ABSTRACT

Children with disabilities or developmental delays need intervention services as early as possible. Although previous research has provided prevalence estimates and information about disparities in accessing early intervention services (EI; children from birth to age three years), less research has documented this information for children in the preschool early childhood special education (ECSE) age range (three to five years). Using a nationally representative data set (Early Childhood Longitudinal Study- Birth Cohort), the current study estimates the prevalence rate of children who should be receiving ECSE services. Similar to previous research that examined the EI age range, this study estimates that 13.22% of children in the United States qualify to receive ECSE services. Comparing this estimate to parent-reported rates of service utilization and Department of Education data, this study shows the underutilization of services persists for this age range. Implications for practice and future directions are discussed.

INDEX WORDS: Early childhood special education; Eligibility; Prevalence; Early Childhood Longitudinal Study-Birth Cohort
CALCULATING ESTIMATED RATES OF EARLY CHILDHOOD SPECIAL EDUCATION
ELIGIBILITY FROM A NATIONAL LONGITUDINAL DATABASE

by

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B.S., Presbyterian College, 2014
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DEDICATION

I would like to dedicate this thesis to my family for supporting me and always believing in me.
ACKNOWLEDGEMENTS

I would like acknowledge my advisor and thesis committee chair, Ashley Harrison, for providing me with guidance and feedback during the process of writing my thesis. I am sincerely thankful for her patience and encouragement. I would also like to acknowledge Sydney Erickson for her valuable contribution to this research project.
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CHAPTER 1

INTRODUCTION

The Individuals with Disabilities Education Improvement Act (2004) guarantees all children with disabilities between the ages of birth and 21 years a free and appropriate education. Whereas infants and toddlers (birth to three years old) receive early intervention (EI) services through Part C of IDEA, preschool children (three to five years old) have a similar but distinct set of guidelines that allows them to receive early childhood special education (ECSE) services under Part B of IDEA (Section 619; Individuals with Disabilities Education Act, 2004). Research has shown that both EI and intervention during the preschool years plays a vital role in beneficial outcomes for children with a range of disabilities (e.g., Moeller, 2000; Rickards, Walstab, Wright-Rossi, Simpson, & Reddihough, 2009; Zwaigenbaum et al., 2015). Considering this research, it is imperative that all children eligible for EI and ECSE services are identified as early as possible and receive services before entering kindergarten.

Understanding how widely and systematically these interventions are being accessed in both age groups with studies of prevalence as well as examinations of disparities can help to determine if interventions are needed to promote greater service use. Further, prevalence estimates of children eligible for EI and ECSE services helps to plan for financial and resource allocation, as well aiding in the identification of underserved populations. Although there has been a rise in the number of children accessing EI services and there is preliminary evidence that many children who should be obtaining services are being missed, meaningful limitations exist with regard to previously used measurement approaches to quantify the population estimate of
children who meet eligibility criteria for EI and ECSE services (Feinberg, Silverstein, Donahue, & Bliss, 2011).

Limitations with EI Service Eligibility Prevalence Estimates

Many previous studies examining prevalence estimates of children with a disability or delay have simply quantified families who are already accessing early intervention services (e.g., McManus, Magnusson, & Rosenberg, 2014; Scarborough et al., 2004). Although these studies provide valuable information, they do not provide accurate estimates of the total number of children who qualify for EI or ECSE services because they omit several groups of individuals. More specifically, this assessment approach does not include those families who are unaware of such services or those children deemed eligible but whose parents or caregivers opt not to access services. As a result, these approaches to prevalence evaluations will greatly underestimate the true population eligible for services. Further, this approach may particularly underestimate eligibility numbers among populations that may be particularly susceptible to barriers to treatment seeking.

An additional issue with existing prevalence estimates is a heavy reliance on parent report of child disability status. Although estimates of children eligible for EI services based on direct child assessments exists, less research has been conducted in this area for the ECSE age range. To date, few studies have attempted to document the true prevalence of children eligible for EI or ECSE services by using direct assessment data of children, which provides a more accurate estimate of eligibility than does parent report alone. One reason why parent report may result in an underestimation of the problem is that parents may not have sufficient knowledge of developmental milestones to identify signs of a developmental delay in their child. There is research to suggest that knowledge of developmental milestones varies across cultures and
countries (Ertem et al., 2007). In further support of this notion, in a study where parents were given materials on signs of developmental delays, parental knowledge statistically significantly increased from baseline to post-intervention, where the intervention included groups that received information on child development (Graybill et al., 2016). The fact that this intervention was successful indicates that there is significant room for improvement in terms of parent knowledge regarding typical developmental milestones, which may result in underidentification of developmental delays. For this reason, using direct child assessment data may give more accurate information about children’s developmental delays.

