AN ABSTRACT OF THE THESIS OF

Erica E. Twardzik for the degree of Master of Science in Kinesiology presented on April 26, 2016.

Title: Transition from Early Childhood Special Education Programs to School Based Programs for Children Diagnosed with Developmental Delay in the State of Oregon: A Secondary Data Analysis.

Abstract approved:

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Megan I. MacDonald

Background: Current policy in Oregon under the Individuals with Disabilities Education Act (IDEA) indicates that children diagnosed with developmental delay (DD) are eligible for services before school, but not eligible for the receipt of services in school-based programs. Due to this definition of eligibility, children with DD face additional barriers transitioning from early intervention/early childhood special education into school-based education services. Purpose: The present study investigated the relationship between enrollment in school-based special education programs given a change in primary disability diagnosis before or after the age of five in children originally diagnosed with DD. Methods: Children met eligibility criteria for the present study if they were enrolled in early intervention/early childhood special education services in the State of Oregon with a primary disability diagnosis of DD and had a change in primary disability diagnosis before third grade (n= 5,076). Results: Odds of enrollment in special education during school were greater in children with a change in primary disability diagnosis after the age of five in comparison to children that had a change in primary disability diagnosis before the age of five, while adjusting for demographic characteristics (diagnosis after age five adjusted odds ratio: 2.37, 95% CI 1.92, 2.92). Conclusion: The results of this study suggest that children who exit IDEA because they have met the maximum age of

eligibility are likely to reenter the special education system after a gap in the receipt of service access. A gap in service access during this period of development can have great implications on later life success.

Transition from Early Childhood Special Education Programs to School Based Programs for Children Diagnosed with Developmental Delay in the State of Oregon: A Secondary Data Analysis

by
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I understand that my thesis will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my thesis to any reader upon request.

Erica E. Twardzik, Author

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Chapter 1: Introduction

The Individuals with Disabilities Education Act (IDEA) is a piece of legislation that supports children with disabilities to access the supports needed in order to have similar education opportunities as their peers who are typically developing. The IDEA has rules and regulations that are administered at the federal, state and/or local level. At the federal level it is indicated in SEC.602.3 that a child with a disability includes children aged three through nine with a developmental delay (DD), but that “any subset of that age range, including ages 3 through 5” can be indicated as eligible by the state agency (*Individuals with Disabilities Education Improvement Act of 2004* [IDEA], 2004). Therefore, it is up to the state legislature to determine the DD age range and ultimately how funding will be allocated for children with this diagnosis to access services. In a 2011 report, Danaher found that there are a large number of states, 48 out of 51 states, using a subset of the federal age range for DD, to indicate eligible children. Within the state of Oregon, and in 19 other states across the country, children are only eligible for the receipt of services from three through five years of age. It is a national requirement by the IDEA that every state have a multidisciplinary team to support a “smooth and effective” transition from Early Intervention/Early Childhood Special Education (EI/ECSE) into school based special education programs (IDEA, 2004). However, for children initially diagnosed with DD there are unique challenges to successfully transition from EI/ECSE into school based special education programs.

In some cases, children initially diagnosed with DD in the state of Oregon are evaluated early and receive a new diagnosis in time to transition from EI/ECSE into school-based special education. This change in diagnosis is important in states like Oregon, as it results in continued enrollment in IDEA programs and continuity in access to services. The newly diagnosed disability allows the children to be eligible for services beyond the age specified for DD. However, not all children with an initial DD diagnosis receive a new diagnosis. Thus, beyond the specific age range indicated by Oregon Department of Education (ODE), they are ineligible for services and exit from EI/ECSE because they have met the “maximum age of eligibility” (Oregon

Department of Education, 2015). For example, a child with a DD diagnosis exits special education services at five years of age and re-enters at seven years of age with an autism spectrum disorder diagnosis having missed two years of special education services. It is not yet known if children who exit EI/ECSE with a DD diagnosis because maximum age for eligibility was met reenter into school based special education programs with a new diagnosis after a gap in the receipt of services.

1.1 Purpose statement

Little is known about the transition process out of EI/ECSE services and into school-based services for children diagnosed with DD. The overall objective of this research is to describe enrollment in school based services for children who received EI/ECSE services under a primary diagnosis of DD from three to five years of age in the state of Oregon. To accomplish this objective a secondary data analysis of ODE state collection files will be completed. All data included in this analysis was collected from 2009 to 2015. Data prior to 2009 were collected using different reporting requirements and is not comparable with current collection documents.

1.2 Specific aim

This project aimed to determine if the timing of a change in primary disability diagnosis was associated with enrollment in special education at grade three among children who received EI/ECSE services under a primary disability diagnosis of DD from three to five years of age in the state Oregon. To accomplish this aim, a secondary data analysis of ODE state collection files was completed. It was hypothesized that children with a change in primary disability diagnosis after the age of five would be more likely to be enrolled in special education services at grade three compared to children who had a change in primary disability diagnosis before the age of five.

1.3 Assumptions, limitations & delimitations

Underlying assumptions of this study relate to data collection. It is assumed that school districts and regions are motivated to accurately report the children that are being served within their EI/ECSE and school based special education programs. Accurate reporting is expected because without reporting children to the state school districts would not receive federal funding. Accuracy in reporting extends to children receiving the same secure identification number when they are in the program, their identifiable information is recorded correctly (e.g. birth date, last name), and that the disability diagnosis that identifies the child as eligible for the receipt of services is accurate over time.

A delimitation of this study is that it is only generalizable to the state of Oregon and potentially other states with similar policies about DD eligibility. All participants within the current study are from the state of Oregon and have been influenced by state legislative decisions regarding the IDEA. Other states throughout the country have similar policy regarding children diagnosed with DD's eligibility into IDEA and may have similar outcomes. This population was chosen based on location of researchers and connections with the state education department in Oregon. We expect that this delimitation will allow us to identify outcomes specific to this legislative decision.

