

ABSTRACT

LOZA, SHARON EDNA. Children with Social and Behavioral Disorders in Early Intervention: Secondary Data Analysis Using the National Early Intervention Longitudinal Study (Under the direction of Dr. Lance D. Fusarelli).

This national descriptive study investigated children diagnosed with social and behavioral disorders enrolled in Part C early intervention programs guided by the Individuals with Disabilities Education Act (IDEA). Utilizing data from the National Early Intervention Longitudinal Study (NEILS), a sub sample of infants and toddlers with social and behavioral challenges and complete service record data were examined. The NEILS gathered data on children who were initially enrolled in early intervention between September 1997 and November 1998 and followed them through kindergarten.

This study explored the influence of child, family, and service characteristics on parent report of the impact of early intervention on children's development and declassification from early intervention for children with social and behavioral disorders. The study included interview, survey, and service record data collected from families and service providers over the course of children's enrollment in early intervention. Methodologically, descriptive statistics and inferential statistical analyses (including t-tests, ANOVA analyses, correlations, and binary logistic regression) were conducted. A sample of 78 infants and toddlers with social and behavioral disorders with complete service record data were used for analyses.

Study findings provide information related to demographic, diagnostic, and family characteristics of infants and toddlers with social and behavioral disorders receiving early intervention services. Key findings from descriptive analyses indicate approximately three quarters of the sample were males, which was higher than the proportion of males in NEILS study. Findings show that males have greater rates of social and behavioral diagnoses. With respect to eligibility, 91% of children in the sample were determined eligible due to a

“Developmental Delay,” rather than a “Diagnosed Condition” or “At-risk.” Findings showed that the average age of infants and toddlers with social and behavioral disorders enrolled in early intervention was approximately 2 years old. In addition, approximately 90% of children presented with two or more conditions, with the greatest proportion of children (approximately 60%) having communication delays.

Findings exploring group means and the relationship between the average amount of service with the study child and family characteristics were performed. Group means comparisons showed no significant differences related to gender, maternal education, and family income. A small but significant difference was found in the average of amount of scheduled services between children categorized as “Other” in the race/ethnicity variable as compared to White children. Correlation analyses were conducted to identify the relationship between number of diagnoses and age at start in early intervention with the average amount of services children were scheduled to receive while enrolled in early intervention; no correlational relationship was found. Logistic regression analyses were performed to investigate the relationship between the amount of services children were scheduled to receive and child and family characteristics (gender, race/ethnicity, age at start in early intervention, and household income) on parent report of impact of early intervention on children’s development and declassification from early intervention. Results from logistic regression analyses found that the hours per week and child and family characteristics did not predict the odds of parent report of early intervention having a positive impact on children’s development. With respect to declassification, the average hours per week children were scheduled to receive services was the only statistically significant predictor. Implications for research, policy and practice in Part C early intervention are discussed to help identify future research efforts as well as enhancements to national policy and local of

implementation of early intervention programs to better serve infants and toddlers with social and behavioral disorders.

Keywords: Part C, infants and toddlers, social and behavioral disorders, IDEA, declassification, NEILS, impact of early intervention.

© Copyright 2020 by Sharon Edna Loza

All Rights Reserved

Children with Social and Behavioral Disorders in Early Intervention: Secondary Data Analysis
Using the National Early Intervention Longitudinal Study

by
Sharon Edna Loza

A dissertation submitted to the Graduate Faculty of
North Carolina State University
in partial fulfillment of the
requirements for the degree of
Doctor of Philosophy

Educational Research and Policy Analysis

Raleigh, North Carolina

2020

APPROVED BY:

Lance D. Fusarelli
Committee Chair

Anna Egalite

Colleen Paeplow

Kristin Hoffmann

DEDICATION

To my mother and father who instilled my love for education and aspiring success.

To my daughters who were my inspiration and motivation.

To my friends and families who encouraged me and cheered on the sidelines along my journey.

BIOGRAPHY

Sharon Edna Loza was born in Montreal, Canada on November 10, 1976 to two loving, brave, and progressive Protestant, Egyptian parents. Sharon's parents always shared two mantras related to education, "No one can take away your education," and "Education is the key to success." With this, the importance of education was instilled in her from the time she was a young child. Her parents moved to Montreal in the late 1960s as part of the "brain drain" from Egypt to evade the change in radical political leadership and religious discrimination that targeted Christians and pervaded the country.

In 1980, Sharon's family moved to Raleigh, North Carolina. She received her K-12 education through the Wake County Public School System and graduated from the University of North Carolina at Chapel Hill in 1994 with a dual bachelor's degree in Psychology and French and a Master's in Early Intervention and Family Support in 2000. After receiving her Master's, she moved to Maryland and worked at Johns Hopkins University and the University of Maryland. In 2003, she returned to North Carolina to join RTI International supporting a national study investigating the impact of maternal education on children's development. While at RTI, she received a Certificate in Public Health from the Gillings School for Public Health, a Certificate in Non-Profit Management from Duke University, and also pursued a second Master's in Liberal Studies from the University of North Carolina at Greensboro.

Sharon still aspired to attain her PhD. In 2005, she began her doctoral work overseas. During her coursework, she received a pre-doctoral Fellowship opportunity at the Frank Porter Graham Child Development Institute that provided in-depth training in national special education policy and large-scale studies. Through this Fellowship, she decided that her doctoral work would anchor on secondary data analysis. While writing her research proposal, she learned she was expecting her first child. With her family in North Carolina, she returned home and

made her own family the priority for almost the following decade. During that time, she welcomed two beautiful daughters and continued her career in early childhood.

In 2014, she determined it was time to revisit her PhD and found an academic home at North Carolina State University. Since her enrollment at NCSU, she has received a world-class education with a supportive faculty and Department. She has grown academically, professionally, and personally during her time as a student. She currently serves as the President of the Board of the North Carolina Infant and Young Child Mental Health Association and the Branch Head/Part C Coordinator of the North Carolina Infant-Toddler Program (NC's Part C early intervention program). This research and academic journey has been a culmination of her life's work, and she is proud to carry her Wolfpack pride in crossing the finish line.

ACKNOWLEDGEMENTS

I would like to acknowledge my advisor, Dr. Lance Fusarelli, who provided ongoing support to me throughout my doctoral work. Your patience, encouragement, and faith in my ability to achieve this life goal were invaluable.

I would also like to acknowledge my committee members for your constructive feedback and input that helped me strengthen my skills as a researcher and evaluator. Your collective investments in me and my work provided me with the guidance I needed to keep moving forward with my research.

And most of all, to my family, especially mom and dad, who were there at the beginning and throughout this journey. You instilled a passion of learning and never-ceasing curiosity about the world, fostered my aspirations for intellectual, professional, and personal growth, and provided encouragement, support, and the faith to reach my dreams. To my brother who challenged me on my doctoral journey. And to my daughters who were and remain my why. This is a testimony to my love for you and the example I want to be in your life. You both will keep making me a lifelong learner as I continue to learn how to best support you so that you can continue to be your best and do your best.

TABLE OF CONTENTS

LIST OF TABLES	ix
LIST OF FIGURES	x
CHAPTER 1: INTRODUCTION.....	1
Purpose of the Study	6
Significance of the Study	7
Overview of Research Design.....	8
Research Questions	9
Summary	10
CHAPTER 2: LITERATURE REVIEW	12
Conceptual Underpinnings of Early Intervention	12
Biopsychosocial Development	12
Sociocultural History of Special Education – Education as a Human and Civil Right.....	14
The 1950s: Beginning of Special Education Policy in the U.S.	14
The 1960s: Dramatic Developments in Special Education Policy	14
The 1970s: Dramatic Developments in Special Education Policy	15
The 1980s: Infants and Toddlers Become Part of the Education Policy Landscape	17
The 1990s: Individuals with Disabilities Education is Established.....	18
The 2000s: Reauthorization of IDEA	19
Summary of Special Education Policy Evolution.....	19
Early Intervention as Prevention	20
Economics of Early Intervention.....	21
Early Childhood Mental Health for Infants and Toddlers: Definition and Prevalence Rates ...	23
Early Childhood Mental Health for Children with Developmental Disorders.....	24
Theoretical Perspectives for Evaluation of Children in Early Intervention	24
Bronfenbrenner's Ecological Model	25
Sameroff and Chandler's Transactional Model.....	26
Effectiveness of Early Intervention	26
Identification/Eligibility Determination– Child Find.....	30
Child Characteristics	31
Age at Start	32
Race/Ethnicity	33
Gender.....	35
Comorbidity of Social and Behavioral Disorders with Other Conditions	36
Familial Characteristics	37
Maternal Education.....	37
Household Income and Socioeconomic Status	37
Intensity and Type of Services ('appropriate' services).....	38
Challenges in Examining the Effectiveness of Early Intervention	39
Summary	42
CHAPTER 3: METHODOLOGY	43
Research Design.....	43
Research Questions	44
Data Collection.....	45