**Current Research Examining EI Eligibility Prevalence and Usage Disparities**

To date only two published studies have examined EI eligibility estimates using best practice, child-focused assessment procedures. One estimate shows a meaningful discrepancy between the number of children who qualify for EI services and the number of children accessing services (Rosenberg, Zhang, & Robinson, 2008). Specifically, using a nationally representative sample (Early Childhood Longitudinal Study-Birth Cohort), this study quantified the number of 9-month-old and 24- month-old infants with cognitive delays, motor delays, or low birth weight significant enough to deem them eligible for EI services (Rosenberg et al., 2008). According to Rosenberg and colleagues, approximately 12% of 9-month-olds and 13.8% of 24-month-olds would qualify to access EI services. This study also examined rates of accessing services and found only a small proportion of those eligible at 24 months reported accessing EI services. More specifically, only 2.8% of all 24-month-olds received services, which means only 10.1% of those who qualify for services actually receive them (Rosenberg et al., 2008). Another study that predicted EI eligibility in a similar way but used slightly more stringent criteria to determine eligibility, found comparable results, such that at 9 months of age
9.3% met criteria for EI services and at 24 months of age 10.1% met criteria for EI services (Feinberg et al., 2011). Feinberg and colleagues also provided further evidence of an underutilization of EI in that only 9% of the eligible children received services at 9 months and only 12% of the eligible children received services at 24 months (Feinberg et al., 2011). Together, these studies provide initial evidence for a global underutilization of EI services for children who are eligible. Quantifying and more closely examining the overlooked but eligible EI and ECSE children has important clinical implications because it informs researchers of the types of interventions that should be implemented to increase participation in EI and ECSE services.

Comprehensively understanding the rate of eligibility can also serve to elucidate disparate trends in accessing services. This is particularly important because in addition to a universal underutilization of EI services, a number of disparities exist among specific groups in terms of their rates of accessing services. For example, Rosenberg et al. (2008) reported that Black children were less likely to receive early intervention services than children of other races and ethnicities. Feinberg found racial groups accessed services at comparable rates at 9 months, but that at 24 months of age, White children were five times more likely to access services than Black children (Feinberg et al., 2011). Additionally, later referral for early intervention occurred at higher rates for Black mothers compared to White mothers, for mothers with government or no insurance compared to those with private insurance, and for mothers living in areas with greater rates of poverty compared to those not living in areas with high rates of poverty (Barfield et al., 2008). In addition to an overall underutilization of EI services among families, minority children and children living in areas with high rates of poverty are even less likely to access EI services than non-minority children and children living in areas with lower rates of poverty.
Although this research allows us to compare group rates of usage, without true prevalence estimates of service eligibility, it is difficult to document the true extent of the disparity.

Through clear quantification of the disparities that exist with regard to service access, interventions designed to increase engagement in these types of programs can be targeted to the groups most in need. This is particularly important given research that suggests that without specific interventions in place, disparities in accessing health care services continue to persist over time for minorities and children with no health insurance (Berdahl, Friedman, McCormick, & Simpson, 2013). The Centers for Disease Control and Prevention (CDC) provides examples of health disparities for racial and ethnic minorities and families from a lower socioeconomic status, such as disproportionate access to health care and negative health outcomes, continuing over the years, and discusses the ways in which disparities tend to persist unless evidence-based interventions are specifically implemented to reduce these disparities ("CDC Health Disparities and Inequalities Report — United States, 2013," 2013). Studying these disparities is an important part of reducing the differences in access to services and poor outcomes. According to Kilbourne, Switzer, Hyman, Crowley-Matoka, and Fine (2006), conducting health disparities research involves three steps: 1) Defining and identifying the disparities, 2) Determining what causes these disparities, and 3) Designing, carrying out, and assessing interventions to lessen these disparities. Before determining the cause of disparities and creating and implementing interventions to reduce them, researchers must first determine prevalence rates of children eligible for ECSE services and identify the specific demographic disparities in accessing these ECSE services.
Discontinuity Between EI Services and ECSE Services