1.4 Significance statement

Special education services most commonly accessed by young children include speech language therapy, occupational therapy, and physical therapy (Rosenberg, Robinson, Shaw, & Ellison, 2013). These services are essential for their healthy growth and development. Specifically, within the communication domain a break in intervention access has large implications on learning progress. For example, a child that is having difficulty communicating would be negatively impacted by even a month's gap in the receipt of services. Multiple researchers within speech-language pathology have found that skill acquisition is related to the length of time between practice (i.e. intervention services) and later performance (Adi-Japha & Abu-Asba, 2014; Adi-Japha, Fox, & Karni, 2011; Hedenius et al., 2011). A gap in service access impacts children because they may loose their progress made. It is still unknown what proportion of children accessing EI/ECSE services under a diagnosis of DD do not transition into school based special education programs. Additionally, it is important to discuss the association between a child's reentry into school based special education programs after exiting EI/ECSE due to maximum age of eligibility. By identifying the association of reentering school based special education programs with a change in diagnosis before or after the age of five, researchers will be able to inform legislators on future policy and practice regarding individuals with DD and the outcomes of transition into school based special education programs.

The relationship between reenrolling in special education services indicates a gap in the receipt of services for children during a time of rapid growth and development. These findings contribute to the existing literature concerning children who are at risk or have a developmental delay and may suggest a change in eligibility age range at the state level. Specifically, it is important that children are exiting services once they are ready to join their peers and not due to restricted access based on age. Study outcomes may inform state legislature that have current practices limiting the age for eligibility of children with DD to three through five. Evidence in support of an association between later diagnosis change and enrollment in third grade special education would suggest that it would be beneficial to continue services for children with DD instead of reenrolling them in services later on in life. Findings from the present study will initiate discussion about how eligibility decisions are made at the state and federal level, and the influence these decisions can have on a child's future academic success and later in life outcomes.

Chapter 2: Literature Review

Early elementary students, from ages of five through eight years of age, are in a sensitive time of growth and development. Within this age range children continue to develop and elaborate in every domain (physical, cognitive, communication, emotional, and adaptive development) and begin demonstrating skills in adult-initiated tasks that are commonly found in academic settings (McConnell et al., 1998). Although children with developmental delays experience delays within a domain or multiple domains, these children continue development, but it is during these early years that the achievement gap widens if the appropriate supports are not in place (McConnell et al., 1998). This literature review includes the historical improvements on the definition of developmental delay, the importance of services during the first years in school based education programs, and why grade three holds much prominence in special education programming.

2.1 Developmental delay definition

The Education for All Handicapped Children Act (P.L. 94-142) was the first piece of legislation that supported children with disabilities to have similar education opportunities as their typically developing peers. Identifying children that were eligible to receive services had been a challenge since the enactment of this act in 1975. The law required that states provide services to children identified by the disability categories outlined in this piece of legislation. Implementation of this act continued into the 1980s. Around this time, professionals raised concerns that the outlined disability categories, such as mental retardation or autism, may not be appropriate for very young children. Researchers have expressed concerns that incorrectly labeling a child early on in life may create a self-fulfilling prophecy and unfairly stigmatize children who, with early intervention, may not need to continue into special education services (Hadadian & Koch, 2013). Researchers were concerned that many developmental domains (e.g. motor and cognition) are so interrelated that the appropriate disability might not be diagnosable at such a young age (Danaher, 2011).

These concerns motivated Congress to incorporate a revision to the law that addressed eligibility for preschool children. In 1991 the law was renamed the

Individuals with Disabilities Education Act (IDEA) and under P.L. 102-119 states an option to incorporate an additional disability category for children, ages three to five, who were experiencing developmental delays (DD). Subsequent reauthorization of this act, the Individuals with Disabilities Education Improvement Act (2004), clarified that the age range for developmental delay would include ages three to nine, or any subset of that range. The federal legislation reads in SEC.602.B that a child with a disability includes:

> (B) Child aged 3 through 9 – The term "child with a disability" for a child aged 3 through 9 (or any subset of that age range, including ages 3 through 5), may, at the discretion of the State and the local education agency, include a child –
>
> (i) experiencing developmental delays, as defined by the State and as measured by appropriate diagnostic instruments and procedures, in one or more of the following areas: physical development, cognitive development, communication development, emotional development, or adaptive development; and
>
> (ii) who, by reason thereof, needs special education and related services (*Individuals with Disabilities Education Improvement Act of 2004*, 2004).

Children with a disability, as defined above, are eligible for age-specific services through Part C and Part B. Part C programs are under the IDEA and serve children birth through five years of age and Part B programs serve children three through 21 years of age. It is a national requirement that every state have a multidisciplinary team to support a "smooth and effective" transition from Part C programs to Part B programs (*Individuals with Disabilities Education Improvement Act of 2004*, 2004). However, there are important distinctions between these two programs that can make transitioning difficult. Part C programs are specifically designed to service infants and toddlers with disabilities (Department of Education, 2005). These services are more commonly accessed within the home or community setting, and service coordinators are responsible for the development of an individualized family service plan. Part C recognizes DD as a disability category making a child eligible for services (Department of Education, 2005). Part B programs are specifically designed to service school aged children aged three to 21 with disabilities (Department of Education, 2006). These services are more commonly accessed within a school based setting, and service coordinators are responsible for the development of an individualized education plan (Department of Education, 2006). In contrast to Part C, Part B does not recognize DD as a disability category that would make a child eligible for services (Department of Education, 2006).

In addition to deciding the age range of children to be eligible, states are also responsible for defining DD in their state. The DD definition must include five developmental areas. The five developmental areas contain cognitive, physical, communication, social/emotional and adaptive development (IDEA, 2004). Within the state of Oregon, the definition of DD includes three components:

1) The child has a DD of 1.5 standard deviations or more below the mean in two or more developmental areas or 2.0 standard deviations or more below the mean in one or more developmental areas (Oregon Department of Education, 2015).
2) The child's disability must have an adverse impact on the child's developmental progress.
3) The child must need an early childhood special education service.