Data Sources	45
Family Enrollment Interview	46
Service Record Forms.....	46
Transition Family Interview	47
Kindergarten Family Interview.....	47
Variable Selection	48
Study Sample.....	50
Descriptive Statistics	52
Inferential Statistics	52
Group Comparisons	53
Correlations.....	54
Binary Logistic Regression.....	54
Validity and Reliability	58
Limitations of the Study	60
Age of Study.....	60
Self-report Biases	61
Survey Methods Limitations	62
Summary of Limitations.....	63
Ethical Consideration	63
CHAPTER 4: FINDINGS	64
Study Sample.....	64
Missing Data.....	65
Study Power.....	66
Patterns of Missing Data	72
Statistical Approach for Study Analysis.....	73
Research Question 1: Descriptive Statistics of Child and Family Characteristics	75
Child Demographics and Characteristics	75
Family Characteristics	83
Research Question 2: Understanding Service Provision for Children with Social and Behavioral Disorders in Early Intervention.....	84
Examining Group Differences Related to Service Provision	86
Logistic Regression Analyses	90
Missing Data.....	91
Research Question 3: Factors Associated with Impact of Early Intervention.....	91
Research Question 4: Factors Associated with Declassification	92
Chapter Summary.....	94
CHAPTER 5: DISCUSSION	96
Summary of Major Findings	96
Discussion	97
Gender	97
Race/Ethnicity	99
Age at Start	100
Number of Diagnoses and Comorbidity.....	102
Maternal Education	103
Household Income.....	104
Parent Report of Impact of Early Intervention on Children's Development.....	104

Declassification	105
Implications for Research.....	107
Implications for Policy and Practice	109
Concluding Thoughts	111
REFERENCES.....	114
APPENDICES.....	137
Appendix A: Form A from the National Early Intervention Longitudinal Study.....	138
Appendix B: Data Dictionary for Variables Used in Study	139
Appendix C: Diagnosis Categories with Associated Disability Codes Used in NEILS	142
Appendix D: Findings from NEILS Compared to Study Sample	145

LIST OF TABLES

Table 1	Prevalence Rates of Social, Behavioral, and/or Mental Health Disorders in Children Under 5 years old.....	24
Table 2	Key Studies Examining Early Intervention for Infants and Toddlers.....	29
Table 3	Overview of Survey Tools Used in the NEILS	45
Table 4	Selected Variables from the National Early Intervention Longitudinal Study	48
Table 5	Table of Missing Values in Study Sample.....	66
Table 6	Sensitivity Power Analysis Results	68
Table 7	Minimal Sample Size Requirements to Achieve Statistical Power at Varying Effect Sizes	69
Table 8	Chi-square Tests of Contingency for Independent and Dependent Variables	70
Table 9	Correlational Analysis of Independent and Dependent Variables	71
Table 10	Correlational Analysis of Independent Variables to Assess Multicollinearity	71
Table 11	Summary of Child Demographics	76
Table 12	Crosstabulation Analysis of Race/Ethnicity and Social and Behavioral Diagnoses....	80
Table 13	Summary of Family Characteristics.....	84
Table 14	One-Way ANOVA of Average Hours Per Week Across Demographic Groups.....	88
Table 15	Tukey Post Hoc Test Results Comparing Racial/Ethnic Group Means	89
Table 16	Logistic Regression of Parent Report of Impact of Early Intervention	92
Table 17	Logistic Regression of Declassification and Independent Variables.....	94

LIST OF FIGURES

Figure 1	Map of States That Participated in the NEILS.....	51
Figure 2	Eligibility Category for Children with Social and Behavioral Disorders	77
Figure 3	Breakdown of Social and Behavioral Diagnoses.....	78
Figure 4	Crosstabulation of Gender and Social and Behavioral Diagnoses.....	79
Figure 5	Number of Diagnoses for Children with Social and Behavioral Disorders.....	81
Figure 6	Comorbid Conditions for Children with Social and Behavioral Disorders	82

CHAPTER 1: INTRODUCTION

Early intervention may well be the centerpiece of our nation’s efforts on behalf of vulnerable children and their families (Feldman, 2004, p. 38)

The passing of the Individuals with Disabilities Education Act (IDEA) led to a dramatic shift in civil and social programs and services for individuals with disabilities. The Part C (also known as Early Intervention) program, established in 1986, was an act by Congress to recognize the “urgent and substantial need to: enhance the development of infants and toddlers with disabilities; reduce educational costs by minimizing the need for special education through early intervention; minimize the likelihood of institutionalization, and maximize independent living; and, enhance the capacity of families to meet their child’s needs” (Individuals with Disabilities Education Act, 20 USC §1432). This legislation highlighted the critical importance of age in beginning special education and providing family supports in infancy as essential to improving child, families, and societal outcomes.

Part C of the IDEA is a federal grant program currently implemented in all fifty states and eligible territories; it mandates that early intervention be universally available to every family with children meeting certain eligibility criteria. States have discretion regarding eligibility criteria. Some states offer eligibility for children and families with social and/or environmental risk factors (i.e., substance abuse, incarceration, physical abuse, etc.), while most states have eligibility criteria based on biological/neurobiological bases (i.e., developmental delays and/or established medical conditions).

Part C of the IDEA elevated the practice and research related to the benefits of intervening early with children and families to improve child outcomes. From a practice lens, early intervention has been conceptualized as a system comprised of resource and social supports, and the provision of information and services for young children, ages birth to 3 years,

with established medical conditions or at-risk for and/or identified with disabilities and delays and their families (Crosby, 2004; Guralnick, 1998; Shonkoff & Meisels, 2000). Legislatively, the mandate highlighted the intention to “reduce educational costs by minimizing the need for special education through early intervention” (U.S. Department of Education, 2019). Various studies examining the potential cost-benefit for early childhood intervention programs support the notion that investing in early intervention is beneficial not only to the individual receiving intervention, but to society as a whole (Heckman, 2012; Kilburn & Karoly, 2008; Lee et al., 2012). While these studies have not specifically examined Part C of the IDEA, they offer support and value to early intervention as a means of improving both child, family, and societal outcomes. James Heckman, an international early childhood economics expert, stated that, “The highest rate of return in early childhood development comes from investing as early as possible, from birth through age 5, in disadvantaged families. Starting at age 3 or 4 is too little too late, as it fails to recognize that skills beget skills in a complementary and dynamic way. Efforts should focus on the first years for the greatest efficiency and effectiveness” (“Invest in Early Childhood,” 2017). Part C of the IDEA is a legally mandated program that offers an opportunity to intervene in the early years for infants and toddlers to improve developmental outcomes that lay the foundation for later academic and social success.

Recent evidence from brain science demonstrates the first 2000 days (birth to 3 years old) are foundational to establishing neural connections that subsequently lead to varying developmental outcomes (Center on the Developing Child, 2007; Haartsen, Jones & Johnson, 2016; Moore, Arefadib, Deery, & West, 2017, Shonkoff, 2000; Tierney & Nelson, 2009). Of note, a child’s brain volume and architecture are predominantly established by age 3. Brain development for young children is heavily influenced by their environmental and social supports.

A child's first few years of life are particularly critical in laying neural pathways that support social, emotional, and behavioral development (Sherman, 2014). Social and environmental factors, both protective and detrimental, directly influence the risk for altered neurobiological development and negative social and behavioral outcomes (Thompson & Nelson, 2001).

Research has shown that children exposed to toxic stress (e.g., extreme poverty, abuse and/or neglect, and/or caregiver mental health or substance abuse problems) have impaired neurological functioning in areas of the brain that are responsible for linguistic, cognitive, and social-emotional development ("Early Childhood Mental Health," n.d.; National Scientific Council on the Developing Child, 2004). Children with existing developmental delays and/or medical conditions, in addition to exposure to toxic stress, are even more vulnerable to mental health disorders. Evidence suggests that social, emotional, and behavioral disorders are not transient and that they have lasting negative effects on children's educational and psychological outcomes (Briggs-Gowan, Carter, Bosson-Heenan, Guyer, & Horwitz, 2006; Gleason, Goldson, & Yogman, 2016)

Social, emotional, and behavioral development and competence in young children is a strong predictor of later academic success in elementary school. Children's social emotional competence has been shown to have direct implications on behavior and serve as a stronger predictor of academic success than cognitive skills and family background (Raver & Knitzer, 2002). Social emotional health in very young children (also referred to as early childhood mental health) is essential to how children engage socially with others, manage their behavior (i.e., self-regulate), and learn. In infants and toddlers, social-emotional health and development is often expressed through their behaviors and matures with age, typically developing in the toddler and preschool years (National Scientific Council on the Developing Child, 2004; Murray &

Palaiologou, 2018). Early identification and treatment of social and behavioral issues is critical for children's short- and long-term developmental and academic success.