Although evidence is mounting to support the idea that underutilization of services and disparities in accessing EI services are prevalent, a shortage of research exists examining these same issues among the next developmental group: preschoolers ages three to five years. While it may be tempting to simply extend interpretations of data obtained on the EI age range to the ECSE group, examining each age group separately (EI for birth to three years and ECSE for three to five years) is particularly important given the lack of continuity that exists between EI and ECSE services. In addition to different categorization nomenclature, states have, in many cases, distinct sets of guidelines for EI services and ECSE services eligibility. Specifically, 21 states have policies in place which do not guarantee the continuity of receipt of services when transitioning from EI services to ECSE services (Danaher, Shackelford, & Harbin, 2004). In Danaher’s study, the researchers rated the states according to the likelihood that a child transitioning from EI to ECSE services on his or her third birthday would continue receiving services. They determined that while 21 states do not guarantee continuity between EI and ECSE services, the remaining 30 states were classified as either somewhat likely or very likely that a child receiving EI services would also receive ECSE services (Danaher et al., 2004). Under EI services, children must have a developmental delay, have a diagnosed condition that may lead to a developmental delay, or (in the case of some states) be considered at-risk for a developmental delay ("PL 108–446," 2004). For ECSE services, children can receive services if they qualify for one of thirteen categories (one of which is developmental delay; Child Count and Educational Environments, 2015). These policies raise concerns regarding the continuity of receipt of services because children who had previously qualified for services may no longer qualify in some states, which supports the potential need to study these two groups separately as
opposed to combining all children under the age of five into one group. As a result, children may not automatically meet eligibility for ECSE simply because they met EI criteria, which may lead to differences in prevalence estimates for the two age ranges. Until the criteria align better between these ages or until these two groups are determined to have similar rates of eligibility, researchers should treat the groups independently and calculate separate rates of eligibility and participation for each group.

**ECSE Service Access Research**

In spite of the underrepresentation of literature examining ECSE programs, an initial examination of utilization of preschool services among three- to five-year-olds reveals a higher rate of accessing services than the younger age bracket but potentially still low rate overall. More specifically, in 2014, per the U.S. Department of Education, approximately 6.1% of children between the ages of three and five received ECSE services (U.S. Department of Education, 2016). This number is higher than the 2.9% of children under the age of three obtaining EI services (U.S. Department of Education, 2016), but this 6.1% may still represent an underutilization of services. Further, regarding research in disparities in the ECSE range, one study specifically examined differences in rates of utilization among groups of children at the age of 48 months by using data from the Early Childhood Longitudinal Study- Birth Cohort (Morgan, Farkas, Hillemeier, & Maczuga, 2012). Specifically, children from low socioeconomic backgrounds, Black children, Asian children, and children who come from a home where English is not the primary language are less likely to access services in this age range (Morgan et al., 2012). There is evidence to show that disparities persist for groups of children transitioning from EI to ECSE services. This information starts to demonstrate that the pattern of
underutilization observed in EI may extend to ECSE and that disparate usage is occurring in both age ranges but does not provide evidence concerning the rates of eligibility for ECSE.

To date only one known study has examined ECSE eligibility prevalence. Using the National Survey of Children with Special Healthcare Needs (NS-CSHCN), a nationally representative data set, Magnusson, Palta, McManus, Benedict, and Durkin (2016) estimated rates of eligibility to access services for children between the ages of birth and five years. This study estimated that 4.7% of children between birth and five years would be eligible to receive therapy; however, this seems like an underestimation given noteworthy limitations of this study. First, the inclusion criteria for this study potentially exclude children who have shorter term developmental delays and children who are either not diagnosed with a delay or are not perceived as having a delay (Magnusson et al., 2016). This study relied on data from a data set that only documented children as having a delay if the delay was formally diagnosed or if the parent answered screening questions about a delay being present. This would result in the omission of children from the data set who may have an undiagnosed or unrecognized delay. Furthermore, this study only examined children that would meet eligibility with the developmental delay category but failed to include children who may potentially qualify for ECSE services under one of the other 12 eligibility categories. As a result of these limitations, this study will significantly underestimate the true eligibility for ECSE programs; therefore, no comprehensive prevalence estimate exists, using direct assessment data, for ECSE eligibility for children between the ages of three and five years. This gap in the literature makes it difficult to truly quantify what percentage of eligible children are not accessing services. Further, before we can accurately identify service usage disparities, an accurate population prevalence estimate should be calculated to inform rate of access expected for each population.
Current Study