However, the continuity of eligibility from Part C early intervention to preschool special education is unreliable as Danaher’s (2011) report show that there are very few explicit policies addressing the gaps in services from Part C to Part B. Additionally, because of variable eligibility requirements and definitions between states there are unique challenges for children depending on their residence. For children diagnosed with a DD in the state of Oregon transitioning from Part C to Part B services (transition into school-based services beyond the age of five years) may be more challenging than children diagnosed with a disability within the 13 primary disability categories. The 13 primary disability categories that allow a child to be eligible within Part B include: autism, deaf-blindness, deafness, emotional disturbance, hearing impairment, intellectual disability, multiple disabilities, orthopedic impairment, other health impairment, specific learning disability, speech or language impairment, traumatic brain injury, or visual impairment.

In the state of Oregon, like 19 other states in our nation, children are only eligible for the receipt of services under the DD diagnosis from birth to five. When a child with a DD diagnosis enters a school-based program, beyond age five, there are two outcomes.

1) Children diagnosed with DD are evaluated early on, and receive a new diagnosis in time to transition into school-based special education programs. This results in no gap in the child's service access.
2) Children that do not receive a new diagnosis are thereby ineligible for special education services and exit the program for a variety of reasons.

Thus, children with a DD diagnosis have unique challenges transitioning between early intervention/early childhood special education (EI/ECSE) into school-based programs in the state of Oregon because the eligibility requirements change between the programs. It is not yet known if children who exit EI/ECSE with a DD diagnosis reenter into school based programs with a new diagnosis after a gap in the receipt of services (e.g. exit EI/ECSE with a DD diagnosis at the age of five and reenter at the age of seven under a diagnosis of autism).

Eligibility requirements may influence a child's ability to smoothly transition into school based education settings. To our knowledge there has only been one study that focused on the transition process for children diagnosed with DD. Giannoni and Kass (2010) evaluated children diagnosed with DD in California's Early Start Program. The purpose of this study was to identify factors that might predict whether a child would be likely to have a gap in service assess or have no gap in service access. This retrospective cohort study predicted odds ratios for children's access into services after exiting the Early Start program at three years of age. The children without a gap in services were more likely to enter Early Start at 24-30 months of age, have a bilingual mother and a DD diagnosis within the communication domain. Children who reentered the program after a gap in services were associated with a disability diagnosis of autism spectrum disorder. This suggests that children with autism spectrum disorder, although they are exhibiting a delay, are more likely to be undiagnosed at three years of age and return to the system later in life after a gap in the receipt of services (Giannoni & Kass, 2010). The proposed study will add to the literature by evaluating all children that have been diagnosed with DD under Part C and their likelihood of reentry or continuation of service access (under part B) until they enter grade three.

2.2 Early elementary education

Successful transition into school-based education systems cannot be overstated, and this transition may be even more difficult for children with developmental disabilities (Welchons & McIntyre, 2015). Early elementary school marks a child's first experience in formal education. Performance in these first few years, in particular first and second grade, paves the way for future academic success or failure. There is a large body of literature that supports the relationship between a child's performance in early elementary school and their later academic achievement (Day, Connor, & McClelland, 2015; McClelland, Acock, & Morrison, 2006). In Ensminger and Slusarcick's (1992) cohort study, children's performance in the first grade was assessed and then used to predict high school completion. Results indicate that if a male child earned A's or B's during first grade they had over twice the odds of graduating high school in comparison to males that earned C's or D's (Ensminger & Slusarcick, 1992). Additionally, the grades that a child earned in third grade significantly predicted their long-term academic achievement (Entwisle & Hayduk, 1988). Behavior in the early school years also predicts long-term school success. Children that were rated as aggressive by their first grade teacher were less likely to graduate from school on time (Ensminger & Slusarcick, 1992). Entwisle and Hayduk (1988) found that the major long-term predictor for standardized achievement were the teachers' expectations of a child during their first and second year in school. Studying the effects of the environment, IQ, and mental health of children in first grade Gutman, Sameroff, and Cole (2003) were able to predict 12th grade academic achievement, both IQ scores and mental health of children were direct protective factors for children to promote their later in life academic achievement (Gutman et al., 2003).

Although developmental science identifies birth to age eight as a critical time of growth and development, interventions are often targeting children birth to five or three to five years of age (Dawson et al., 2010; Kasari, Freeman, & Paparella, 2006; Kasari, Gulsrud, Wong, Kwon, & Locke, 2010; Vismara, Colombi, & Rogers, 2009). These interventions have little success in continuing to increase developmental outcomes after kindergarten (Puma et al., 2012). To give children the greatest chance at success, programs may want to continue providing services for children with DD until eight years of age and develop interventions that target children during the 1st and 2nd grade.

2.3 Third grade special education enrollment

Enrollment in services at third grade is critical because transitioning out of special education greatly declines after age nine. Jenkins et al. (2006) estimated that 41% of students who were identified as having a disability before kindergarten transitioned out of special education by grade three. However, only 26% of students with a disability in grade three transitioned out of special education services by age 19 (Jenkins et al., 2006). This not only increases the costs to the state to support children throughout primary schooling, but also can have a great influence on a child. Growing and learning in a supportive classroom environment influences a child's readiness to learn, academic achievement, and likelihood to graduate with a high school diploma.

Current school readiness initiatives have focused on developing foundational skills (e.g., social skills) in early elementary school so that children are prepared for opportunities to learn in school-based programs. These initiatives commonly include learning appropriate social behaviors, communication and aspects of daily living skills (Mashburn & Pianta, 2006). Proficiency in these skills, and others, provide children with the necessary foundation to learn more advanced skills in later schooling and prepare children for academic success. School readiness behaviors have strong relations with age, and typically follow a rapid developmental sequence with significant progression between the ages of three to five years (Sparrow, Cicchetti, & Balla, 2005). Unfortunately, developmental delays place children further behind their typically developing peers in foundational skills needed for later success in school (Anderson, et al., 2009). Given that children with an identified disability are more likely to transition out of services by third grade if they begin services before kindergarten (Jenkins et al., 2006), providing children opportunities to have both high quality services *and* opportunities to develop foundational school readiness skills is paramount.