Early intervention has been argued as an effective means for ameliorating later delays and improving developmental outcomes for young children with disabilities (Bailey et al., 1999; Feldman, 2004; Guralnick, 1998). However, the literature relating to early intervention for children with disabilities offers controversial evidence as to its effectiveness (Farran, 2000; Guralnick, 1998). Early intervention effectiveness has often been measured by evidence of gains in children's developmental trajectories. Declassification, or exiting the special education service system, has also been offered as a proxy measure of early intervention success (Innocenti & Price, 2005). Child characteristics (e.g. disability, race, gender, and age), familial characteristics (such as maternal education, marital status, income), and contextual characteristics (such as services) have been cited in the literature as factors that impact early intervention effectiveness (Koegh, 2002). Findings from such studies have critical implications for policy development and further research efforts. With the lack of substantiating evidence as to what factors render the most promising outcomes for young children in early intervention, further studies are needed.

To gather more rigorous data regarding early intervention and implementation of the Part C program of the IDEA, the Office of Special Education Programs funded the National Early Intervention Longitudinal Study (NEILS). The NEILS, a large-scale longitudinal study, was conducted from 1996 to 2007. It was the first national study of the implementation of Part C of the Individuals with Disabilities Education Act (IDEA) early intervention program for infants and toddlers with disabilities, or at risk for developmental delay, and their families (Hebbeler et al., 2007). The study aimed to answer questions related to better understanding the population of children enrolled in early intervention, including the type, frequency, and cost of services

children receive, and children's outcomes. Researchers recruited a nationally representative sample of more than 3,000 children to address these questions. While the study yielded many seminal findings, the available literature from the study does not include specific outcome findings related to children with social and behavioral disorders. However, researchers did gather data on specific social and behavioral diagnoses affording further examination of this subset of children. Since the study ended, the NEILS dataset has become publicly available for researchers to continue examining critical questions related to children enrolled in early intervention.

Early intervention has proven effective in helping prevent and narrow developmental gaps lasting beyond early childhood (Guralnick, 1998). The notion of starting early as critical to improving outcomes has reinforced the importance of the age that children start receiving early intervention. Various clinical and evidence-based interventions have been shown to improve outcomes for young children with social, emotional, and behavioral issues (National Academy of Sciences, Engineering, and Medicine, 2016). However, there is a dearth of literature examining the impact of early intervention on children with social and behavioral disorders. The literature on early intervention also shows that demographic characteristics serve an important role in developmental outcomes and predictive growth of children with disabilities (Scarborough et al., 2004); however, research regarding the number, intensity, and specificity of services has been inconclusive in predicting outcomes due to the wide range of variability in children's needs (Hebbeler et al., 2007; Innocenti & White, 1993). This study serves to supplement the academic and policy field by providing information about the potential factors that help children diagnosed with social and behavioral issues and receiving services through Part C of the IDEA legislation exit special education (also known as declassification).

Purpose of the Study

Evidence has demonstrated that a child's neurological development is interlinked with their social environment and relationships; the influence of children's environments and relationships directly influence neurological development and have lifelong impacts. The Part C program of the IDEA is a legislative mandate that provides necessary supports and services to families with young children at-risk for and with developmental delays and/or medical conditions that affect their social-emotional and behavioral health (Bagner, Frazier, & Berkovits, 2014). The early intervention program provides a unique opportunity to ameliorate children's developmental outcomes.

The purpose of this descriptive quantitative study is to better understand the population of children with social and behavioral disorders receiving early intervention and to examine the impact of early intervention on children's development. The only national research study that has focused exclusively on Part C of the IDEA is the National Early Intervention Longitudinal Study (NEILS). NEILS researchers gathered data on diagnoses for children enrolled in early intervention and generally categorized them based on developmental domains. Social and behavioral disorders included diagnoses such as attention deficits, tantrums, and behavioral problems. NEILS data on children categorized as having social and behavioral disorders were used to examine child and family demographics, the amount of services children were scheduled to receive, parent report of the impact of early intervention on children's development, and whether the children were declassified (i.e., they did not continue to receive special education services in preschool). By exploring child and family characteristics, service receipt, and children's outcomes, the study aimed to understand the influence of early intervention on children with social and behavioral disorders. Results from this study can help inform future

research, practice, and policy efforts to better serve infants and toddlers with identified social and behavioral disorders being served by Part C programs.

Significance of the Study

At present, there is a dearth of literature that examines social and behavioral health (also referred to as) early childhood mental health specifically in early intervention. This research can fill a gap in the academic, practice, and policy literature to better understand the impact of early intervention on children with social emotional disorders. This study examines key factors in serving children with social and behavioral disorders and their families in early intervention and provides information about demographic factors as well as information related to service provision and outcomes for this subset of children. By better understanding this population, further attention can be brought to the value of IDEA legislation in serving infants and toddlers with social and behavioral disorders and their families.

In addition to addressing a gap in the literature, this study serves as a model for individual state Part C of the IDEA programs to explore children with social and behavioral diagnoses. By providing a systematic way of considering key demographic and service factors that influence outcomes, state administrators and policy makers can model this study to look at their own state data in order to better serve their children and families. Further, state programs can use this study to better understand this group of children.

Results from this research inform national- and state-level efforts promoting early intervention as a means of identifying and serving infants and toddlers with risk factors affecting their social and behavioral development. This study offered an opportunity to examine the intersection of early intervention and early childhood mental health, which can be instrumental in helping support children's brain development and subsequently, positive short- and long-term social and academic outcomes. In addition, findings support policy and practice to promote

earlier identification of social and behavioral disorders and services thus assuring that young children receive services and supports that can help ameliorate negative outcomes.

Overview of Research Design

This research utilized a quantitative secondary data analysis research design using extant survey data from the National Early Intervention Longitudinal Study. The NEILS was a large-scale longitudinal study that examined children enrolled in early intervention; the study followed children enrolled in early intervention (between the ages of birth to 31 months) until kindergarten in order to understand the long-term outcomes of children receiving early intervention. This study investigated a subset of children from the NEILS and examined the characteristics of children categorized as having social and behavioral disorders. Additionally, this study explored factors associated with improved outcomes (i.e., parent report on impact of early intervention and declassification) for children with social and behavioral disorders enrolled in early intervention. Descriptive and inferential statistics were used to investigate outcomes for children classified as having social and behavioral disorders.

Secondary data analysis with large-scale data sets, such as the NEILS, provides researchers an opportunity to answer questions in a time and cost-efficient manner to address important and potentially “high impact” research questions (Cheng & Phillips, 2014; Smith et. al, 2011). Further, Cheng and Phillips (2014) note that secondary data analysis can also “provide a more nuanced assessment of the primary results from the original study” (p. 371). By using the NEILS to examine the subset of children with social and behavioral disorders, this study provided a more nuanced assessment of early intervention and its impact on children’s development.

Research Questions

This study aimed to expand our knowledge about the population of children with social and behavioral disorders enrolled in early intervention. The greatest proportion of children in Part C early intervention programs are diagnosed with a developmental delay or an established medical condition. Little is known about infants and toddlers with social and behavioral disorders in early intervention. In addition, to better understanding this subpopulation of children, this study intended to answer questions about the role of child and family characteristics and service receipt on parent report of the impact of early intervention on child development and declassification. By exploring these questions, we can better understand the impact that IDEA Part C has on infants and toddlers with social and behavioral disorders. By using the NEILS data set, I was able to use a subset of data to help describe the population of children with social and behavioral disorders in early intervention, their service receipt, parent report of the impact of early intervention on development and declassification from early intervention. I answered the following research questions:

Research Question 1: Who are the children with social and behavioral disorders and their families receiving early intervention services? This question aimed to provide a better understanding of the demographic characteristics of this subset of children in early intervention. To answer this question, I examined child demographic factors of race, gender, eligibility determination, age at start (aka age of enrollment), and number of diagnoses.

Sub question 1a: What are the family characteristics of children with a social or behavioral diagnosis receiving early intervention services? I examined maternal education and household income.

Research Question 2: What is the total amount of early intervention services (hours per week) that children with social and behavioral disorders were scheduled to receive while enrolled in early intervention?

Sub question 2a: What differences exist in the amount of scheduled services for children with social and/or behavioral disorders? Are there differences by gender? By eligibility determination? By household income? By maternal education? By race/ethnicity?

Sub question 2b: Is there a relationship between age at start and amount of scheduled early intervention services that children with social and behavioral disorders in early intervention received? Between number of diagnoses and amount of scheduled services?

Research Question 3: What factors are associated with parent report of impact of early intervention services on children's development? I regressed parent report of impact of early intervention services on children's development on the average amount of services children were scheduled to receive in early intervention while controlling for child characteristics (gender, race, eligibility category, number of diagnoses) and family characteristics (maternal education and household income).

Research Question 4: What child, family, and service factors are associated with children's declassification from early intervention? I regressed declassification from early intervention (using no IEP as a proxy variable) on the amount of services children were scheduled to receive in early intervention while controlling for child characteristics (gender, race, eligibility category, number of diagnoses) and family characteristics (maternal education, household income, and parent report of impact of early intervention services on children's development).

