
Level of Education (%)			
Missing	1.2	33.4	88.8
Less than a Bachelors	0.5	1.0	7.0
Bachelors	16.9	10.0	3.6
Masters	80.7	53.8	0.6
Doctorate	0.7	1.9	0.0
Primary Program (%)			
EI	26.0	27.0	8.7
ECSE	74.0	73.0	91.3
Has >1 position (%)	26.8	31.9	12.7
Full-time (%)	83.6	74.7	30.0
All FTE in EI/ECSE sector (%)	94.2	93.1	96.7
Number of observations	5,171	6,448	7,599
Average number per year	398	496	585

Note: Table displays descriptive statistics for three groups of EI/ECSE employees averaging across 2008 and 2023. Some variables were only available in certain years. Thus race/ethnicity is only for employees after 2011, native language is only for employees after 2014, and gender non-binary is only for employees after 2019. Otherwise, variables are averaged across all years. Tch/Int = Teachers and Interventionists, RSP/OLS = Related Service Providers and Other Licensed Staff, Para/NLS = Paraprofessionals and Non-Licensed Staff.

Table 2

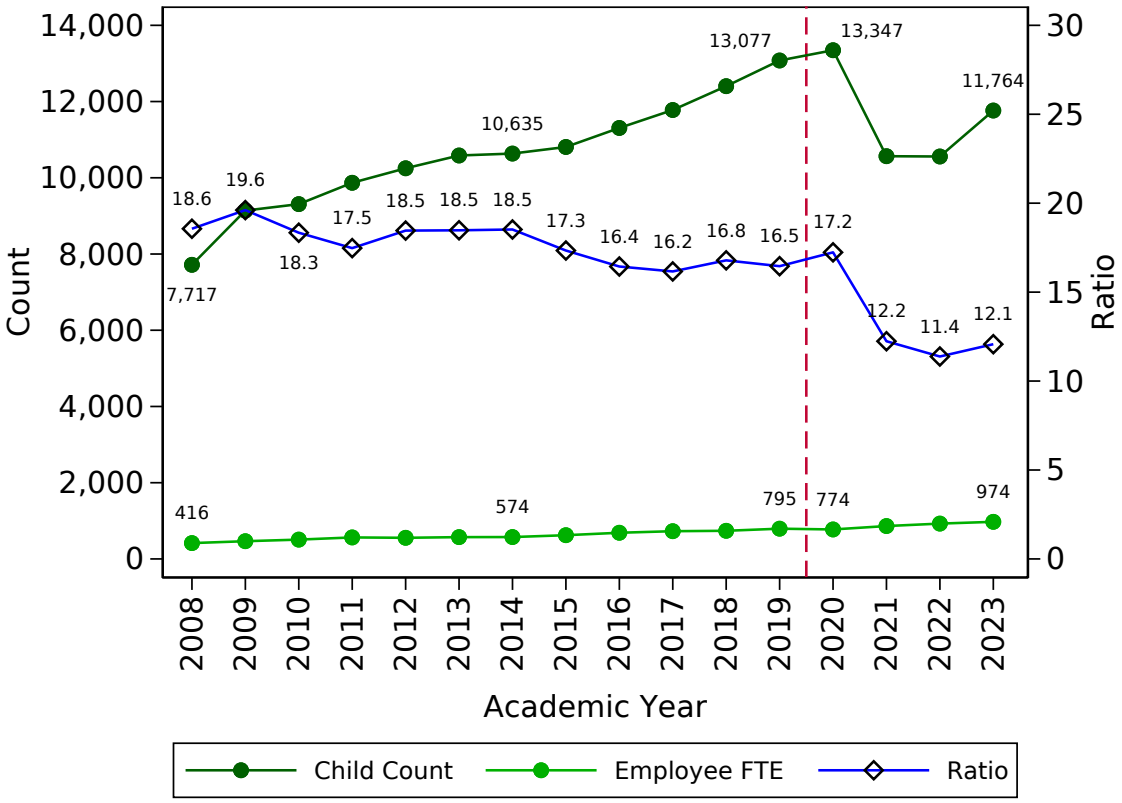
Average One-year Turnover Rate by EI/ECSE Employee Group and Turnover Type Pre- and Post-Pandemic

	Tch/Int		RSP/OLS		Para/NLS	
	Pre	Post	Pre	Post	Pre	Post
% Stayed	83.6	85.7	81.7	83.4	77.6	69.6
% Overall turnover	16.4	14.3	18.3	16.6	22.4	30.4
Exited public education	8.4	7.7	10.4	11.5	15.5	21.1
Switched positions in EI/ECSE	1.7	3.0	1.1	0.7	1.5	2.3
Switched employers in EI/ECSE	0.6	0.9	0.5	0.3	0.0	0.0
Switched to K-12 SpEd	3.8	1.4	5.6	2.4	3.0	3.7
Switched to K-12 GenEd	1.9	1.3	0.7	1.7	2.3	3.2

Note. One-year turnover rates for the pre-pandemic period period are calculated by averaging across the 2008 to 2019 school years and from 2020 to 2022 for the post-period rates. Tch/Int = Teachers and Interventionists, RSP/OLS = Related Service Providers and Other Licensed Staff, Para/NLS = Paraprofessionals and Non-Licensed Staff.