Previous early intervention research has shown that service up until the age of five has little impact on child success beyond Kindergarten (Puma et al., 2012). The head start impact study is a national sample of children who were randomly assigned to either head start intervention (N=2,783) or control (N=1,884) group (Puma et al., 2012). The participants within this study were three or four years of age and could participate in the intervention for one year and three year olds could apply back to participate for two years (Puma et al., 2012). Benefits from the head start intervention were seen within the Kindergarten classroom. However, the benefits seen in school success and cognitive achievement were no longer present when the children had entered the third grade (Puma et al., 2012). This information suggests that children benefit in Kindergarten, but that these same benefits do not hold all throughout early childhood education (Puma et al., 2012). It may be appropriate to continue services for children that need them into the early childhood education classroom to provide them with the greatest opportunity at success during the third grade.

Enrollment in in special education services for a child in the third grade indicates that the child is not achieving milestones within a developmental domain at the same rate as their typically developing peers. Not achieving developmental and academic milestones and labeling a child with a disability at grade three can have negative implications on their academic success. Shifrer (2013) argued that there would be negative stereotypes and expectation biases of teachers and parents for children that had a learning disability in comparison to peers achieving the same reading level but no label of a learning disability. Shifrer (2013) found that teachers and parents hold significantly lower academic expectations for students and children labeled with a disability. Lower expectations can facilitate a self-fulfilling prophecy where “a false definition [a priori] of the situation evoking a new behavior [a posteriori], which makes the original false conception come true” (Merton, 1948). In other words, teachers have low academic expectations for their students who have been labeled with a disability, and therefore their students will have lower academic performance. When coupled with the importance of intervention in the early years (birth to age eight), supporting children's successful exit of services by third grade is likely to support academic and social success throughout the school years.

In conclusion, it is critical to continuously support children diagnosed with DD to give them the best chance at success during the third grade. This includes a supportive classroom environment so that children with DD are ready to learn alongside their typically developing peers. Achievement levels during the third grade have been shown to predict academic achievement and the likelihood of graduating with a high school diploma. Given this knowledge it is important to identify the number of children that have been diagnosed with DD early in life (ages three through five) and their reentry into special education during early years (grades one through three) of school based education.

Chapter 3: Materials and Methods

3.1 Study design

This retrospective cohort study, outlined in Figure 1, used the ODE state database to determine the prevalence of primary disability diagnosis of DD. All data included children aged birth to five who were enrolled in EI/ECSE programs from 2006 to 2015. This study determined the proportion of children diagnosed with DD from birth to five years of age that had a change in their primary disability diagnosis. Furthermore, the risk of a child not receiving special education services at grade three given that the child had been previously diagnosed with DD was evaluated. All of the data used within this study was captured from 2006 to 2015. The ODE is a federally funded agency that is responsible for data collections, federal reports, and public reports for special education in the state of Oregon. Schools and school districts have contractual obligations to ensure all children are accounted for within the database.

[Insert figure 1]

3.2 Participants

Participants in this study included a subset of children identified within the ODE database from 2009 - 2015. Children eligible for this study had a primary disability code of DD from birth to five years of age. In order for a child to be categorized as DD the child must meet three criteria described below in in *Section 3.3.1*. Children that were previously diagnosed with DD and had no change in eligibility status from ages five to eight were appropriately not receiving services after the age of five. This classification indicates that the child was ineligible for this study and will be excluded from further analysis.

3.3 Measures

All measures were collected by the ODE, a federal requirement under IDEA. Continued enrollment in IDEA services from ages five to six indicated that a child transitioned successfully to school based special education programs. Several demographic variables were also included to assess gender, birth cohort, district, residency, agency, enrollment setting and eligibility age.

3.3.1 ODE data system

Within the ODE each school district must report all resident children with disabilities who have been identified, located and evaluated. Thus, these children are receiving EI/ECSE or special education from a public or private educational program. These data collections occurred on December 1 of each school year in the state of Oregon and every district was mandated to report this information to the state. There are unique reporting requirements from charter schools and private schools to the ODE. Charter schools must report children with disabilities who are currently enrolled in the charter school to the district that the child is receiving services regardless of parental residency. If no children were identified, located, and evaluated with a disability, school districts reported this to the state department of education. Private schools also conducted an annual count of the number of children who received equitable special education services. Charter and private school data is then reported to the district where the child is receiving services.

School districts involved in the education of children with disabilities are monitored by the ODE on a regular basis to ensure compliance with the requirements of the IDEA, Oregon Revised Statutes, and Oregon Administrative Rules. Monitoring procedures may include district self-assessment, data collection, analysis and reporting, on-site visits, review of policies and procedures, review of the development and implementation of IEPs, improvement planning, and auditing federal fund use.

To ensure that a child enrolled in EI/ECSE from ages three through five was observed if enrolled in school based special education programs a subset of the data was utilized. Children who were aged three through five in years 2009 through 2011, children aged four or five in 2012, and children aged five in 2013 were all included within the study sample. Selecting these children allowed researchers to maximize the number of eligible participants for the study. These children were then evaluated for enrollment in special education services during the transition from EI/ECSE and then final enrollment in school based special education services at grade three.

3.3.2 Developmental delay categorization

Within the state of Oregon, specific policies and procedures are required for a child's evaluation. This includes that the parent gives consent to the public agency and an evaluation must be conducted by a team that represents two or more separate disciplines or professions (Oregon Department of Education, 2015). For example, an evaluation would be completed by a licensed psychologist as well as a speech language therapist to determine a child's level of delay in the communication domain. Initial assessments include functioning in cognitive, physical, communication, social/emotional and adaptive development (Oregon Department of Education, 2015). The evaluation must be based on informed clinical opinion and be completed within 45 days from the date of referral (Oregon Department of Education, 2015). An evaluation to determine DD must include at least one norm-referenced test (that has been tested to be valid and reliable), one additional procedure to confirm a child's level of function in each area of development, at least one 20-minute observation and review of testing and medical data captured about the child (Oregon Department of Education, 2015). Although there is no endorsement of a specific assessment tool, some examples of standardized assessments utilized within the state of Oregon include Ages & Stages, Assessment Evaluation and Programming System for Infants and Children (AEPS), and Battelle Developmental Inventory- Second Edition (BDI-2) (Early Childhood Technical Assistance Center, 2015). After evaluation, a child is determined eligible if the child meets three specific criteria. First, the child has a DD of 1.5 standard deviations or more below the mean in two or more developmental areas of a norm-referenced test or 2.0 standard deviations or more below the mean in one or more developmental areas of a norm-referenced test. Developmental areas include cognitive, physical, communication, social/emotional, or adaptive. Second, the child's disability must have an adverse impact on the child's developmental progress. Third, the child must need early childhood special education services (Oregon Department of Education, 2015).