This review of the literature confirms that more research needs to particularly examine rates of ECSE service eligibility and disparities among three- to five-year-olds. Without predicted rates of children eligible for ECSE services, we are unable to determine how many children service providers are missing and thus cannot create interventions to reach these children. The current study will first estimate the number of children eligible for ECSE services in the United States using a large longitudinal database from the Institute of Education Sciences (the Early Childhood Longitudinal Study- Birth Cohort). Importantly, this data set uses direct assessment data of preschoolers to determine impairment across a range of eligibility domains including visual impairment, deaf-blindness, hearing impairment, developmental delay, and speech and language impairment. Second, this study will provide a more updated and comprehensive estimate of service utilization. Specifically, this study compared the estimated number of children eligible for ECSE services to the actual number of children accessing these services as obtained from parent report data in the ECLS-B data set to allow for a direct comparison of children eligible for services and those enrolled in services.
CHAPTER 2

METHOD

Participants

Data for the current study were derived from the Early Childhood Longitudinal Study-Birth Cohort (ECLS-B) data set collected by the Institute of Education Sciences (IES; U.S. Department of Education, 2007). More specifically, the ECLS-B data set includes a nationally representative group of children born in 2001 with information collected at ages 9 months, 24 months, preschool (approximately 4 years), and kindergarten (either the 2006 or 2007 school year depending on when the child began kindergarten; Najarian, Snow, Lennon, & Kinsey, 2010). The ECLS-B data set provides data regarding children’s development, health, and education from birth until they entered kindergarten. Data collected as part of this longitudinal study include interviews conducted with parents, as well as cognitive, language, social-emotional, and physical assessments administered to the children. Parents and preschool staff also completed questionnaires including the National Preschool Parent Audio Computer-Assisted Self Interview (ACASI) and Early Care and Education Provider (ECEP) Interview.

The children that make up the preschool data collection wave were born in 2001 and were approximately 52.46 months when data were collected but ranged in age from 44 months to 65.3 months. Parents of 8,950 children completed interviews, and 8,750 children were directly assessed during this data collection wave (Najarian et al., 2010). The racial and ethnic makeup of the group represented in the data set is as follows: White, non-Hispanic 53.8%; Black, non-Hispanic 13.8%; Hispanic, race specified 16.9%; Hispanic, no race specified 8.2%; Asian, non-
Hispanic 2.6%; Native Hawaiian/Pacific Islander, non-Hispanic 0.2%; American Indian/Alaska Native, non-Hispanic 0.5%; and more than one race specified, non-Hispanic 4.0%. Males made up 51.2% of the sample, and 24.8% of the children fell below the poverty threshold (Najarian et al., 2010).

A total of 10,688 children were in the original data set and 8,750 children were directly assessed at the preschool age range; our analyses excluded 50 cases due to missing data. The ECLS-B data set includes tasks and measures of cognitive skills, gross and fine motor skills, social-emotional skills, and language skills. Children were excluded if they were missing cognitive scores, motor skills scores, social-emotional scores, and language scores. Data that were coded as “Refused,” “I don’t know,” or “Nonresponse” were considered missing for the purposes of our analyses. This study was conducted using the remaining 8,700 cases.

Measures

The cognitive measures assessed levels of early reading and mathematics (Najarian et al., 2010). More specifically, these domains assessed areas such as developing interpretation, vocabulary, patterns, and number sense. These items were drawn from existing measures such as the Peabody Picture Vocabulary Test- Third Edition (PPVT-III), the Family and Child Experiences Survey (FACES), and the Test of Early Mathematical Ability- 3 (TEMA-3; Najarian et al., 2010). Prior to inclusion in this study, this measure of cognitive abilities underwent a field test to analyze its psychometric properties. More specifically, item formatting and ordering, validity, and reliability were examined using classical item analysis, Item Response Theory, and Differential Item Functioning before being used in the preschool wave of data collection (Najarian et al., 2010).
In addition to an assessment of cognitive functioning, the ECLS-B data set also includes data from tasks designed to measure motor abilities. The fine motor assessment tasks were from the Early Screening Inventory-Revised (ESI-R; Meisels, Marsden, Wiske, & Henderson, 1997) and included several block building tasks and several copying tasks. The gross motor tasks included a jumping task taken from the Bruininks-Oseretsky Test of Motor Proficiency (Bruininks, 1978) and a catching task from the Movement Assessment Battery for Children (Henderson & Sugden, 1992). The motor score was a composite of the fine and gross motor tasks (Najarian et al., 2010). The language score was obtained from a combination of two storytelling tasks taken from the Preschool Language Assessment Scale (PreLAS; Duncan & De Avila, 1998). For these tasks, the child listened to the examiner tell a story while pointing to pictures and was then asked to retell the story (Najarian et al., 2010). Finally, the ECLS-B data set also includes a measure of social-emotional functioning, which data collectors call the “Two Bags Task.” This task is modified from the “Three Bags Task” and provides a semi-structured environment for the parent and child to interact for which the examiner codes the quality of interactions of the child and the level of engagement of the child with the parent (Najarian et al., 2010). The “Three Bags Task” has been used in other large studies such as the National Institute of Child Health and Human Development (NICHD) Early Child Care Study (Najarian et al., 2010). The “Two Bags Task” is a measure of parent-child interaction which is an important component in a child’s social-emotional development (Najarian et al., 2010). Furthermore, the data indicating if a child had difficulty hearing or was blind were collected at the 24-month data collection period.
Disability Category Determination Criteria