Summary

This chapter introduced this study, its purpose, and significance to the scholarly, policy, and practice fields. This chapter also introduced the study's research design and questions which

aim to describe a national subset of children with social and behavioral disorders enrolled in early intervention. To address the research questions, I use a quantitative secondary data analysis design; this introduction provided an overview of the original study and data sources that were used from the National Early Intervention Longitudinal Study.

CHAPTER 2: LITERATURE REVIEW

In this chapter, conceptual and theoretical underpinnings of early intervention are discussed, and a historical review of the Individuals with Disabilities Education Act leading up to Part C is provided. This chapter includes a review of the literature regarding current prevalence rates of social, emotional, and behavioral disorders in young children. In addition, information is provided about the effectiveness of early intervention and key factors affecting outcomes for young children and their families enrolled in early intervention.

Conceptual Underpinnings of Early Intervention

The field of early intervention for children with disabilities has been grounded in a notable evolution of scientific progress, federal policies, social and civic perspectives of child and family rights, and economics. These conceptual underpinnings serve as the foundation of evidence for both the importance and necessity of early intervention. Researchers, policy makers, and practitioners continue to provide evidence highlighting the importance of early years to later development that impact not only the child and family but society as well.

Biopsychosocial Development

A child experiences the most significant brain development in the first three years of life. From the time a child is born to its first birthday, the volume of the brain doubles in size. By their third birthday, a child's brain will reach 80% of its adult volume (Nowakowski, 2006). At the same time the brain grows in volume, synapses are formed at a greater rate than any other time in life (Urban Institute, n.d.).

Early childhood development consists of a dynamic interplay of genetic, biological, and environmental influences. The early years present a foundational time for developing neurological processes of young children under the age of 3 (Shonkoff & Phillips, 2000). According to Goleman (2006), "Seventy percent of what is given to us genetically is brought to

fruition by our environmental experiences” (Schiller, 2010, p. 26). Children who experience rich, responsive environments and interactions establish a greater number of neurological connections (Schiller, 2010). Environmental influences, or lack thereof, play an essential role in children’s neurobiological development. Critical and sensitive periods of brain development are directly affected by the different stimuli children experience (Families and Work Institute, 1996). The brain develops neural pathways in response to external stimuli; where stimuli are lacking, the process of ‘pruning,’ or the elimination of neural pathways minimally or unexposed to experience, occurs (Thompson, 1998). Young children with developmental delays and disabilities often have structural and/or functional disadvantages affecting neural development, subsequently resulting in social and behavioral disorders.

Most of the social emotional development in young children is heavily reliant on environmental and social supports provided from caregivers until children are 18 months of age (Malik & Marwaha, 2020). At the same time, other critical biological aspects of children’s development (such as motor, language, sensory, self-help skills, and cognitive/intellectual development) are also being established. The interplay of children’s biological, social emotional, and psychological development are foundations to children’s behaviors. As children age into toddlerhood and the preschool years (18-54 months of age), they begin to assert their independence, and more prominent expressions of emotion and behavior emerge. Behavioral issues, such as tantrums, hyperactivity, and impulse control become more evident (Gadow, Sprafkin, & Nolan, 2001; Malik & Marwaha, 2020). Social, emotional, and behavioral disorders are often diagnosed when children are toddlers and older.

Considerations of race/ethnicity and gender also come into play when understanding the biopsychosocial nature of development. In addition, caregiver resources, such as education and

financial supports, also play a critical role in supporting social, emotional, and behavioral development in infants and toddlers (Aratani, Wight, & Cooper, 2011). Further research is needed to examine how these factors affect infants and toddlers with social and behavioral disorders, especially within the context of Part C early intervention programs.

Sociocultural History of Special Education – Education as a Human and Civil Right

Federal policies for young children with disabilities have evolved over the course of the last 50 years as a result of various political and social confluences. From as early as the 1950s, efforts were being made to assist children with varying disabilities, with a particular emphasis on children with mental retardation and children who were deaf and/or blind.

The 1950s: Beginning of Special Education Policy in the U.S. Under President Eisenhower, various federal initiatives were created. Most markedly in 1952, with significant parent and community advocacy, the National Association of Parents and Friends for Retarded Children was established (The Arc, n.d.). Following this, a flurry of federal policies addressing the need for teacher training, resources, and research for children with mental retardation were created. Towards the end of this decade, recognition of advocacy and parent groups and their efforts led to additional legislative efforts, including PL 85-926, which was passed to provide training for educators of students with mental retardation, and The Training of Professional Personnel Act of 1959 (PL 86-158), which was created to assist leaders teaching children with mental retardation (Office of Special Education Programs, 2007).

The 1960s: Dramatic Developments in Special Education Policy. The 1960s was a time of great political and social change in America. Under the Presidency of Lyndon B. Johnson, several domestic initiatives were created to target disparities of poverty and racial injustice. Key initiatives under Johnson's administration included the Great Society and War on Poverty. These programs were an enactment of an ongoing movement to implement civil rights

laws targeting the most underserved (Germany, 2019). Concurrently, there was a growing awareness in the academic and political community of the importance and impact of early years on later development. In 1965, P.L. 89-10, Title I of the Elementary and Secondary Education Act (ESEA) was passed as a federal policy to fund elementary and secondary education (Boyle & Lee, n.d.). Under ESEA, Head Start began, which provided a vision of comprehensive services for young children in poverty to provide them with additional resources to influence later development and as part of Johnson's War on Poverty. In the same year, an amendment to ESEA led to P.L. 89-313, or the Federal Assistance to State Operated and Supported Schools for the Handicapped (FASOSSH). This law provided grant money to states for special schools to serve children with disabilities. P.L. 89-313 was significant in that it provided funds for programs for children from birth to 20 (Hebbeler, Smith, & Black, 1991). Shortly thereafter, in 1968 under the head of the Bureau of Education for the Handicapped (BEH), Congress passed P.L. 90-538, the Handicapped Children Early Education Assistance Act (HCEEP). The HCEEP was the beginning of federal mandates focused on young children with special needs and provided seed money for model programs (i.e., experimental preschools and early education programs) to provide for young children with special needs (McLean et al., 2016). Twenty four demonstration projects were funded under HCEEP, which fulfilled Congress' goal to invest in the exploration of early education opportunities for young children with disabilities (Hebbeler et al. 1991).

The 1970s: Dramatic Developments in Special Education Policy. Following this mandate came a Congressional consolidation of existing policies for children with disabilities under P.L. 91-230, or the Education of the Handicapped Act (EHA) in 1970 (Coates, 1985). At the same time, the Family Education Rights and Privacy Act (FERPA) was passed. In essence, P.L. 91-230 provided grant money to states to improve programs for handicapped children from

the age of 3 to 21. This law built on years of expanding special education policies and programs and further reinforced the significance of reaching young children (Smith, 1994). The passing of P.L. 93-380, extending the Education of the Handicapped Act in 1974, brought implications to state education agencies receiving federal funds to serve children with disabilities (Gettings, 1974). Under this law, further regulations regarding due process, testing and evaluation, service provision, and the notion of least restrictive environment began to formulate what would ultimately be the foundation for special education in United States the following year (Hebbeler et al., 1991). This legislation also indicated the social movement from institutionalizing children with disabilities to a deinstitutionalization and community acceptance of children with special needs. In 1975, under the Presidency of Gerald R. Ford, Congress passed the Education for All Handicapped Children Act (EAHCA), P.L. 94-142, which required every public school district in the United States to provide all students with disabilities ages 3 through 21 with an individualized and free appropriate public education (FAPE) in the least restrictive environment (Trohanis, 2002).

P.L. 94-142 was landmark legislation as it brought the notion of entitlement of education for all to truly incorporate all underserved and underprivileged children, not just those in poverty and/or racially disparate. Likewise, it began to expand the notion of entitlement to younger children as well. Inclusive in P.L. 94-142 was the Preschool Incentive Grant Program that provided states with additional funding to expand services for children between the ages of 3 to 5 (Office of Special Education and Rehabilitative Services, 2010). In 1976, as part of the HCEEP, the BEH created State Implementation Grants (SIGs) to support “needs assessments, the convening of planning groups, the development and dissemination of plans, staff training, the development of program standards and guidelines, the development and support of consortia, and

data collection and analysis” (McLean et al., 2016, p. 7). The result of awarded grants facilitated the creation of Early Childhood Research Institutes (ECRIs) in 1977, which began years of research investigating children with disabilities in “typical” settings. The outcomes from the ECRIs were groundbreaking and provided not only additional interest and expansion of research centers but also programs and practices for young children with special needs (Smith & McKenna, 1994). In 1979, a study investigating the implementation of P.L. 94-142 found that of the school districts studied, only half were providing pre-school services, highlighting the need for additional resources to support the population need.