3.3.3 Enrollment in special education services

The primary outcome of this study was enrollment in special education services in grade three. In order to observe a child that was enrolled in grade three services that previously had been diagnosed with DD a subset of collected data was needed. For example, a child observed in 2010 and was three years old would be observed in 2015 as an eight-year-old. However, a two-year-old in 2010 would not be observed as an eight-year-old within the database and was therefore excluded from analysis. Children that were eligible for the study based on age and collection year is described thoroughly in section 3.3.1.

3.3.4 Change in primary disability diagnosis

Utilizing the secure student identifier, we identified children with a primary disability diagnosis of DD within EI/ECSE services. Following these children over time we determined any changes in primary disability diagnosis. A change in primary disability diagnosis would therefore indicate that the child is eligible for school based special education services. As displayed in Figure 1, children who had a primary disability diagnosis of DD for EI/ECSE services and never changed their primary disability diagnosis were excluded from this study. Children who left ECSE services and then reentered IDEA programs because they received a new diagnosis after the age of five will end up in either Group F or G of Figure 1.

3.3.5 Covariates

Demographic information captured for use during this analysis included gender, agency, enrollment setting, and eligibility age. Agency is the department responsible for providing service to the child while enrolled in EI/ECSE or school based services. It was expected that agency could influence a child's ability to access services while in school because of conflicting time in comparison to accessing services while still in preschool or at home. Examples of enrollment settings that a child could be identified as receiving services from would be at home, in the hospital, or within the school. It was expected that enrollment setting may influence a child's ability to access services because of ease of accessing services within the school verses other locations. Eligibility age was calculated using the initial age for eligibility date and the child's birth date. Eligibility age has been shown to significantly predict a gap in the receipt of services and therefore may influence the relationship between disability diagnosis and enrollment in special education during the third grade (Giannoni & Kass, 2010). The initial age of eligibility indicates the date that the participant was first determined eligible for enrollment in IDEA programs.

3.4 Analytic strategy

Data files from the ODE were downloaded and read into STATA (14.1 for Mac [2016-02-16]). The excel file of data collected from 2009 to 2015 was uploaded and and aggregated by collection year. No weighting was performed during the analysis because data collected is not sampled to estimate a greater population, but the true numbers of children accessing services within the population.

Demographic information included gender, district, enrollment setting, and initial age of eligibility. The frequency count and percentage were reported for children that had a change in disability diagnosis before the age of five and those that had a change in disability diagnosis after the age of five. These frequency counts were tested for differences between groups using a Pearson Chi-square test for independence. The p-value for each descriptive variable was reported. Proportion of children diagnosed with DD (number of children diagnosed with DD/number of children enrolled in ECSE programs) was calculated from 2009 to 2015. This was displayed using a line graph and a nonparametric test for trends across ordered groups developed by Cuzick (1985) was used to determine if this trend was significant.

Logistic regression models were utilized for this analytic plan to address the hypothesis "change in primary disability diagnosis after age five will have a stronger association with enrollment in a special education at grade three compared to children who had a change in primary disability diagnosis before age five". The model was built from the most basic model, which includes the main exposure (change in primary disability diagnosis before/after the age of five) and the main outcome (enrollment in special education services at grade three). After the initial, basic model was ran covariates were added one at a time keeping only those that significantly contribute to the model ($p<.05$). The odds of enrollment in special education given a child was diagnosed before or after the age of five was calculated. Additionally the adjusted probability on an absolute scale, relative risk, attributable risk and number needed to treat was calculated with 95% confidence intervals using this predictive model.

Chapter 4: Results

This study consisted of 5,076 children diagnosed with DD from 2009 to 2015 in the state of Oregon. As illustrated by Figure 1, the majority of children (94.1%) that had a DD diagnosis either changed in primary disability diagnosis before the age of five or did not have a change in diagnosis at age five or grade three.

4.1 Children with developmental delay

The number of children that had a change in primary disability diagnosis before the age of five was ten times the number of children that had a primary disability diagnosis after the age of five (Fig. 1). However, a greater proportion of children that had a change in primary disability diagnosis after the age of five were enrolled in special education in comparison to children that had a change in primary disability diagnosis before the age of five, 62.6% and 39.0% respectfully. The majority of children were initially eligible for EI/ECSE programs after 36 months of age (Table1).

[Insert table 1]

Additionally, the majority of children diagnosed with a DD are male. The proportion of children that are receiving services under IDEA with a primary disability diagnosis of DD is staying somewhat constant over time (Fig. 2). Among those that had a change in primary disability diagnosis before the age of five 38.99% were enrolled in special education at grade three while 61.01% were not enrolled in special education at grade three. Among those that had a change in primary disability diagnosis after the age of five 62.58% were enrolled in special education at grade three while 37.42% were not enrolled in special education at grade three. The proportion of children that are diagnosed with a primary disability diagnosis of "Developmental Delay" appears to be slightly increasing over time ($p < .05$).