Figure 1

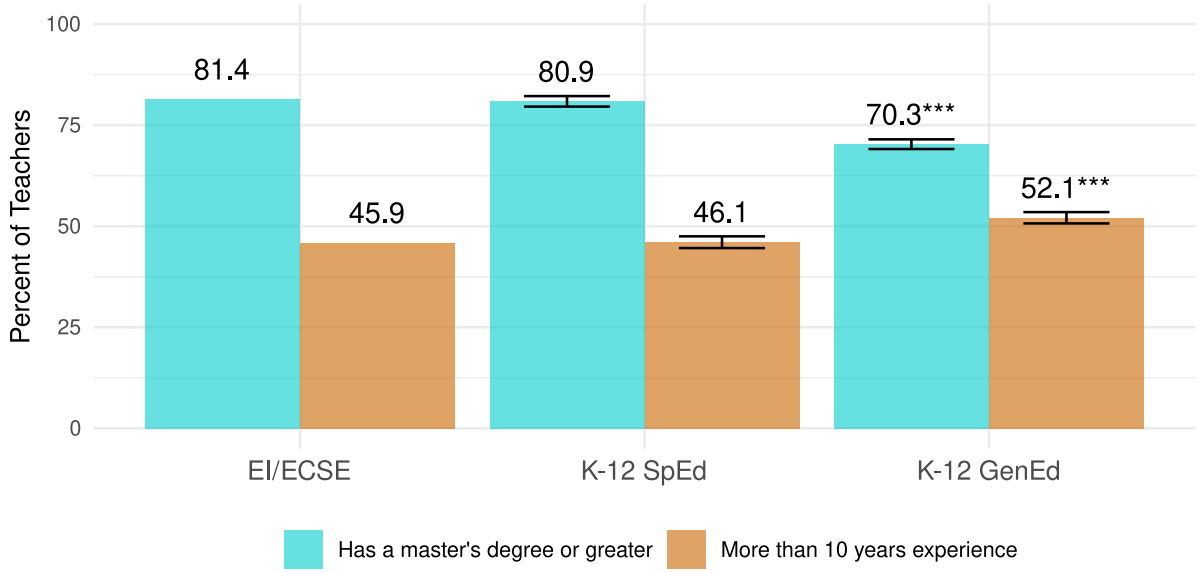
Trends in the number of children, number of licensed employees, and the child-to-employee ratio for Oregon EI/ECSE



Note: Figure displays changes in the number of children of all ages and licensed employees of all types in EI/ECSE in Oregon. Licensed employees include two groups of employees: teachers/interventionists and related service providers/other licensed staff. The number of licensed employees is adjusted by their FTE (full-time equivalency). The child-to-employee ratio is calculated by dividing the number of children served by the number of total licensed employees (FTE-adjusted) in a given year.

Figure 2

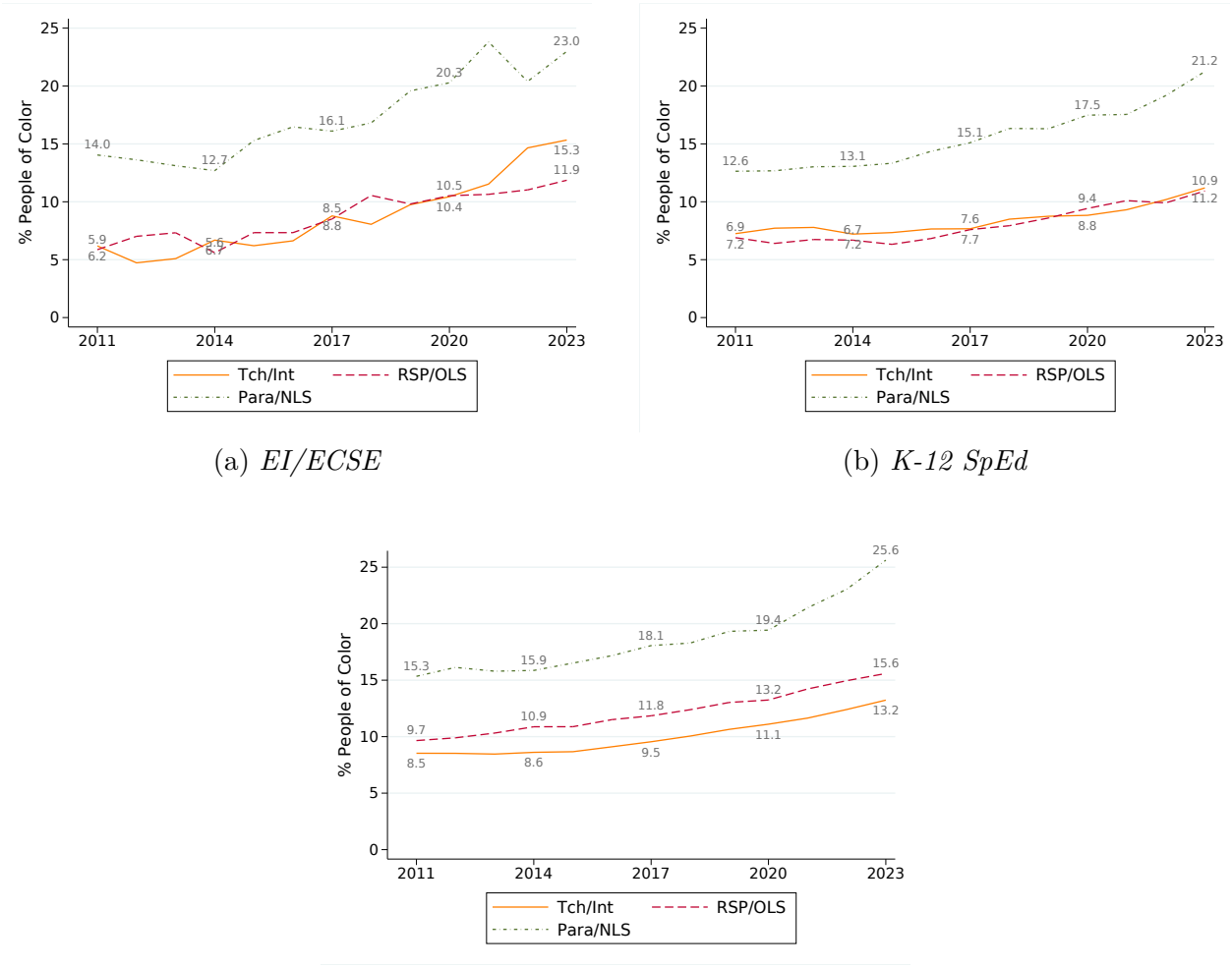
Teacher/Interventionist qualifications by sector