The 1980s: Infants and Toddlers Become Part of the Education Policy Landscape. A few years later, in 1983, Congress passed P.L. 98-199, an amended version of the Education of the Handicapped Act to help states create comprehensive services for handicapped children from birth to 5 years (Trohanis, 2002). To do this, State Plan Grants (SPGs) were offered on a non-competitive basis to provide states with resources to plan services according to their populations of children and their specific needs. In the amended law, the Preschool Incentive Grant Program extended the age of provision to children from birth to age 5. This signaled not only the developing interest for greater service provision but also the importance of reaching children under the age of 3 (Hebbeler et al., 1991).

In 1986, Congress passed P.L. 99-457 that mandated services for young children with disabilities to include infants and toddlers (birth to 2 years) and included regulations that served to outline the necessity of family involvement and service provision as entitlements to all Americans (Trohanis, 2002). This groundbreaking policy integrated federal requirements to provide services and mandated necessary parental and interagency involvement to ensure the best possible outcomes for young children with disabilities.

The 1990s: Individuals with Disabilities Education is Established. Further amendments were made to EHA, which ultimately led to the 1990 congressional passing of P.L. 101-476 and changed its name to the Individuals with Disabilities Education Act (IDEA). The 1990 amendment incorporated transition services, particularly for older populations (Office of Special Education Programs, 2017). Small amendments were made in 1991, 1992, and 1994 that clarified the policy and provided more insight for the older population served under the law (Hebbeler et al., 1991). The next large iteration of IDEA came in 1997 (P.L. 105-17) with notable amendments to the policy in which additional grants were offered for assistance to infants, toddlers, and parent and professional training (Trohanis, 2002).

While IDEA amendments were ongoing, President George W. Bush came into office and began shifting the political and social dimensions within the country to that of market and capital principles and educational accountability. As one of Bush's first large inaugural initiatives in 2001, the No Child Left Behind Act (Public Law 107-110) was the beginning of a growing movement towards the accountability and monitoring of children's academic performance (Gamoran, 2013). Likewise, existing educational government institutions became more outcome and quantitatively oriented (e.g., What Works Clearinghouse, National Center for Educational Sciences). As such, governmental funding streams and research focused on gaining more information on children with disabilities.

Within this context, the Office of Special Education programs provided funding for a series of longitudinal studies investigating children with disabilities on a national scale to gain more and better information on the population. The studies together painted a nationally representative picture of children receiving special education services. These studies grew out of the evolving special education policies for the last half-century and were part of a continuous

movement to gain more knowledge to augment policy and services for young children with disabilities and their families. Of the studies, the National Early Intervention Longitudinal Study (NEILS) was created to better understand the population of infants and toddlers receiving special education services.

The 2000s: Reauthorization of IDEA. In December 2004, President Bush reauthorized the Individuals with Disabilities Education Act (Turnbull, 2005). The Reauthorization primarily focused on changes related to Part B, including Individualized Education Plan processes, due process, and student discipline (Weiss & Mettrick, 2015). In 2011, during the Obama administration, more significant updates were made to address changes in Part C. The Office of Special Education and Rehabilitative Services, U.S. Department of Education disseminated Federal Register 76 that updated definitions (related to multidisciplinary teams and native language), application requirements, enhancements to Child Find, evaluations and assessments, IFSPs, procedural safeguards, payment systems, and public reporting (Individuals with Disabilities Education Act, 2011). These measures were intended to ensure greater accountability and transparency of Part C of the IDEA programs.

Summary of Special Education Policy Evolution. Over the course of the history of special education policy, the aims of policies have been to provide greater understanding and/or resources to children with special needs. Stemming from movements targeting underprivileged and underserved populations, political and social contexts have dictated the development of refined policies to address such needs. Special education policies for preschoolers, beginning with HCEEP and following up until the legislation of IDEA, laid the groundwork for existing programs and practices. With policy change there has also come a change in the social climate in which children are served. By taking federal initiatives to better understand what is happening

with children receiving special education services, the goal is to refine existing policies and ameliorate the lives of children with disabilities nationwide. NEILS was one of many studies implemented to contribute to this aim and was intended to generate a greater knowledge base and understanding to further the mission of providing a free and appropriate education for all.

Early Intervention as Prevention

Early intervention has been conceived as a means to eliminate, prevent, and/or treat the onset of later developmental and educational delays in young children at-risk and/or with special needs. According to Ramey and Ramey (2005), “A policy alternative to remedial and special education is primary prevention. Primary prevention entails identification of high-risk individuals among the general population and the provision of the hypothesized missing essential experiences for normative development” (p. 234). Three levels of prevention have been described as a means of serving children at-risk or with existing disabilities (Sameroff & Fiese, 2000; Snow et al., 1998). In primary prevention, the goal is to reduce the incidence of delay/disease (Snow et al., 1998). Children who are environmentally or biologically at-risk for later developmental and/or educational delays often receive secondary prevention, which constitutes efforts to reduce the prevalence of later delays/disability (Snow et al., 1998). Head start policy and programs serve this very purpose by offering services to disadvantaged children to prevent later cognitive and social delays. Further, for Part C programs that offer eligibility based on risk factors, early intervention serves to help prevent further developmental delays. For children with identified delays and disabilities, tertiary prevention involves interventions in the hopes of preventing further delays (Crosby, 2004; Sameroff & Fiese, 2000). For children identified with social and behavioral disorders, early intervention can provide early support for and interventions to remediate the impacts of these disorders on later social and academic attainment. Each distinction reinforces the necessity and importance of early intervention and

stipulates a rationale for ameliorating secondary problems for children with and at-risk for developmental delays and disabilities.

More recent attention has been drawn to the significance of challenging behavior (e.g., tantrums, aggression, noncompliance) in young children. Recent literature indicates preschool-age children who exhibit challenging behavior have experienced high rates of suspension and expulsion from state-subsidized preschools, exceeding the rate of kindergarten expulsion by three times (Gilliam, 2005). As early childhood education and intervention has been shown to ameliorate outcomes for most children, preschool suspensions have a deleterious effect on maximizing children's optimal development and learning (Dunlap et al., 2006). As was intended by the passing of Part C legislation of the IDEA, early intervention can serve as a preventive measure for children at-risk and/or with developmental delays. According to Diamond, Justice, Siegeler, and Snyder (2013), "Without early prevention and intervention, social, emotional, and behavioral challenges are likely to persist or worsen beyond the early childhood years and lead to negative outcomes, including poor academic achievement, problems with socialization, and mental health concerns" (p. 27). In the same way, early intervention was intended to also reduce the costs associated with later remedial and special education supports. Economists and educational researchers have explored the economic benefits of early intervention over the past half century.

Economics of Early Intervention

One of the primary goals of IDEA was to 'reduce educational costs' (Trohanis, 2002). A foundational belief to this goal was that early intervention programs for young children with disabilities would offer benefits that outweigh the cost of program implementation (Early Childhood Outcomes Center, 2005; Meisels & Shonkoff, 1990; Jesinski, 2006; Spiker & Hopmann, 1997). Since the 1980s, studies have been conducted to examine the cost-benefit that

early intervention has on society, from both a social and economic perspective (Kilburn & Karoly, 2008). To date, there exist minimal findings from research as to the economic benefits of early intervention for children with developmental disabilities, primarily due to methodological problems of conducting economic studies (Barnett, 2000; Wood, 1981).

Because of the individualized nature of child and family needs and variability in service provision, an overall economic impact of early intervention proves challenging (Hebbeler et al., 2009). Economic studies for evaluating young children with disabilities have been particularly challenging, as there are relatively few sound studies investigating the long-term efficacy of early intervention. According to Barnett and Escobar (1987), “long-term efficacy is a central issue in the economics of early intervention because most of the quantifiable economic benefits depend on long-term effects” (p. 388). A better understanding of the nature of populations of children receiving services and the impact of start of services on developmental outcomes would enable economic analyses to better inform policymakers as to both the worthiness of investment and how funds should be distributed among various facets of early intervention programs (e.g., early identification programs such as Child Find, assessment, and professional training) (Barnett & Escobar, 1998; Barnett, 2000). Barnett and Escobar (1990) examined economic studies that included at-risk children and children with disabilities and concluded that the costs of early intervention ranged from approximately \$1,500 to \$9,000 per child per year, depending upon type of service provided, duration of service, and intensity of service.

The economics of early intervention have been well cited in studies investigating the impact of early intervention for at-risk children. Wood (1981) conducted a study in which he developed a model to investigate the cost-effectiveness of early intervention using the assumption that: a) children who received services earlier would later not require special

education and b) delaying intervention would require additional remedial services at a higher cost. Results from this study indicated that early intervention was cost-effective. In addition, Fish (2002) noted evidence from Barnett (2000) and Kilburn and Karoly (2008) highlighting that investments in early intervention produced both social and economic benefits, “particularly associated with a decreased need for services” (p. 8).