[Insert figure 2]

4.2 Logistic regression coefficients

It was found that a change in primary disability diagnosis after the age of five was significantly associated with enrollment in special education services at grade three. Prior to adjustment, the odds of enrolling in special education at grade three given that there was a change in primary disability diagnosis after the age of five was

2.62 (2.14, 3.20) times the odds of enrolling in special education at grade three given that there was a change in primary disability diagnosis before the age of five. The odds of a child enrolling in special education at grade three given that the child had a change in primary disability diagnosis after the age of five is 2.37 (1.92, 2.92) times the odds of a child enrolling in special education at grade three given that the child had a change in primary disability diagnosis before the age of five while adjusting for initial age of eligibility and agency served. The odds ratios are presented in Table 2 with the full model, including the agency served, as well as the model without the agency. Agency was shown to be a significant predictor in the model. However, because the sample size within the subgroups of agency served was so small, the model with and without agency as a predictor was presented.

[Insert table 2]

4.3 Predictive probabilities

Using the final logistic regression model, adjusted for initial age of eligibility and the agency administering services, the adjusted predicted probabilities were calculated. All statistics provided within Table 3 are assuming a causal relationship between a timing of a change and enrollment in third grade special education. Results below should be used with caution when interpreting for practical implications. As displayed in Table 3, the probability that a child will be enrolled in school based special education programs during the third grade given the child had a change in primary disability diagnosis before the age of five is 0.393 (.380, .407). Using these probabilities, we were able to calculate the relative risk of enrollment in school-based special education at grade three. It was found that likelihood of being enrolled in school based special education programs given that a child had a change in primary disability diagnosis after the age of five is 1.486 (1.42, 1.54) times the likelihood of being enrolled in school based special education programs given that a child had a change in primary disability diagnosis before the age of five. Among children who had a change in primary disability diagnosis after the age of five 19.1% (.146, .237) of their risk for being enrolled in school based special education programs at grade three can be attributed to their change in primary disability diagnosis after the age of five compared to those that had a change in primary disability diagnosis before the age of five. To identify the number of children that would need a change in diagnosis before the age of five to keep one child from enrollment in school based special education programs at grade three we calculated the number needed to treat. Based on these data, if six children change their primary disability diagnosis earlier (i.e. before the age of five) who otherwise would have changed later (i.e. after the age of five) we would prevent one child from being enrolled in school based special education programs during third grade.

[Insert table 3]

Chapter 5: Discussion

These data supported our hypothesis that a change in primary disability diagnosis after age five would be associated with enrollment in a special education at grade three. This suggests that children who do have a change in primary disability diagnosis early on are more likely to transition out of special education services before grade three. Due to possible differential misclassification of outcome in children who had a change in disability diagnosis after age five, the association found is likely to be conservative. For example, children that leave EI/ECSE and reenroll into school based special education services after a gap in service access are more likely to receive a new identification number than children that continue to access services over time. The adjusted odds probability, relative risk, attributable risk difference and number needed to treat support the relationship found from the odds ratio. However, when using these statistics in practice it is assumed that there is a causal link between the timing of a change and enrollment in third grade special education. This causal like is highly unlikely given researchers were unable to control for likely confounding variables (e.g. socioeconomic status, paternal education) and these numbers should be used with caution. It is suggested that the odds ratio presented in Table 2 be used to inform policy and practice, as it is the most common statistic used within practice today. The odds ratio supports the relationship between timing of a change in diagnosis among those with DD and enrollment in third grade special education without extrapolating the results. The odds ratio found is most likely influenced by to policy decisions made at the state level.

In Hebbeler et al. (2011) authors utilized Brofenbrenner’s (1979) ecological theory and identified the multilayered influence that the IDEA had at many different levels of our society. This study has focused on the state level policies for eligibility and it’s influence on a child’s access to services within their community. However, as Hebbeler et al. state in their 2011 article, discussions involving IDEA are complex and include multiple levels of governmental decisions. Decisions at the state level are affecting children, care providers, teachers, and the child’s family. Since the initial enactment of this conceptual policy there has been advocacy for the inclusion and support of young children with disabilities through early intervention, early childhood special education, and school based special education programs. However, with the rapidly expanding body of literature that supports the benefits of access to intervention during a young child’s lifetime it is time to extend access to children that are exhibiting delays in their development beyond five years of age. Although some states have been restricting criteria for eligibility into programs in response to fiscal crises (Cole, Oser, & Walsh, 2011), Hebbeler et al. (2011) agues that this is inappropriate. The authors suggest that children who are no longer eligible because of these restrictive policies are those with the mildest conditions (e.g. Developmental Delay) who have the highest probability of showing strong outcomes with interventions (Hebbeler et al., 2011). Based on the results from this study, it is possible that continuity in service access during their formative years may have increased their likelihood of transitioning out of IDEA.

5.1 Affected States

This paper has focused on state policy within Oregon, and how their policy on access to school based programs is affecting children with DD. However, many states have similar eligibility policy and if evaluated, may have similar outcomes for their children. Findings from Danaher’s (2011) report show that within the state of California children with an established medical disability are only eligible for the receipt of services under DD diagnosis from three through four years of age (Danaher, 2011). In Delaware children are eligible for the receipt of services from three through four years of age as well, and have a provision that if a child has a speech delay they are eligible under a DD diagnosis until age 8 (Danaher, 2011). The following states have the same eligibility requirements as Oregon, ages three through five, as of Danaher’s 2011 report: Arkansas, Colorado, Connecticut, Florida, Indiana, Maine, Missouri, Montana, Nevada, New Jersey, New York, Ohio, Pennsylvania, South Dakota, Texas, Vermont, West Virginia, and Wisconsin. The states listed above may benefit from extending their eligibility age to nine years old. This may increase children’s likelihood of transitioning out of IDEA when they no longer need services instead of meeting maximum eligibility age indicated by the state legislature.