Note: Figure averages across observations from 2008 to 2023. EI/ECSE refers to Early Intervention/Early Childhood Special Education, SpEd is Special Education and GenEd is general education. Confidence intervals come from regression models predicting education and experience by sector with EI/ECSE as the omitted category. Stars next to the mean rates indicate that the rate is significantly different from the EI/ECSE rate for teachers in that sector. $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$

Figure 3

Proportion of staff of color by sector



(a) *EI/ECSE*

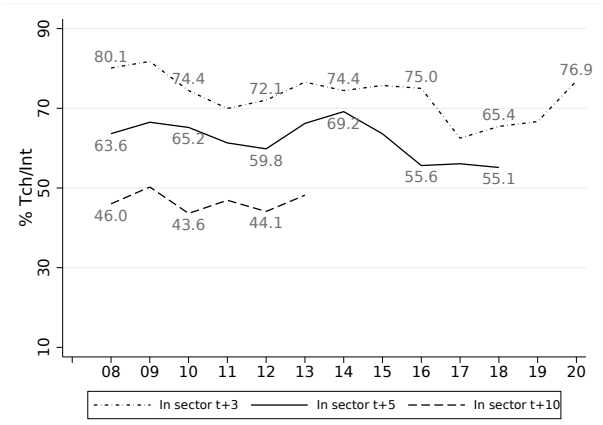
(b) *K-12 SpEd*

(c) *K-12 GenEd*

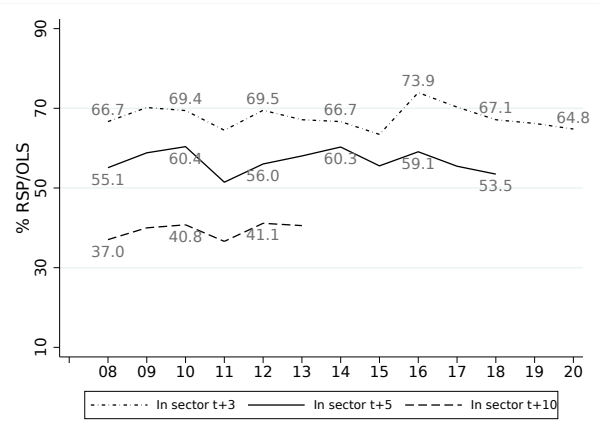
Note: Figure plots percent of staff in each sector that identify as a person of color from 2011-2023. EI/ECSE refers to early intervention/early childhood special education, SpEd is special education and GenEd is general education. People of color is defined here as individuals who identify as Black, Hispanic, Asian/Pacific Islander, American Indian/Alaska Native, or Multi-racial. Tch/Int = Teachers and Interventionists, RSP/OLS = Related Service Providers and Other Licensed Staff, Para/NLS = Paraprofessionals and Non-Licensed Staff.

Figure 4

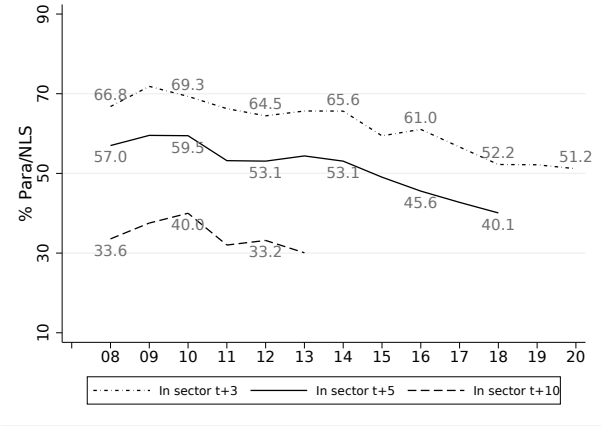
Three-, five-, and ten-year retention rates in the Oregon EI/ECSE sector by group



(a) *Tch/Int*



(b) *RSP/OLS*

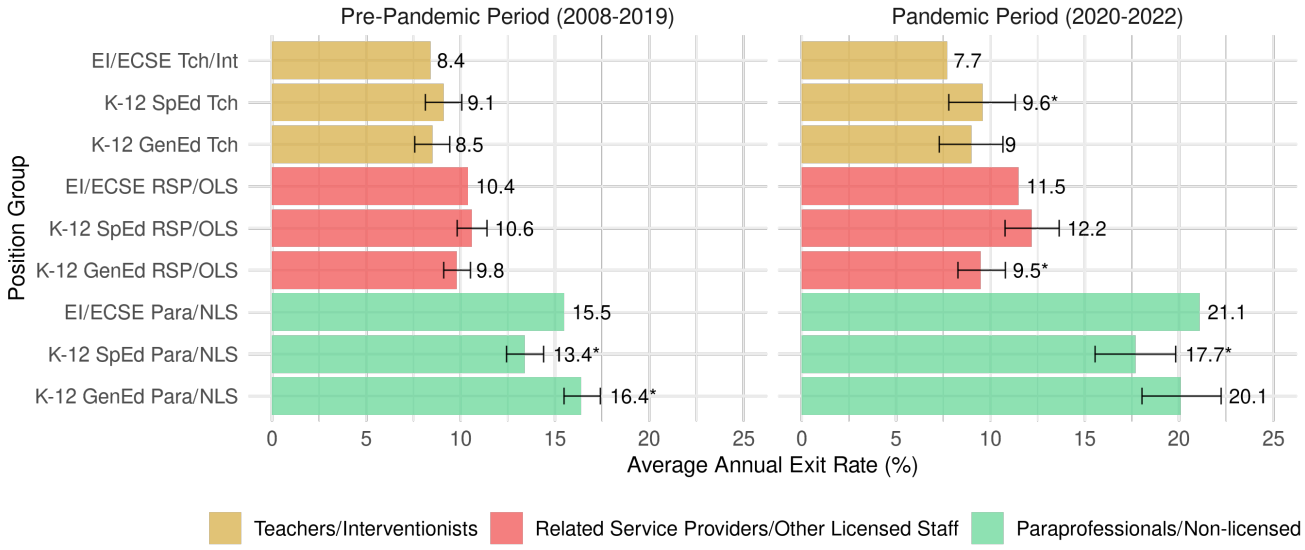


(c) *Para/NLS*

Note: Figure displays the proportion of EI/ECSE employees that are still observed working in Oregon's EI/ECSE system three, five, and ten years later. The x-axis refers to the school year. Tch/Int = Teachers and Interventionists, RSP/OLS = Related Service Providers and Other Licensed Staff, Para/NLS = Paraprofessionals and Non-Licensed Staff.