Early Childhood Mental Health for Infants and Toddlers: Definition and Prevalence Rates

According to Zero to Three, the definition of early childhood mental health (also referred to as social emotional health) is “the developing capacity of the child from birth to 5 years of age to form close and secure adult and peer relationships; experience, manage, and express a full range of emotions; and explore the environment and learn—all in the context of family, community, and culture” (Zero to Three: <https://www.zerotothree.org/resources/110-infant-early-childhood-mental-health>). Children’s social, emotional, and behavioral development are associated with the broader classification of early childhood mental health.

Because young children process and express emotions differently than adults and their development is often rapid and varied in the early years, identification and diagnoses of disorders prove challenging. With this, there is variability in the literature as to the prevalence and rates of mental health or social, emotional, and/or behavioral disorders in early childhood. Table 1 provides an overview of the literature on prevalence rates of social, emotional, and behavioral disorders by source.

Table 1

Prevalence Rates of Social, Emotional, Behavioral, and/or Mental Health Disorders in Children Under 5 Years Old

Source	Prevalence Rates
American Academy of Pediatrics Council on Early Childhood, Committee on Psychosocial Aspects of Child and Family Health, Section on Developmental and Behavioral Pediatrics	8-10% of young children under 5 years old
von Klitzing, Döhnert, Kroll, and Grube (2015)	17% of children aged 1–5 years old have mental disorders
Brauner and Stephens (2006)	between 9.5% and 14.2% of children under the age of 5
Carson (2004)	less than one percent of children under age 5 with emotional behavioral problems

Early Childhood Mental Health for Children with Developmental Disorders

Factors that affect social, behavioral, and psychological disorders in young children include familial and environmental conditions, as well as biological and developmental conditions. For children with developmental delays, social, emotional, behavioral, and psychological disorders are more prominent. Evidence suggests high rates of comorbidity for children with social and behavioral disorders (Baker et al., 2010).

Theoretical Perspectives for Evaluation of Children in Early Intervention

Historically, early intervention research has been argued as lacking a strong theoretical base (Dunst, 1990; Odom, 1988). Interventions and their respective outcomes have often been mismatched in conceptual bases, and research regarding efficacy has led to vague, hypothetical, and often misguided interpretations of outcomes (Casto & Lewis, 1986; Dunst, 1990; Dunst & Rheingrover, 1981). Further, evaluations have taken limited perspectives on the multiple factors affecting child outcomes (i.e., familial and environmental), which do not fully account for the

true impact of the intervention (Dunst, 1990; Shonkoff & Hauser-Cram, 1987). By identifying the theoretical base for evaluations and using a comprehensive model that incorporates the multiplicity of variables affecting development, more robust findings can be made; such examples are that of Bronfenbrenner and Sameroff and Chandler.

Bronfenbrenner's Ecological Model

Bronfenbrenner's Ecological Model of Child Development incorporates the various biological, socio-cultural, and physical environments in which children develop and their effects on development (Bronfenbrenner, 1979). Child characteristics, family dynamics, school/setting characteristics, communities, and services rendered impact children's developmental trajectory (Bronfenbrenner, 1992). With the passing of P.L. 99-457, requiring legal, school, and service provision for children with disabilities and their families as actors in the process, the Bronfenbrenner model has been central to research in the field, when taking an environmental and contextual perspective of young children's development. According to Sontag (1996), the Bronfenbrenner model provides a critical framework to apply in disabilities research. By examining these characteristics and their interlocking effects, a more comprehensive understanding of the impact and importance that early intervention and preschool special education have on young children with disabilities can be determined.

Bronfenbrenner's Ecological Model of Child Development theory accounts for the various biological, socio-cultural, and physical environments in which children develop and the transactional effects on their development. Moreover, with the passing of Part C of the IDEA, requiring legal, school, and service provision for children with disabilities and their families as actors in the process, the Bronfenbrenner model has been central to research in the field when taking an environmental and contextual perspective of young children's development.

Bronfenbrenner's model (1992) notes that child characteristics, family dynamics, school/setting

characteristics, communities, and services rendered all impact a child's developmental trajectory. By examining these characteristics and their interlocking effects, we will be better able to understand the impact and importance of early intervention on young children with mental health disorders.

Sameroff and Chandler's Transactional Model

Sameroff and Chandler's Transactional Model of Human Development states that children are constantly transacting with their environment and conceptualizes development as a dynamic interchange of environmental and biological factors (Sameroff & Chandler, 1975). One of the primary goals of early intervention is to promote child development through interventions. This transaction happens on a direct scale with the child and their intervention program, as well as their family and has transactional implications for the research and policy community (Sameroff & Fiese, 2000). In turn, community is constantly revising their understanding and knowledge of early intervention and preschool special education based on the outcomes of children.

Effectiveness of Early Intervention

The effectiveness of early intervention has been justified by factors such as improvements in developmental skill, better academic and behavior performance outcomes, declassification from special education, and economic advantages of earlier service provision (notion of advancing development versus minimizing declines in development). Many studies examining the efficacy of early intervention for children have also highlighted the importance of long-term effects, such as lower rates of high school dropout, crime, etc (Guralnick, 1998). While most studies have shown more marked long-term societal gains, others have shown intermediate cognitive gains (Shonkoff & Hauser-Cram, 1987). Embedded in these themes are a host of mediating, moderating, and confounding variables when investigating these themes in

real world settings. Few at best have highlighted the longitudinal impact of early intervention on children with varying disabilities. Likewise, disability or condition-specific studies have shown variable effects (Berlin, Brooks-Gunn, McCarton, & McCormick, 1998). A lasting argument facing the field is the lack of specific interventions and documentation related to treatment fidelity. Moreover, no research has specifically investigated the impact of early intervention of children with social and behavioral disorders.

Declassification, or children who exit the special education system, has been promoted as an alternate outcome measure denoting effectiveness of early intervention (Innocenti & Price, 2005). Much of the literature has utilized developmental outcomes to examine effectiveness of early intervention; however, a reduced need for services has been proposed as another outcome worthy of investigation (Bailey et al., 1999; Innocenti, 2004). As originally included in the legislation of early intervention, one of the major arguments was the reduced need for special education (IDEA of 1986). Findings related to declassification for young children with disabilities are sparse (Bailey et al., 1999). Likewise, there is a large disparity in comparable findings of studies, as sample representativeness and sizes offer methodological implications in interpretation. Findings from the NEILS indicated that one-third of children in the study were declassified from special education after their enrollment in early intervention (Hebbeler et al., 2007). Additional findings suggest that children who receive early intervention are more likely to be declassified if their disability is less severe, and evidence of declassification rates vary from 7 to 50% (Daley et al., 2009; Innocenti, 2004). However, uniformly noted in the literature, children with more severe disabilities typically are those receiving services in the first place (OSEP, 2007; Scarborough et al., 2004).

Various meta-analyses have been conducted investigating the efficacy of early

intervention (inclusive of children ages birth to 5) for children with disabilities and/or delays. Meta-analyses provide useful information in the overall analysis of a large collection of integrated findings from numerous studies. Research conducted from the original passage of IDEA up to the passage of the 1986 amendments has been coined “first generation” research, while research conducted after 1986 has been termed “second generation” research (Crosby, 2004). Consistent across the meta-analyses and reviews executed evaluating the effectiveness of early intervention is the notion that children enrolled in early intervention show mild gains and positive effects; however, academic/developmental gains may not demonstrate themselves until children are closer to 4, and these gains may not be sustained. Further studies examining effectiveness have identified key factors that are associated with improved outcomes for children receiving early intervention (Berlin et al., 2008; Guralnick, 1991; Casto & Mastropriore, 1986).

A multitude of factors affects developmental and academic outcomes of children with disabilities. Guralnick’s (1991) review of the effectiveness of early intervention programs for young children with disabilities provides critical information as to the pertinent factors that yield greatest effects, specifically that of age at start, family involvement, and severity of disability. In his 1998 review, Guralnick further identifies poverty as a critical factor in contributing to confounding factors that lead to later developmental delays. His review of the effectiveness of early intervention programs for young children with disabilities provides critical information as to the pertinent factors that yield greatest effects, specifically age at start of the service, family involvement, severity of disability, and poverty. These and other child, familial, and contextual risk factors have been shown to contribute to later educational outcomes (Koegh, 2002). The literature investigating risk for young children has noted numerous factors for children in regular education; the NEILS includes a few factors that are examined in the current study and discussed

in the following sections. Table 2 outlines key studies that have reported effect sizes in investigations of the effectiveness of early intervention.

Table 2

Key Studies Examining Early Intervention for Infants and Toddlers

Author/Year	Study Design	Sample	Outcomes/Findings
Shonkoff & Hauser-Cram, 1987	Meta-analysis	31 studies with children with handicaps birth to 3 years old	Age at start of early intervention, parental intervention, structure curricula with effects sizes ranging from .48 to .55
Berlin, Brooks-Gunn, McCarton, & McCormick, 1998	RCT of Infant Health and Development Program	377 Low-birth-weight premature infants from birth to 3 years old across 8 study sites	More intensive intervention yields more positive outcomes (effect sizes ranging from .41 to .83). No difference in mother's ethnicity, age, or education or with child's birth weight, gender, or neonatal health status
Aratani, Wight, & Cooper, 2011	Secondary data analysis	800 African American and 2,200 White boys at 9- and 24-month old taken from Early Childhood Longitudinal Study-Birth cohort	African-American boys scored significantly lower on socio-emotional development as compared to white boys while controlling for child's age, mother's education, two-parent households, WIC receipt, teen mother, child low birthweight, family income, having checking/saving accounts, and parents providing toys to children. No significant difference in cognition.