5.2 Limitations

This study only evaluated the state of Oregon and may not be generalizable to other states, especially if the state has different laws regarding eligibility into IDEA. Although these data have all been collected from the state of Oregon there was a large sample size (N = 5,076) of children with DD in the population. Secondly, a limitation of this study is that children might have reentered into school-based programs under a new identification number. It is also likely that this misclassification occurred more often in children who had a change in primary disability diagnosis after the age of five. These children would therefore not be captured by this analysis and might have influenced the association that was seen between children that had a change in primary disability diagnosis after the age of five in comparison to children that had a change in primary disability diagnosis before the age of five. Third, there were very small sample sizes in the subgroups that were initially thought to be included as covariates within our analysis. For example, agency was a significant predictor within the model, but had a sample size of three within the regional subgroup for children that had a change in disability diagnosis after the age of five. This resulted in many of the covariates not contributing to the final model and for the two covariates that did contribute to the final model, they had little influence on the relationship between our main exposure (i.e. change in primary disability diagnosis before or after the age of five) and our main outcome (i.e. enrollment in school based special education programs at grade three). Fourth, statistics that were provided based off of the logistic regression model were predictive odds probability. Relative risk association, attributable risk difference and the number needed to treat are all based off of the assumption that this is a causal relationship between the timing of a change in diagnosis and enrollment in third grade special education. Given that not all potential confounding variables were accounted for the assumption of causality between our predictive variable and outcome is unlikely and statistics presented in Table 3 should be interpreted with caution.

Chapter 6: Conclusion

The enrollment of children with DD into school based special education programs warrants further investigation on it's influence on later in life outcomes, such as enrollment in special education throughout primary school, academic achievement, and adult independence. The ecological theory developed by Brofenbrenner (1979) and the representation of this model by Hebbeler et al. (2011) describes the influence federal, state, and local level policies regarding IDEA have great influence on individuals opportunity for success. Although many states throughout the country are extending eligibility decisions to allow children who have DD to be eligible for the receipt of services when they enter school, not all states have begun this transition. It is important that children who are in need of services are accessing supports to be successful and participate alongside their typically developing peers. Further research on the lifelong outcomes of children who have been diagnosed with developmental delay is needed. As a next step, it would be valuable to identify the primary disability diagnosis children commonly enter into school-based programs and if they have a change in primary disability diagnosis before the age of five.

Figures

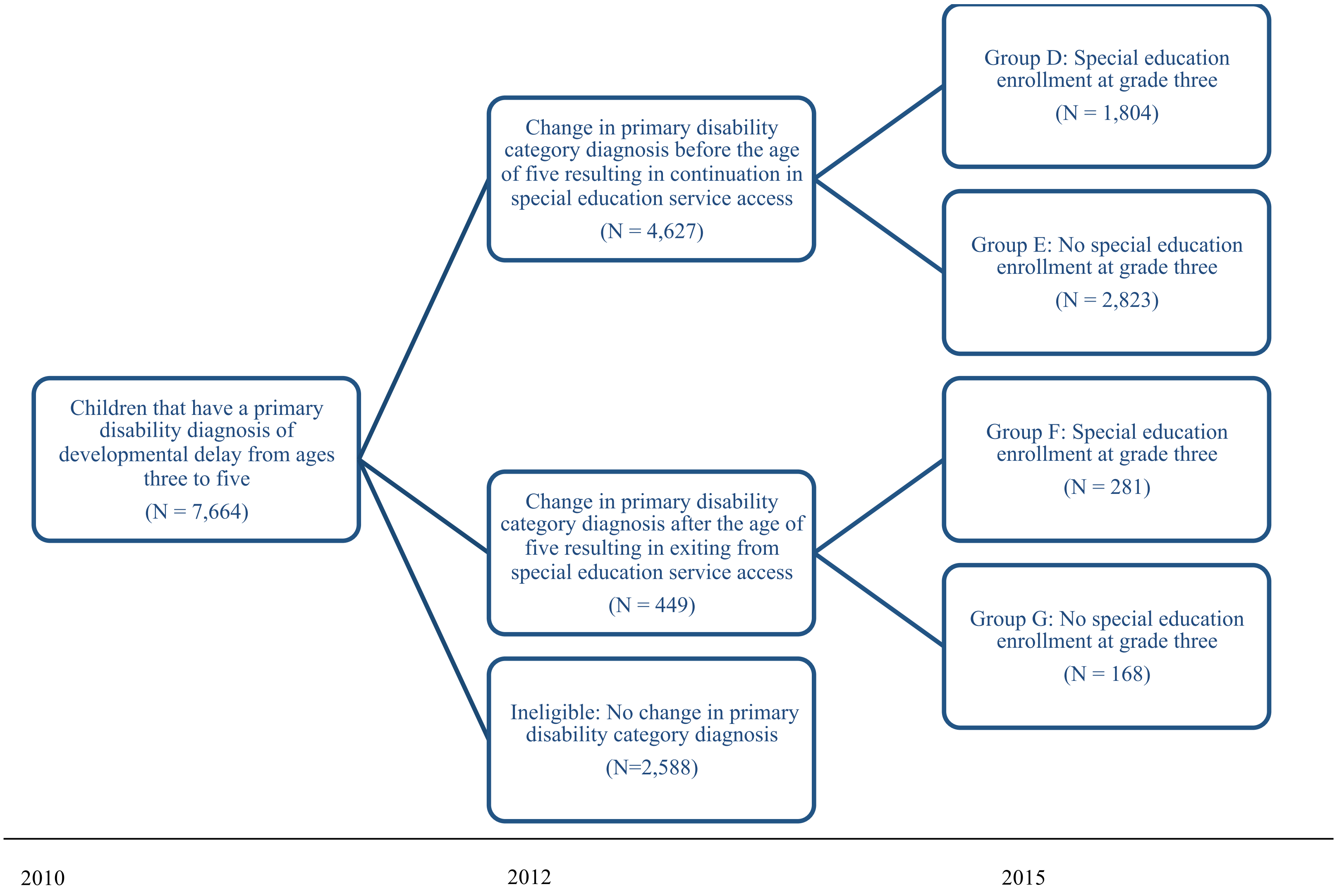

Figure 1. Study design and sample size of children enrolled in the following retrospective cohort study