Figure 5

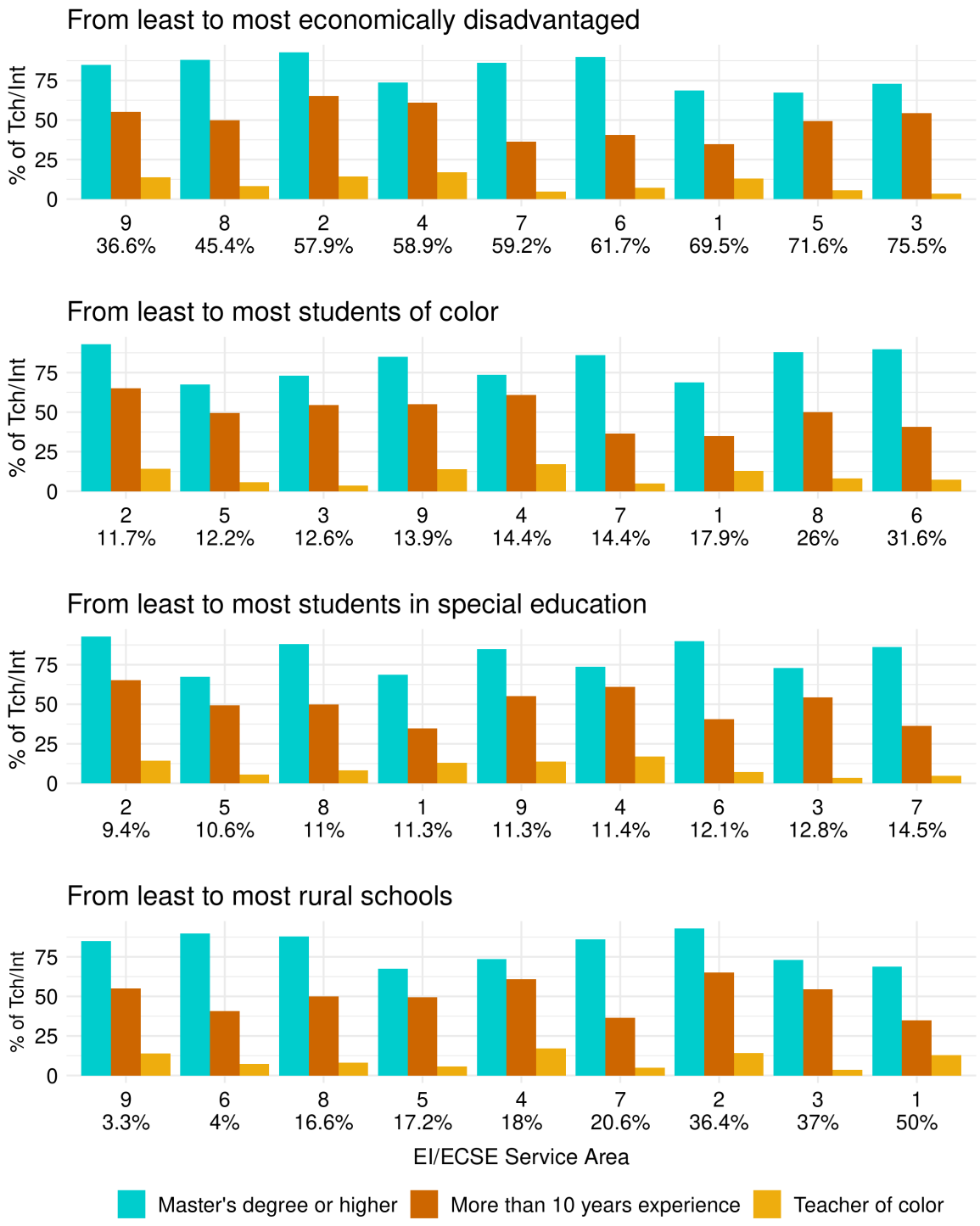
Comparison of EI/ECSE employee exit rates to K-12 special education and general education employees



Note: Figure displays mean one-year exit rates by employee group and sector during the pre-pandemic and pandemic periods. Exit is defined as leaving employment in the Oregon public education system. Confidence intervals come from regression models predicting exit by sector with EI/ECSE as the omitted category. Stars next to the mean rates indicate that the rate is significantly different from the EI/ECSE rate for that employee group ($p<.05$). See Appendix Table A3 for the regression models. Tch/Int = Teachers and Interventionists, RSP/OLS = Related Service Providers and Other Licensed Staff, Para/NLS = Paraprofessionals and Non-Licensed Staff, SpEd = Special Education, GenEd = General Education.