The Office of Special Education Program's federal indicator data for IDEA Part C programs drawn from state Annual Performance Reviews consistently demonstrate gains in children's overall development. Over 65% of children enrolled in IDEA Part C programs showed an increase in their rate of growth in positive social-emotional skills, acquisition and use of knowledge and skills, and use of appropriate behavior to meet their needs (Early Childhood

Technical Assistance Center, 2019). While these reports do not include information about effect sizes, they offer additional information as to the influence of Part C early intervention on improving children's development.

Identification/Eligibility Determination– Child Find

One of the most critical factors in effectiveness of early intervention is ensuring appropriate identification, referral, and enrollment into early intervention. As the earliest years of a child's life are a time of rapid and defining development, early influences (through education and intervention) are critical to maximizing a child's learning potential (Smith, 1988). The federal legislation relating to the identification, referral, and enrollment for young children requiring early intervention is called Child Find. While the legislative mandate exists, it does not stipulate how states should identify children, nor does it offer a universal definition of developmental delay or specific eligibility criteria for early intervention; therefore, states are required to establish their own policies and procedures around these criteria (Congressional Research Service, 2019). There is a wide range of eligibility criteria, from environmental risk factors (also known as at-risk), such as children living under toxic stress, to developmental delays of varying levels of severity. In a systematic review conducted to investigate identification of children in early intervention, researchers found the research is limited and fragmented (Barger et al., 2018).

In a retrospective 5-year follow up study, Innocenti and his colleagues (2005) investigated the notion of severity and eligibility under Part C and later declassification as a means of informing policy efforts related to resource allocation and redesigning Part C Eligibility to include more stringent criteria. Findings from the Early Intervention Research Institute suggested that too many children were being identified at-risk or without significant delays, and in turn, these children were declassified (Innocenti & Price, 2005). He discussed the

implications of eligibility criteria and argued that only children with more severe disabilities should be included in the system.

Identification of children potentially eligible for early intervention has also been evaluated from a lens of access and equity. Shapiro and Derrington (2004) investigated the notion of equity of access related to Hawaii's early intervention Child Find according to certain populations. Results from the study indicated that military and uninsured children were afforded the least access. Rosenburg et al. (2013) reviewed eligibility definitions across the U.S. and utilized the Early Childhood Longitudinal Survey–Birth Cohort study data to determine the proportion of children who would be eligible for Part C under the IDEA. Computations suggested that the proportion of infants and toddlers likely to be eligible for Part C services ranged from 2% to 78% across the United States (Rosenburg et al., 2013), whereas actual enrollment in Part C nationally at the time was closer to 2.77% (Early Childhood Technical Assistance Center, n.d.). The literature estimates prevalence rates at 15% (Boyle et al., 2011).

Fewer states have considered a broader eligibility category of at-risk children, which may not necessarily hold as stringent developmental delay criteria. In 1999, a criterion to include children at-risk was only available in nine states (Bailey et al., 1999). Currently, only 5 states and 2 U.S. territories have the at-risk eligibility designation (Early Childhood Technical Assistance Center, 2015). When considering this larger population of infants and toddlers who may be eligible according to legislation, there are many factors that come into play for states, such as funding, personnel, and service capacity to serve enrolled children. Many states have adjusted their eligibility categories to enroll children with more severe disabilities.

Child Characteristics

Child characteristics play a central role in developmental outcomes for young children with social and behavioral disorders. Further, in early intervention, children at-risk for and/or

with disabilities have multiple biological, social, and contextual variables that influence their developmental outcomes. Evidence suggests that age, race/ethnicity, and gender are key factors in determining eligibility, participation and outcomes from children enrolled in early intervention.

Age at Start. The age at start, or ‘earlier is better’ argument, has been explored in various early intervention projects with children at-risk as well as those with varying disabilities. Research has shown variability in the claim that earlier is in fact better. Some of the literature indicates that earlier interventions are associated with greater improvements in developmental outcomes for young children (Crosby, 2004; Mastropriore, 1987; Watkins, 1987). However, Warfield (1999) stated that meta-analyses investigating the ‘earlier is better’ argument demonstrate different findings (Casto & Mastropriore, 1986; Shonkoff & Hauser-Cram, 1987). Casto and Mastropriore (1986) also found minimal support to substantiate the claim.

The literature provides evidence to support the idea that short-term benefits exist for developmental domains (e.g., cognitive); however, the impact of these improvements do not last into school-age years (Detterman & Thompson, 1997; Feldman, 2004). Further, studies have reported findings related to specific disabilities or conditions to support this hypothesis. Boyce et al. (1993) investigated the age at start question for medically fragile children in early intervention and found that infants and toddlers who received early intervention services at 3 months scored significantly higher than children whose intervention began 18 months. According to a review and meta-analysis of the literature investigating the ‘earlier is better’ supposition conducted by Kim, Innocenti, and Kim (1996), researchers found evidence to support the theory that earlier interventions led to better outcomes for children with disabilities

or from disadvantaged backgrounds. The authors also indicate that other factors (e.g., severity of disability) may be a factor in substantiating this claim.

Severity of disability has consistently been shown to result in fewer developmental improvements despite intervention efforts. Likewise, children with more severe disabilities are more likely to be identified and enrolled in early intervention services at a younger age than those with less severe disabilities (Scarborough et al., 2004). With this, age at start of service receipt has been debatable as to its impact of later developmental outcomes (Casto & Mastropieri, 1986; Kim, Innocenti, & Kim, 1996). Other factors, such as familial and contextual factors play a varying but significant role in the developmental trajectory and declassification of young children with disabilities (Daley, Simeonsson & Carlson, 2009).

Race/Ethnicity. The biopsychosocial nature of development in young children elevates the importance of social, cultural, and contextual influences, often linked to racial and ethnic differences, on children's social, emotional, and behavioral development. A child's race/ethnicity is comprised of cultural norms and expectations related to social interactions and behavior. Research has not been conducted to explicitly examine the influence of race and ethnicity on outcomes for children with social and behavioral disorders in early intervention; however, there is a significant amount of literature to establish the importance of investigating race/ethnicity. This section highlights literature that discusses children of color, particularly African American and/or Black children. Findings noted in this section maintain the language used in respective studies to describe this population of children.

Much of the available literature examining race/ethnicity for young children report on preschool- and school-age children and demonstrates racial disparities and poorer outcomes for African American children (Aratani et al., 2011). Preschool expulsion and suspension rates

indicate that 79% of black boys are suspended at least once, and black girls account for 12% of suspension, which is higher “than girls of any other race or ethnicity and most boys” (U.S. Department of Education Office of Civil Rights, 2014, p.1). As noted earlier, children’s social, emotional, and behavioral disorders are rarely transient; therefore, identifying social and behavioral disorders and intervening as early as possible may help in reducing negative outcomes for black children as they enter more formal educational settings.

Available research on infants and toddlers and early intervention has demonstrated racial disparities in identification, developmental trajectories, enrollment, and service provision for children of color. Research focusing on infants and toddlers suggests differences in developmental trajectories for African American boys. Halle et al. (2009) found that black infants and toddlers exhibit less secure attachment, demonstrate poorer health, and score lower on cognitive assessments at 9 and 24 months of age. Further, Aratani et al. (2011) found that African American infants and toddlers demonstrate “significantly lower scores on socio-emotional development starting from 9 months to pre-school age” (Aratani et al., 2011, p. 7). Findings from these studies also find correlations with children of color and family socioeconomic status, particularly that children of color come from families living in poverty or lower socioeconomic status. With respect to service provision, Feiberg et al. (2011) found that African American toddlers with developmental disabilities were “five times less likely to receive services than White children” (p. 284).

Understanding racial differences and disparities in early intervention is essential as early intervention can play a significant role in ameliorating later delays and educational outcomes. Further, recent data indicate that 51% of infants born in the United States in 2019 were children

of color (Keating et al., 2019). For purposes of this study, children will be categorized as African American/Black or Hispanic in reference to children of color.

Gender. Evidence related to gender and the effectiveness of early intervention on children with social and behavioral disorders is limited. Information available is typically related to enrollment rates, gender-specific differences in development, and prevalence rates of existing social and behavioral disorders. Data on enrollment rates in Part C programs consistently indicate a higher rate of males than females (Blackorby et al., 2010). Also noted earlier, evidence supports disparities in enrollment, service provision, and differences in development for African American males (Halle, 2009; Aratani et al., 2011).