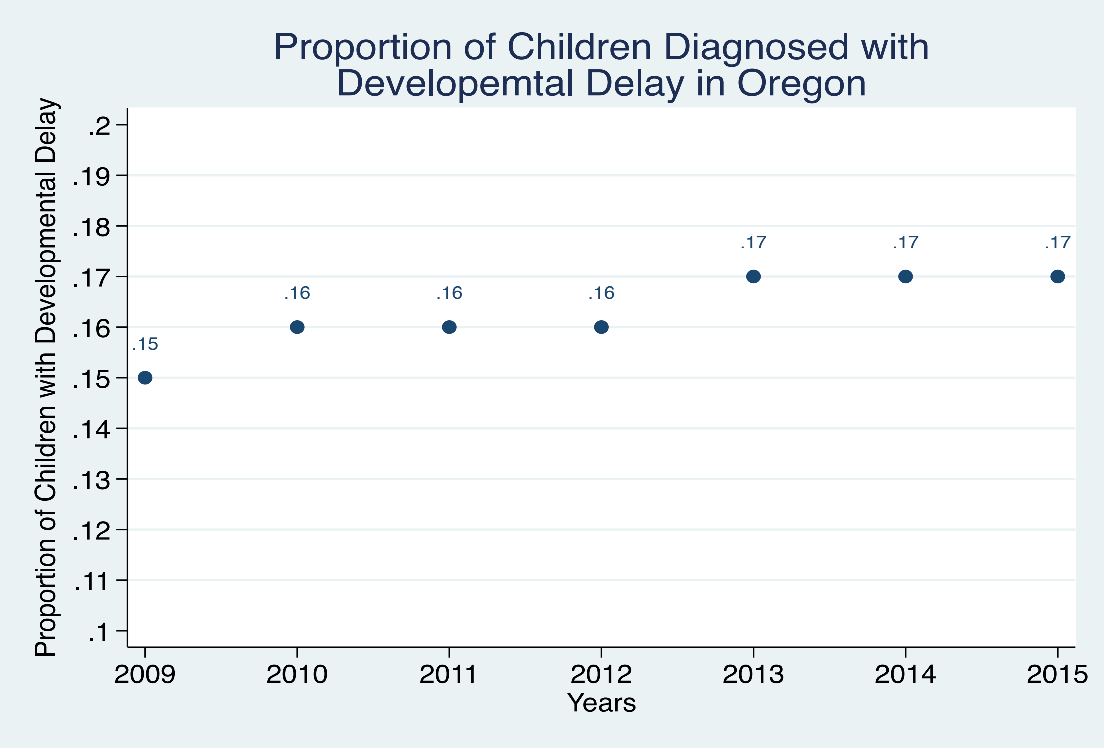

Figure 2. Proportion of children three to five years of age diagnosed with developmental delay within the state of Oregon from 2009 to 2015.
[1]Significant increasing trend from 2009-2015 ($p < .05$)

Tables

Table 1. Descriptive characteristics of children within the state of Oregon from 2006 to 2015 that had a primary disability diagnosis of developmental delay from birth to five and had a change in primary disability diagnosis

	Change in disability diagnosis before age five		Change in disability diagnosis after age five		P[a]
	N=4,627	%	N=449	%	
Gender					
Male	3,390	73.3	323	71.9	0.54
Agency					
Program	4,476	96.7	446	99.3	<0.01
Regional	151	03.3	3	00.7	
Enrollment Setting					
School	4,623	99.9	448	99.8	0.38
Other	4	00.1	1	00.2	
Eligibility age					
0 – 6 months	180	03.9	12	02.7	<0.01
6 – 12 months	216	04.7	11	02.5	
12 – 18 months	238	05.1	16	03.6	
18 – 24 months	411	08.9	21	04.7	
24 – 30 months	641	13.9	40	08.9	
30 – 36 months	746	16.1	68	15.1	
> 36 months	2,195	47.4	281	62.6	
Special Education					
Enrolled	1,804	39.0	281	62.6	<0.01
Not enrolled	2,823	61.0	168	37.4	

[a] Pearson Chi-squared p-value

Table 2. Odds that a child enrolled in Early Intervention/Early Childhood Special Education services under primary disability diagnosis of DD from birth to five will be enrolled in School Based programs at grade three given that they had a change in primary disability diagnosis in the state of Oregon from 2006 – 2015.

	Model 1 Odds Ratio[a] (95% CI for Exp β)	Model 2 Odds Ratio[b] (95% CI for Exp β)
Diagnosis change		
Before age five	1.00	1.00
After age five	2.31 (1.88, 2.85)	2.37 (1.92, 2.92)
Initial Age of Eligibility		
0 – 6 months	1.00	1.00
6 – 12 months	1.19 (0.75, 1.88)	1.15 (0.72, 1.82)
12 – 18 months	1.03 (0.66, 1.63)	1.02 (0.64, 1.61)
18 – 24 months	0.65 (0.42, 1.00)	0.68 (0.44, 1.05)
24 – 30 months	1.09 (0.74, 1.61)	1.15 (0.78, 1.70)
30 – 36 months	3.09 (2.14, 4.48)	3.28 (2.26, 4.76)
> 36 months	4.01 (2.82, 5.71)	4.22 (2.96, 6.03)
Agency		
Program	-	1.00
Regional	-	2.43 (2.72, 3.44)

[a] adjusted for age of initial eligibility (0-6, 6-12, 12-18, 18-24, 24-30, 30-36, >36 months), limited model

[b] adjusted for age of initial eligibility (0-6, 6-12, 12-18, 18-24, 24-30, 30-36, >36 months) and agency served, final model

Table 3. Probability, relative risk, attributable risk, and the number needed to treat for a child enrolled in Early Intervention/Early Childhood Special Education services under primary disability diagnosis of DD from birth to five will be enrolled in School Based programs at grade three given that they had a change in primary disability diagnosis in the state of Oregon from 2006 – 2015.

	Change in disability diagnosis before age 5 (95% CI)[a]	Change in disability diagnosis after age 5 (95% CI)[a]
Probability		
Enrollment in Special Education at Grade Three	0.393 (.380 - .407)	.585 (.541 - .628)
Relative Risk	-	1.486 (1.42 – 1.54)
Attributable Risk Difference	-	0.191 (.146 - .237)
Number Needed to Treat	-	6

[a] adjusted for age of initial eligibility (0-6, 6-12, 12-18, 18-24, 24-30, 30-36, >36 months) and agency served

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