Because this study focuses on determining ECSE eligibility, we will specify the criteria for children to be eligible to receive ECSE services in this study. The change in eligibility for EI to ECSE services occurs when a child turns three years old. The U.S. Department of Education reports data for thirteen categories for children between the ages of three and five years (Child Count and Educational Environments, 2015). These categories include 1) autism, 2) deafblindness, 3) emotional-disturbance, 4) hearing impairment, 5) intellectual disability, 6) multiple disabilities, 7) orthopedic impairment, 8) other health impairment, 9) specific learning disability, 10) speech or language impairment, 11) traumatic brain injury, 12) visual impairment (including blindness), and 13) developmental delay. Estimates of eligibility were calculated for only those categories with sufficient information based on data available in the ECLS-B data set. The estimates were included for the following categories: deaf-blindness, hearing impairment, visual impairment (including blindness), speech or language impairment (SLI), and developmental delay. Due to limited information in the ECLS-B data set, the rates of participation in the remaining categories (i.e., autism, emotional-disturbance, intellectual disability, multiple disabilities, orthopedic impairment, other health impairment, specific learning disability, traumatic brain injury) were not calculated. Despite limited information about these other disability categories, due to the nature of the developmental delay and SLI categories, these categories may encompass some children with disorders not directly examined such as autism spectrum disorder (ASD) and intellectual disability. For a list of categories included and excluded as part of the analyses in this study as well as the criteria used to determine eligibility, see table 1.
**Table 1**  
*Categories Included and Excluded in Analysis and the Criteria Used if Included*

<table>
<thead>
<tr>
<th>Category</th>
<th>Included</th>
<th>Criteria Used if Included</th>
</tr>
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<tbody>
<tr>
<td>Autism</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Deaf-Blindness</td>
<td>Yes</td>
<td>Yes indicated for difficulty hearing and blindness in data set</td>
</tr>
<tr>
<td>Emotional-disturbance</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Hearing impairment</td>
<td>Yes</td>
<td>Yes indicated for difficulty hearing in data set</td>
</tr>
<tr>
<td>Intellectual disability</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Multiple disabilities</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Orthopedic impairment</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Other health impairment</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Specific learning disability</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Speech or language impairment</td>
<td>Yes</td>
<td>$\leq 2$ SD below mean on language assessment</td>
</tr>
<tr>
<td>Traumatic brain injury</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Visual impairment (including blindness)</td>
<td>Yes</td>
<td>Yes indicated for blindness in data set</td>
</tr>
<tr>
<td>Developmental delay</td>
<td>Yes</td>
<td>$\leq 1.5$ SD below mean on two of four domains (i.e., cognitive, motor, language, social-emotional) OR $2$ SD below mean on motor, cognitive, or social-emotional measure</td>
</tr>
</tbody>
</table>
To determine a composite score for each of the domains (i.e., cognitive, motor, language, and social-emotional), a z-score was calculated for each task and averaged across domain. These data did not meet the assumption of normality and attempts to transform the data were not effective. However, consistent with other research using large samples, the QQ plots were assessed for trends of normality. Overall the data showed trends toward normality.

Based on information obtained from the state departments of education, almost half of states with the developmental delay category determine eligibility for this category by using the criteria that children must receive a score of 1.5 standard deviations below the mean on a measure in two domains or a score of 2 standard deviations below the mean in one domain. The domains typically assessed include adaptive, social-emotional, cognitive, motor, and language. Other states also determined eligibility using visual development, academic development, and hearing, but these were in the minority of cases. Thus, these three domains were not included to determine eligibility for the developmental delay category. Using this information, the rates of developmental delay for this study were estimated by including those children who fall 1.5 standard deviations below the mean on an assessment in two of four categories (i.e., cognitive assessment, motor assessment, language assessment, social-emotional assessment) or who fall 2 standard deviations below the mean on the motor assessment, cognitive assessment, or social-emotional assessment. It was determined that there was not enough information to also use the adaptive domain, so this domain was not considered in the analysis. According to the state special education requirements, the speech and language impairment criteria varied more than the developmental delay category. Some states require a speech and language pathologist evaluation and others include the broad requirement that different sources be used. Several states provided a more specific requirement that a child must be delayed 1.5 standard deviations
or 2 standard deviations on tests of speech and language. Since the NCLS-B data set only included one measure of language, children were considered eligible for the speech or language impairment category if their score on the language assessment fell at least 2 standard deviations below the mean to provide a more conservative estimate of eligible children.