Figure 6

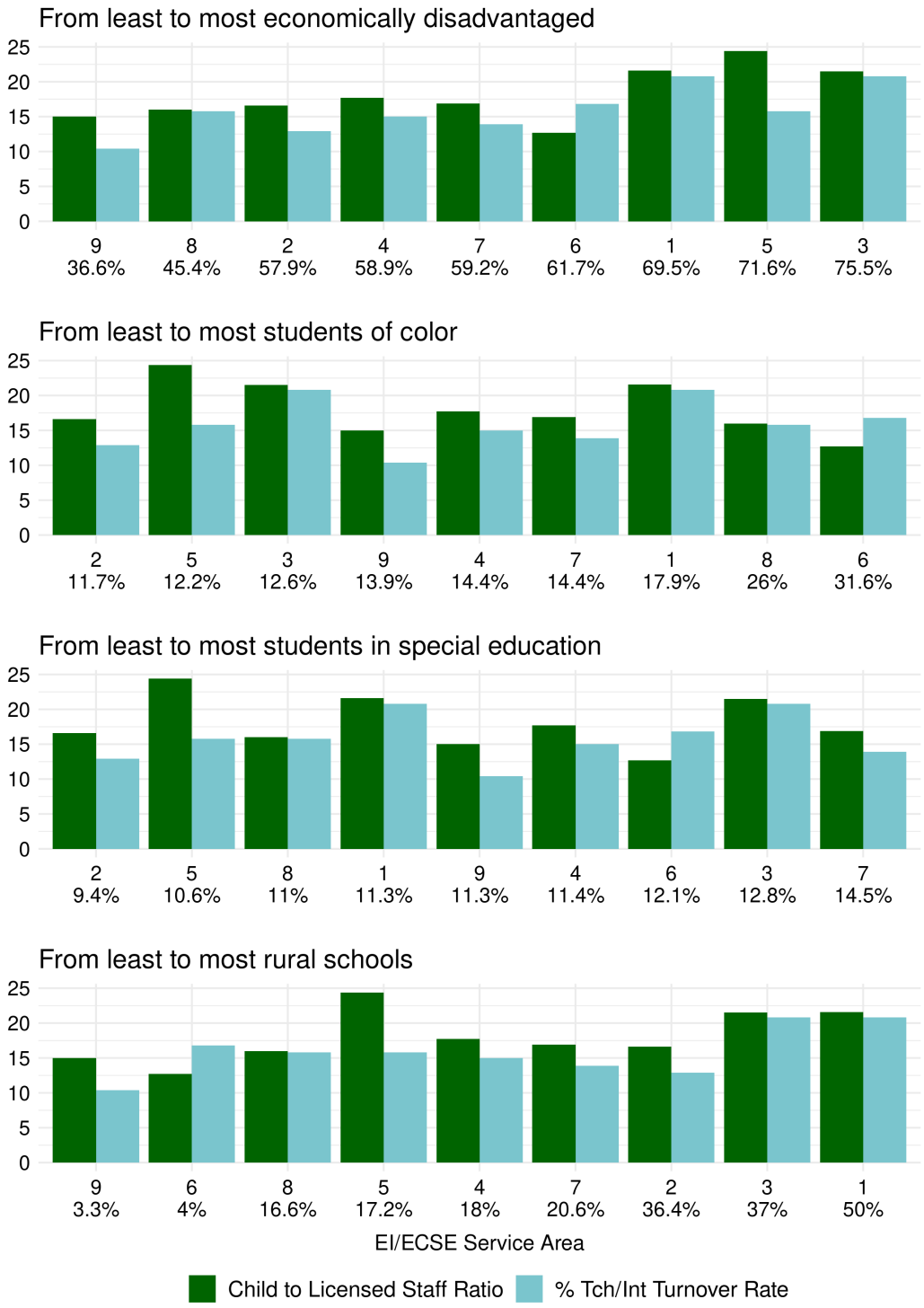
Teacher/Interventionist attributes by EI/ECSE service area



Note: Figure plots teacher/interventionist characteristics for each of the 9 EI/ECSE service areas arrayed from least to greatest on attributes of the kindergarten population in that service area. Values of the child demographic characteristic are printed below the service area number on the x-axis. Values are averaged between 2011 to 2022.

Figure 7

Teacher/Interventionist turnover and child-to-licensed-staff ratios by EI/ECSE service area



Note: Figure plots teacher/interventionist characteristics for each of the 9 EI/ECSE service areas arrayed from least to greatest on attributes of the kindergarten population in that service area. Values of the child demographic characteristic are printed below the service area number on the x-axis. Values are averaged between 2011 to 2022.

Appendix
Online Supplemental Materials

Table A1

Position by employee group and sector

Sector	Category	Position in administrative data
EI/ECSE	Teachers and Interventionists (Tch/Int)	SpEd Teacher (Non-PE); SpEd Teacher (PE); SpEd Other Services, Licensed + position comment containing "EI/ECSE Specialist" or other key words
EI/ECSE	Related Service Providers/ Other Licensed Staff (RSP/OLS)	SpEd Audiologist; SpEd Speech Pathologist; SpEd Interpreter; SpEd Psychologist; SpEd Occupational Therapist; SpEd Physical Therapist; SpEd Recreational/Therapeutic Specialists; SpEd School Social Workers; SpEd Medical and Nursing Staff; SpEd Counselors and Rehab Counselors; SpEd Orientation and Mobility Specialists; SpEd Other Services, Licensed + no comment matching Tch/Int criteria; SpEd Administrator, Director; SpEd Administration, Other Admin Position
EI/ECSE	Paraprofessionals/ Non-Licensed Staff (Para/NLS)	SpEd Paraprofessional; SpEd Administration, Support Staff; SpEd Other Services, Non-Licensed
K-12 SpEd	Teachers and Interventionists (Tch/Int)	SpEd Teacher (Non-PE); SpEd Teacher (PE)