The rates of eligibility of the other included special education categories were calculated based on an indication of yes for difficulty hearing, blindness, or difficulty hearing and blindness in the ECLS-B data set. A child was categorized as one who should be receiving services in the hearing impairment category if the data indicated that child had difficulty hearing, and a child was categorized as one who should be receiving services in the visual impairment category if the data indicated that the child was blind. Additionally, if the child was coded as having difficulty hearing and blindness, they were labeled as one who should be receiving services under the deaf-blindness category.

Once a child was determined to be eligible for one category, he or she could not be determined to be eligible for another category so as to prevent the double-counting of any child. The deaf-blindness category was the first category coded. The visual impairment category was second, followed by the hearing impairment category, then the developmental delay category, and finally the SLI category. The developmental delay category was coded before the SLI category because a child with speech or language concerns in addition to other delays would often be considered developmentally delayed rather than having only a speech and language impairment. Although some children may be better served in a category other than the one into which they were coded, it is important to note that the overall estimate of children eligible would not change if a child was moved to a different category.
Examining Composition of U.S. Department of Education (DOE) Reports of ECSE Utilization

Due to the exclusion of several categories from the estimate produced by this study, there were some concerns that the estimate of children eligible for ECSE services would likely be low. To determine how inclusive our estimate was, we also examined the composition of the U.S. DOE reports of ECSE utilization. First we calculated the percentage of children who fell into each special education eligibility category out of the total number of children accessing ECSE services. Then we determined for how much our estimate accounts in relation to category composition.

Comparing Predicted Rates of ECSE Service Eligibility to Actual Rates of ECSE Service Utilization

After estimating the number of children eligible for ECSE services based on direct assessment data, the current study also examined the percentage of eligible children whose families indicated receipt of services during data collection. This percentage is determined by dividing the number of children who received either EI or ECSE services by the total number of children who were determined eligible to receive services. Due to an error in coding during data collection for the ECLS-B study, parents only reported that their child was receiving ECSE services if they had never received services before that time (Najarian et al., 2010). This error made it impossible to determine if a parent did not report accessing ECSE services due to their child continuing to receive services from EI to ECSE or if children did not ever start receiving ECSE services after having received EI services. For this reason, the current study includes parent report of accessing either EI or ECSE services as an indicator of receiving services.
CHAPTER 3

RESULTS

Percentage of Children Eligible for Services

The current study calculated the percentage of children that comprises each ECSE category by dividing the number of children deemed eligible for that category (based on our previously stated criteria) by the total number of children included in the analysis of the data set and multiplying by 100. Combining the five categories, in which we were able to estimate rates of eligibility, we found that about 13.22% of children in the ECLS-B data set qualify for at least one category. Within each category, our analysis revealed that 7.92% of children in the ECLS-B data set qualify for the developmental delay category by falling 1.5 standard deviations below the mean in two of four domains (i.e., cognitive, motor, language, social-emotional) or 2 standard deviations below the mean in the cognitive, motor, or social-emotional categories. Excluding children eligible for the developmental delay category, the percentage of children in the data set that would be eligible for the SLI category based on their language assessment score falling 2 standard deviations below the mean was 3.69%. Additionally, our analyses indicate that 1.31% of children qualify for the hearing impairment category, 0.17% qualify for the visual impairment category, and 0.13% qualify for the deaf-blindness category.