Table A1 continued from previous page

Sector	Category	Position in administrative data
K-12 SpEd	Related Service Providers/ Other Licensed Staff (RSP/OLS)	SpEd Audiologist;
		SpEd Speech Pathologist;
		SpEd Interpreter;
		SpEd Psychologist;
		SpEd Occupational Therapist;
		SpEd Physical Therapist;
		SpEd Recreational/Therapeutic Specialists;
		SpEd School Social Workers;
		SpEd Medical and Nursing Staff;
		SpEd Counselors and Rehab Counselors;
		SpEd Orientation and Mobility Specialists;
		SpEd Other Services, Licensed;
		SpEd Administrator, Director;
		SpEd Administration, Other Admin Position
K-12 SpEd	Paraprofessionals/ Non-Licensed Staff (Para/NLS)	SpEd Paraprofessional;
		SpEd Administration, Support Staff;
		SpEd Other Services, Non-Licensed
K-12 GenEd	Teachers and Interventionists (Tch/Int)	Head Teacher, Non-SpEd;
		Teacher, Non-SpEd
K-12 GenEd	Related Service Providers/ Other Licensed Staff (RSP/OLS)	Superintendent;
		Assistant Superintendent;
		Principal;
		Assistant Principal;
		Instructional Coordinator/Supervisor, Non-SpEd;
		Psychologist, Non-SpEd;
		Library/Media Specialist;
		Guidance Counselor, Non-SpEd;
		Other Licensed Staff, Non-SpEd;
		Nurse, Non-SpEd

Table A1 continued from previous page

Sector	Category	Position in administrative data
K-12 GenEd	Paraprofessionals/ Non-Licensed Staff (Para/NLS)	Paraprofessional (Educational Assistant), Non-SpEd;
		District Support (Non-Licensed, Non-SpEd);
		School Support (Non-Licensed, Non-SpEd);
		Student Support (Non-SpEd);
		Library/Media Support;
		Other Non-Licensed staff, Non-SpEd

Note: Table displays positions in the administrative data for each of the 3 employee groups (Tch/Int, RSP/OLS, and Para/NLS for each of the three sectors (EI/ECSE, K-12 SpEd, K-12 GenEd).

Table A2

Descriptive Statistics for K-12 Employees in Oregon, 2008-2023

	K-12 SpEd			K-12 GenEd		
	Tch	OLS	NLS	Tch	OLS	NLS
Gender (%)						
Female	76.9	86.2	86.9	69.5	66.0	70.1
Male	23.0	13.8	13.0	30.5	34.0	29.9
Non-binary	0.1	0.1	0.2	0.1	0.1	0.1
Age						
Median	44	47	48	43	46	50
Standard Deviation	10.9	11.0	12.2	10.7	9.8	12.3
Native Language (%)						
English	92.7	95.9	89.8	91.7	91.0	92.7
Other language	7.3	4.1	10.2	8.3	9.0	7.3
Race/Ethnicity (%)						
Asian/Pacific Islander	1.7	2.0	2.4	2.0	2.0	2.5
Black	1.0	0.6	1.7	0.6	1.8	2.3
Hispanic	3.2	3.3	8.6	5.1	6.3	11.2
American Indian/Alaskan Native	0.8	0.6	1.0	0.5	0.6	1.0
Multi-racial	1.8	1.7	2.1	1.8	1.8	1.8
White	91.5	91.9	84.3	89.9	87.5	81.2
Level of Education (%)						
Missing	0	16.0	94.3	0	5.7	94.7
Less than a Bachelor's	0.2	2.7	3.3	0.4	0.6	2.9
Bachelor's	18.9	9.7	1.9	29.3	9.9	1.6
Master's	80.5	68.1	0.5	69.8	80.4	0.7
Doctorate	0.4	3.6	0	0.5	3.5	0.1
Has >1 position (%)	9.9	17.7	8.3	12.0	13.5	6.5
Full-time (%)	93.6	74.7	14.6	91.2	89.7	49.6
Number of observations	52,595	31,307	130,119	433,149	87,138	450,818
Average number per year	4,046	2,408	10,009	33,319	6,703	34,678

Note: Table displays descriptive statistics for three groups of K-12 employees averaging across 2008 and 2023. Some variables were only available in certain years. Thus race/ethnicity is only for employees after 2011, native language is only for employees after 2014, and gender non-binary is only for employees after 2019. Otherwise, variables are averaged across all years. Tch = Teachers and Interventionists, OLS = Related Service Providers and Other Licensed Staff, NLS = Paraprofessionals and Non-Licensed Staff.

Table A3

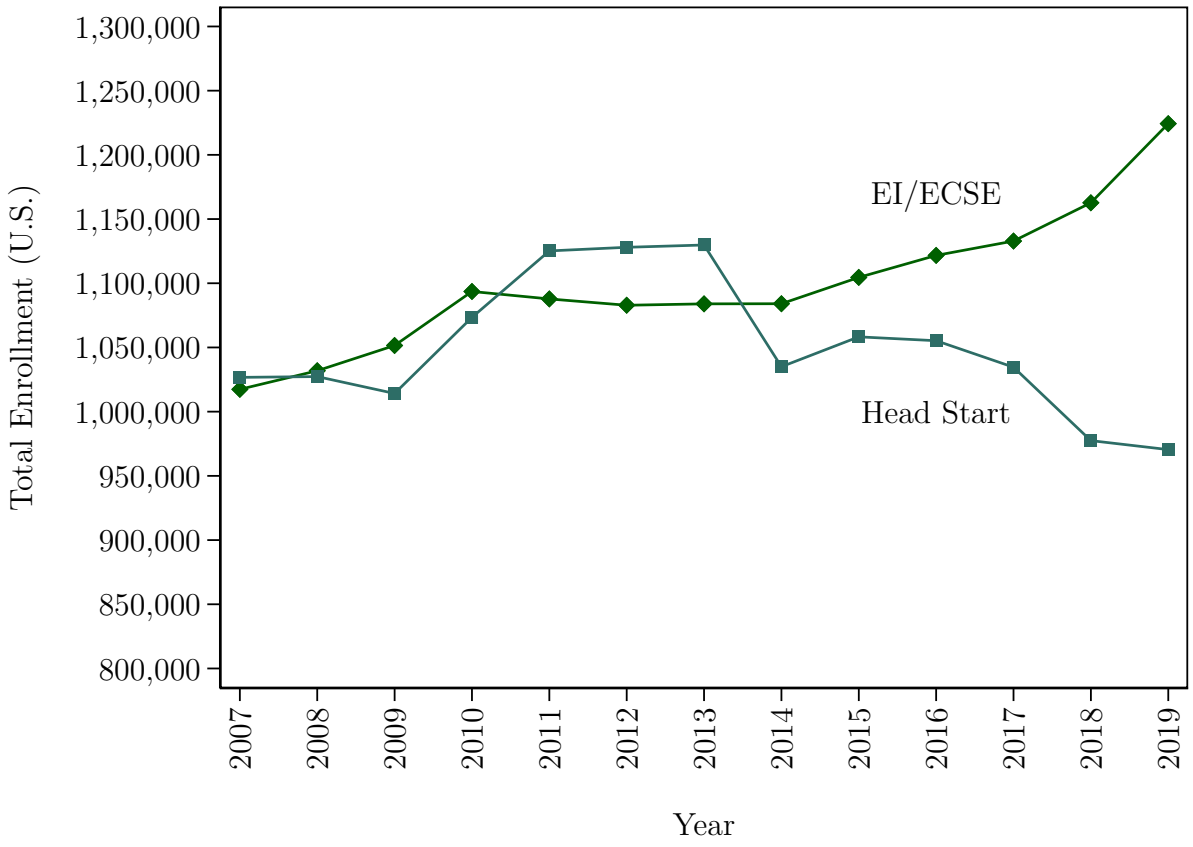
Regression comparison of exit rates by sector before and after the onset of the pandemic

	Tch/Int	RSP/OLS	Para/NLS
EI/ECSE	0.084***	0.104***	0.155***
	(0.005)	(0.003)	(0.005)
K-12 SpEd	0.007	0.002	-0.021***
	(0.005)	(0.004)	(0.005)
K-12 GenEd	0.001	-0.006	0.010+
	(0.005)	(0.004)	(0.005)
Post Pandemic	-0.007	0.011	0.056***
	(0.010)	(0.007)	(0.011)
K-12 SpEd X Post	0.012	0.005	-0.014
	(0.010)	(0.008)	(0.011)
K-12 GenEd X Post	0.012	-0.014+	-0.019+
	(0.010)	(0.007)	(0.011)
N	457,949	114,628	544,721

Note: Table displays coefficients from linear probability regression models run at the individual-level predicting one-year exit rates by employee group and sector during the pre- and post-pandemic onset periods. Exit is defined as leaving employment in the Oregon public education system. These models were used to construct the estimates produced in Figure 5 by combining the relevant coefficients. Tch/Int = Teachers and Interventionists, RSP/OLS = Related Service Providers and Other Licensed Staff, Para/NLS = Paraprofessionals and Non-Licensed Staff, SpEd = Special Education, GenEd = General Education. ***p<.001 **p<0.1 *p<.05 +p<.1

Figure A1

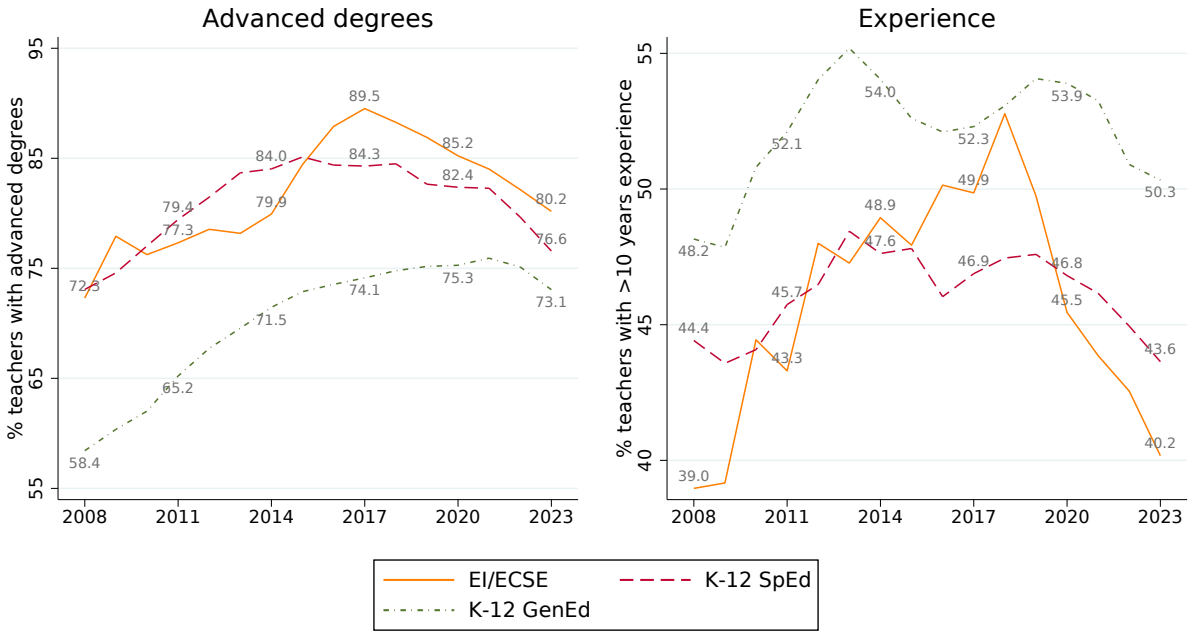
Enrollment in Early Intervention/Early Childhood Special Education and Head Start in the U.S., 2007-2019



Note. Data on early intervention/early childhood special education (EI/ECSE) enrollment include all children enrolled in both infant and toddler (Part C) and preschool (Part B 619) programs. Head Start enrollment includes children enrolled in Early Head Start and Head Start. Data come from the U.S. Department of Education child count data for EI/ECSE and and Annie E. Casey Foundation KIDS Counts data center for Head Start enrollment (Annie E. Casey Foundation, 2022; U.S. Department of Education, 2017a, 2017b)