Examining Composition of U.S. DOE Reports of ECSE Utilization

The U.S. Department of Education (DOE) reports the total number of children accessing ECSE services in the United States; these numbers are broken down by the thirteen eligibility categories. Using the DOE’s numbers, we calculated the percentage of children that access
special education services under each category (See Table 2; U.S. Department of Education, 2007). The five categories we analyzed (i.e., deaf-blindness, developmental delay, hearing impairment, speech or language impairment, and visual impairment (including blindness)) accounted for 82.25% of children actually accessing preschool services in the United States. Overall, the categories we excluded based on missing data in the ECLS-B data set only comprise 17.75% of children actually accessing preschool services. This information indicates that it is likely that more than 13.22% of children between the ages of three and five years are eligible for services due to our exclusion of several of the categories that still make up 17.75% of the overall ECSE service usage.
Table 2

*Actual Eligibility Category Composition According to the DOE*

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autism</td>
<td>9.47%</td>
</tr>
<tr>
<td>Deaf-Blindness</td>
<td>0.02%</td>
</tr>
<tr>
<td>Developmental delay</td>
<td>37.37%</td>
</tr>
<tr>
<td>Emotional-disturbance</td>
<td>0.36%</td>
</tr>
<tr>
<td>Hearing impairment</td>
<td>1.16%</td>
</tr>
<tr>
<td>Intellectual disability</td>
<td>1.80%</td>
</tr>
<tr>
<td>Multiple disabilities</td>
<td>1.02%</td>
</tr>
<tr>
<td>Orthopedic impairment</td>
<td>0.75%</td>
</tr>
<tr>
<td>Other health impairment</td>
<td>3.12%</td>
</tr>
<tr>
<td>Specific learning disability</td>
<td>1.08%</td>
</tr>
<tr>
<td>Speech or language impairment</td>
<td>43.33%</td>
</tr>
<tr>
<td>Traumatic brain injury</td>
<td>0.15%</td>
</tr>
<tr>
<td>Visual impairment (including blindness)</td>
<td>0.37%</td>
</tr>
</tbody>
</table>
Comparing Predicted Rates of ECSE Service Eligibility to Actual Rates of ECSE Service Utilization

Of the children deemed eligible to access preschool services based on previously stated criteria, only a subset reported accessing services through early intervention or through their local school district. In considering either early intervention services or local school district services, approximately 7.32% of the total sample accessed those services, which equates to 20.26% of eligible families. This percentage is likely an overestimation of the families accessing local school district services because due to the error in coding discussed earlier, we could not calculate the percentage of families who definitively accessed local school district services. Instead we included children who had accessed EI services or ECSE services.
CHAPTER 4
DISCUSSION

This study estimated the percentage of children that would qualify for ECSE services based on direct child assessment data collected as part of the ECLS-B data set. We estimated that approximately 13.22% of children qualify for ECSE services. This estimate aligns with the previously published approximations revealing 12% of 9-month-olds and 13.8% of 24-month-olds being eligible for EI services (Rosenberg et al., 2008). This study marks the first comprehensive prevalence estimate of ECSE eligibility. Despite discontinuity regarding eligibility requirements between EI and ECSE eligibility determinations, the rates of eligibility remain relatively consistent for children under the age of five years. This research provides important information to suggest that differences in actual rates of utilization of EI and ECSE and eligibility remain relatively constant when children transition from EI services to ECSE services.

It is important to note that the percentages from the current study reflect best estimates of rates of eligibility for ECSE services. While consistent with eligibility numbers published for the birth to age three range, the estimate of the current study is thought to be conservative and likely underestimates the number of children truly eligible for ECSE services. For example, we did not have sufficient information to determine eligibility for categories such as ASD or intellectual disability. The omission of these categories means the current estimate of children eligible for ECSE services is low. Excluding categories in the overall approximation of children eligible to receive ECSE services underestimates the true number of children that should be accessing these
services. However, whereas in the Magnusson et al. (2016) study, they only examined one of 13 categories of eligibility, this study examined five of the most common eligibility categories for individuals between the ages of three and five years. In order to determine the magnitude that the category omission would have on our overall totals, we examined U.S. DOE data to see what percentage the excluded categories comprise of the overall service usage. We found that the five categories used to estimate total eligibility in this study account for 82.25% of children accessing services in the United States; therefore, the omitted categories only represent less than 20% of children. That said we anticipate that we omitted even less than this estimate as children in our study that were not counted under the excluded categories (e.g., autism spectrum disorder, intellectual disability) may have been deemed eligible in some of the included categories (e.g., developmental delay, speech and language impairment).

The current study also compared the estimated number of children eligible for ECSE services to the actual number of children accessing these services as obtained from parent report data in the ECLS-B data set. Only 20.26% of children deemed eligible for ECSE services accessed either EI or ECSE services. Previously, Rosenberg et al. (2008) found that 10.1% of eligible 24-month-olds received services, and Feinberg et al. (2011) found that 9% of eligible children at 9 months and 12% of eligible children at 24 months received services. Although the percentage found in the current study is higher than those determined by previous studies examining EI services exclusively (20.26% rate of ECSE service access among the eligible population), this study still provided evidence of an underutilization of services.

Of note, the percentage of actual ECSE utilization reported in this study is likely an overestimation of families accessing ECSE services since this percentage includes families who accessed either EI or ECSE services. Due to the error in data coding in the original data set,
families who started receiving ECSE services as new services and who accessed EI services previously were counted as families accessing ECSE services. For this reason, the current study used both EI and ECSE services to estimate rates of access, but this estimate is high. Some families may have received EI services and not ECSE services, but these families would be included in our estimate because we were unable to distinguish between families who received EI services exclusively and families who received both EI and ECSE services. Regardless, approximately 6.1% of all children between the ages of three and five received ECSE services in the United States in 2014 (U.S. Department of Education, 2016). This percentage is much lower than the estimated 13.22% of children in our study who were determined to be eligible based on direct assessment data; therefore, this study unequivocally shows an overall underutilization of ECSE services.

Limitations

Using an existing data set led to several limitations in this study. First, while the assessment measures used to quantify child motor, cognitive, social-emotional, and language skills were derived from pre-existing measures with psychometric support, the measures were not used in their entirety in the ECLS-B data set. Without using preexisting measures in their entirety, it is difficult to compare the scores from the children in the data set to other children outside of the data set and to determine the validity and reliability of the tasks used. Although the cognitive subscales used underwent some psychometric analyses, the other measures were not subject to similar measurement rigor. Second, the ECLS-B data set included scores from individual motor, social-emotional, and language tasks as opposed to reporting a composite score based on performance on multiple tasks. Given that multiple tasks were completed for each area, the current study calculated a composite score to determine delay in each domain; however, a
full measure would be a more accurate representation of a child’s ability in that area. Additionally, only motor, cognitive, social-emotional, and language tasks were included; thus, no measures were included to examine the adaptive domain (a domain often considered for developmental delay eligibility). Although these limitations exist, this study is one of the first to estimate the number of children who should be receiving ECSE services based on direct child assessment data.

**Future Directions**

Even though our estimate depicts an underutilization of services, our approximation is likely a low estimate of the number of children who should be accessing services, as we were not able to calculate a percentage eligible for each category. While the eligibility percentage of 13.22% found in this study falls between the 9-month (12%) and 24-month (13.8%) estimations made by Rosenberg et al. (2008), future research should collect data specific to all special education eligibility categories to determine an even more accurate estimate. Regardless, this estimate still indicates that within school districts, eligible children are not all receiving the necessary services. Additional information to directly assess for ASD and intellectual disability, as well as better information for the developmental delay and SLI categories, would help estimate how many children fall into each category. Direct assessment data would be necessary along with parent and teacher report. To determine a more accurate estimate of children eligible for ECSE services, all the eligibility categories need to be considered. With the estimate provided using the currently available data, districts and states have a better idea of how many children should be receiving services. This information may inform future interventions to increase rates of participation in services and funding for these services.
Conclusion

Although the current study has several limitations, it improved upon previous studies by providing an estimate of the rate of eligibility of accessing ECSE services using direct child assessment data. No previous studies were found that examined the predicted rate of accessing services under particular categories that would qualify children to receive ECSE services. Additionally, the current study shows an underutilization of ECSE services through estimating the number of children who would be eligible to access those services based on direct assessment data and by comparing that estimate to the number of children who accessed those services. An estimate of predicted rates of eligibility would allow for comparisons of usage across groups to determine if specific populations are underutilizing ECSE services. Future research should continue to search for any demographic disparities in accessing ECSE services, such as race and socioeconomic status, and examine the potential causes of these disparities. Barriers to accessing ECSE services should also be addressed in future research. While it is important to know rates of utilization are low, a greater understanding of why this is occurring would be even more beneficial. Steps should be taken in the future to more closely examine those who are successful in accessing services and those who are unsuccessful in accessing services.

Recognizing the underutilization of ECSE services is imperative for planning interventions to increase rates of accessing these services. Interventions that begin early in a child’s life improve many outcomes for that child such as behavior, social competence, and academic performance (e.g., Weikart, 1998; Zigler, Taussig, & Black, 1992). Additionally, investing in interventions early in a child’s life lead to returns on the investment of over $7.00 to every $1.00 invested (Weikart, 1998). These outcomes show the importance of increasing rates
of service access for children who are eligible, and the results of the current study show a high proportion of eligible children are not currently accessing much needed services.
REFERENCES