Figure A2

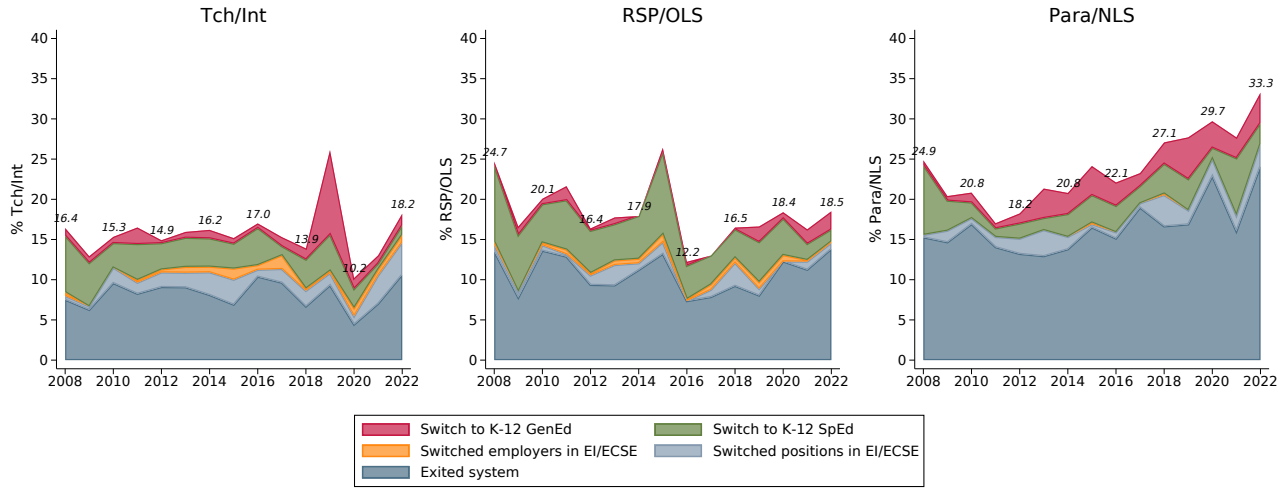
Teacher/Interventionist qualifications by sector over time



Note: Figure plots percent of teachers/interventionists in each sector that have a master's degree or above and that have more than 10 years of experience from 2008-2023. EI/ECSE refers to early intervention/early childhood special education, SpEd is special education and GenEd is general education.

Figure A3

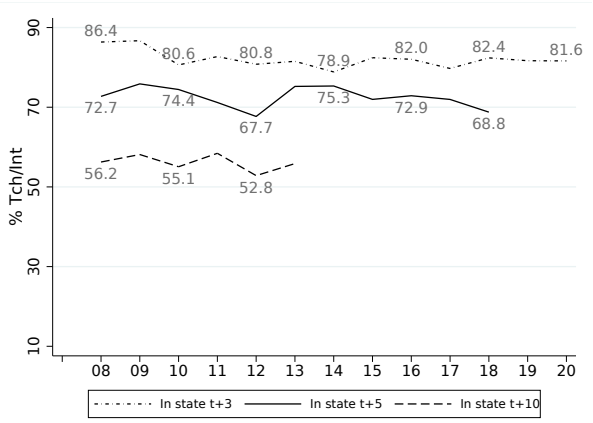
One-year turnover rates by group by type of turnover



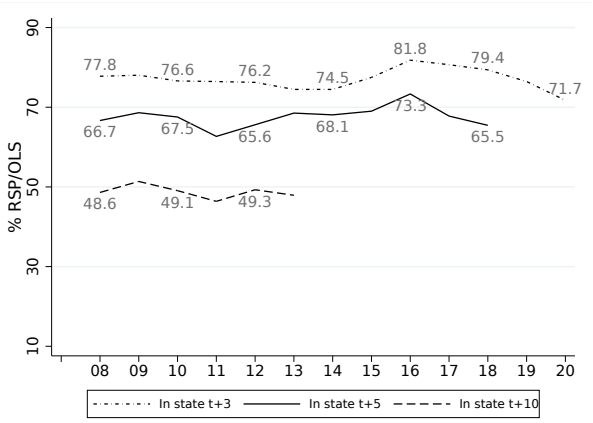
Note: Figure displays the proportion of EI/ECSE employees that turned over from one year to the next by the type of turnover. Tch/Int = Teachers and Interventionists, RSP/OLS = Related Service Providers and Other Licensed Staff, Para/NLS = Paraprofessionals and Non-Licensed Staff.

Figure A4

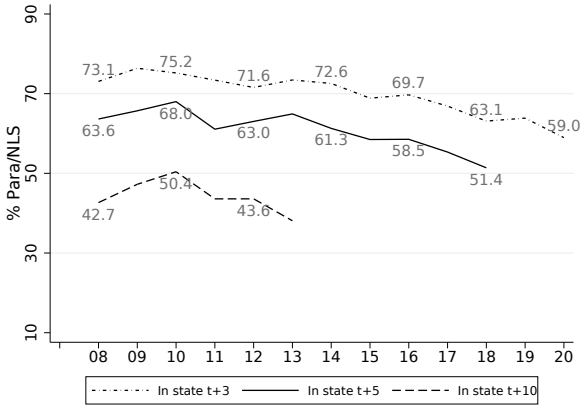
Three-, five-, and ten-year retention rates in the Oregon public education system by group



(a) *Tch/Int*



(b) *RSP/OLS*



(c) *Para/NLS*

Note: Figure displays the proportion of EI/ECSE employees that are still observed working in public education in Oregon at any level or capacity three, five, and ten years later. Tch/Int = Teachers and Interventionists, RSP/OLS = Related Service Providers and Other Licensed Staff, Para/NLS = Paraprofessionals and Non-Licensed Staff.