Like race and ethnicity, social, emotional, and behavioral development is heavily reliant on social, contextual, and cultural norms for behavior. Gender-specific differences in young children have been shown to relate to specific biological conditions and to social norms of expected behavior between boys and girls. Chaplan (2015) suggests that biopsychosocial factors affect emotional expression in young children. In her findings, she indicates that boys demonstrate more reactivity and higher energy levels in infancy as compared to girls. Further, girls demonstrate more language skills. Fausto-Sterling et al. (2015) suggest caregiver interaction differences between boys and girls reinforce these developmental differences. In their observational study, they found that caregivers offer more physical stimulation and interactions with boys than girls. Their findings reinforce the biopsychosocial nature of children's development and provide additional evidence relating to subsequent higher physical activity for boys. Koldoja and Kolk (2015) examined gender differences in social-emotional problems in young children ranging from 3 months to 5.5 years old with and without mild traumatic brain injury. Their findings suggest that prior to injury, boys exhibited challenges with self-regulation

and autonomy, while girls demonstrated issues with adaptive functioning. After injury both boys and girls demonstrated challenges with social interactions (Koldoja & Kolk, 2015).

Gender has been cited in prevalence of social and behavioral disorders; however, differences do not uniformly apply across all disorders. Behavioral disorders, such as hyperactivity, occur three to four times more in boys than girls (Kraemer, 2000). On the contrary, no gender differences have been noted relating to the prevalence of tantrums (Sisterhen & Wy, 2019). As children age, more differences occur. Whereas evidence suggests greater differences beginning in preschool, with boys demonstrate higher rates of behavioral disorders (Lavigne et al., 1996; Cooper et al., 2009), more research is needed to investigate gender differences in early intervention.

Comorbidity of Social and Behavioral Disorders with Other Conditions. Children who are considered at-risk for and/or with developmental delays or established conditions typically have comorbid conditions that include social and behavioral disorders. Beginning in children as young as 2 years of age, children with developmental disabilities demonstrate an increased risk of behavior problems, such as tantrums, hyperactivity, and aggression (Feldman et al., 2000). Two studies conducted in the early 2000s found that children with developmental delays were three to four times more likely to have a psychological disorder as compared to typically developing children (Dekker, Koot, van der Ende, & Verhulst, 2002; Emerson, 2003a). In a more recent study conducted by Cheng et al. (2014), findings reinforce previous research efforts and suggest that children with cognitive delays demonstrate behavior problems as early as 9 months that become markedly evident by 24 months and increase with age. Further, children with language deficits demonstrate higher social emotional and behavioral problems and have

also been found to have “more frequent and aggressive tantrum behaviors” due to their inability to express themselves (Thurm et al., 2018; Sisterhen & Wy, 2019).

Familial Characteristics

Familial characteristics play a central role in developmental outcomes for young children. Research has shown that these can be identified as risk or opportunity factors. Numerous studies have suggested that the more risk factors present in a child, the poorer their outcomes (Bendersky & Lewis, 1994). Children with disabilities are already affected by a multiplicity of variables affecting their developmental outcomes; therefore, the compounding effects of risk factors are critical in evaluating the effectiveness of intervention. Maternal education, household income, and socioeconomic status have been highlighted as a few of the most critical factors in determining outcomes for children with disabilities in early intervention (Delgado & Scott, 2006; Keogh, 2000; Markowitz et al., 2006).

Maternal Education. Low maternal education has been well documented as a risk factor for later development for young children (Hebbeler et al., 2001; Wagner & Blackorby, 2002). Low maternal education has been shown to be a consistent predictor of later developmental delays and educational outcomes from birth through teenage years (Hebbeler et al., 2001; Wagner & Blackorby, 2002). Delgado and Scott (2006) determined that low maternal education was a significant predictor of later educational outcomes and was a better predictor than maternal age at birth, maternal marital status, prematurity, and low birth weight. Evidence suggests that maternal education is influential in reading and mathematics outcomes (Burchinal et al., 2002; Luster & McAdoo, 1996).

Household Income and Socioeconomic Status. Household income has been shown to be a significant predictor of educational outcomes among young children at-risk (Chamberlain, 1987; Werner & Smith, 1982; Aratani et al., 2011). Most notably, poverty, as defined by families

with a household income less than \$20,000 per year, has been consistently associated with poorer academic achievement (Keogh, 2000; Land & Legters, 2005). Lower household income has also been associated with young children experiencing negative behaviors that impact their development (Knapp et al., 2007). Like maternal education, household income has been shown to be influential in academic outcomes of reading and mathematics (Ackerman et al., 2004; Ramey & Ramey, 1998). The literature for children with disabilities is limited in considering the impact of household income on later developmental outcomes. Evidence from the Pre-Elementary Elementary Education Longitudinal Study (PEELS) indicates that household income impacts later developmental outcomes for preschool children with disabilities (Markowitz et al., 2006).

Intensity and Type of Services ('appropriate' services)

Research has suggested that intensity and specificity of services for “severely disordered children” has an impact on developmental outcomes (Smith, 1988). However, research for children with disabilities in early intervention has been inconclusive due to the difficulties in measuring and evaluating services. Casto and Mastropieri (1986) found that longer, more intense intervention programs were associated with intervention effectiveness. However, findings from a meta-analysis conducted by Innocenti and White (1993) suggest little evidence to substantiate the claim for children with disabilities. Early intervention services, by definition and nature, are highly individualized and specialized according to the child and families’ profiles and needs. Further, children with severe and complex disabilities may require a wide range of services, which in turn may result in less notable developmental gains due to the severity of disability and not necessarily the service provision.

In recent years, various evidence-based practices and treatment methods have evolved to address social and behavioral disorders in infants and toddlers. Prevention and intervention

approaches targeting caregiver education and/or dyadic interactions have been developed to address biological, environmental, and familial factors that support children's development (Gleason et al., 2016). While many evidence-based and evidence-informed treatments have shown positive impacts on child and family outcomes, findings are often restricted to specific interventions. In early intervention, children and families typically receive an array of services and interventions that subsequently leads to limitations in measuring the impact of any one service.

Challenges in Examining the Effectiveness of Early Intervention

Studies investigating the impact of early intervention on children with disabilities under age 3 have demonstrated varying findings regarding the extent and value of impact on child outcomes. Given the individualized nature of early intervention and the complexity and compounding factors affecting child outcomes, definitive evidence as to the effectiveness of interventions has been a continuous challenge (Daley et al., 2009). Variations in children's developmental type and severity, age at start of early intervention services, service type and intensity, children's developmental trajectories, personnel/provider availability to provide services, and measurement reliability and validity are additional factors that pose challenges to examining effectiveness of early intervention services (Elbaum, 2016). Research has shown that biological or child factors play a significant role in early development; however, as children get older (children aged 3 to 7 years old), familial factors are more influential in educational outcomes (Delgado et al., 2006). Natriello et al. (1990) explain that single risk factors have limited predictive power and may overpredict educational failure. Multiple risk or additive models provide better predictions.

Conceptual and methodological problems are also consistently cited in reviews of early intervention include issues with valid measures, lack of follow up studies, and insufficient

empirical evidence (Bailey & Bricker, 1984; Casto & Mastropieri, 1986; Dunst, 1986; Guralnick, 1998). Likewise, small sample sizes, questionable measurements, and inappropriate analyses make for tentative interpretations of findings (Dunst & Rheingrover, 1981; Simeonsson et al., 1982). While some of the literature suggests that early intervention demonstrates benefits to young children with disabilities and their families (Crosby, 2004; Shonkoff & Hauser-Cram, 1987), other studies imply that methodological and conceptual limitations of research in the field offer no conclusive evidence to this end (Dunst & Rheingrover, 1981). The literature offering evidence of the benefit of early intervention on child development outcomes has indicated that “well-designed and well-implemented interventions produce substantial short-term cognitive and social gains in children with disabilities” (Groark, 2007, p. 40; Casto & Mastropieri, 1986; Guralnick, 1997; Shonkoff & Phillips, 2000). Further, more structured interventions as well as those that included dimensions of caregiver-child relationships were shown to be more effective; however, the type of disability and its severity impacted the magnitude of effects (Groark, 2007, Shonkoff & Hauser-Cram, 1987; Shonkoff & Phillips, 2000).

Shonkoff and Hauser-Cram (1987) conducted a meta-analysis investigating the effects of early intervention on children under the age 3 with disabilities. Results indicated that type of disability, relation between age at program entry and severity of disability, highly structured curricula, and parent involvement yield the largest effects on child outcomes. In their review, they also highlight the most prominent gaps in the available literature. In particular, they cite that studies do not offer comprehensive information about child, family, and ecological contexts. Further, studies primarily focus only cognitive measures, rather than including measures to assess other development domains (e.g., social emotional development, linguistic development) and measures of family functioning and parent-child interaction on outcomes. The review does

not, however, indicate the duration of the studies reviewed, nor does it provide information regarding the statistical processes used in their analysis. Findings suggested that early intervention for children with disabilities under the age of three provided some moderate and positive effects (Shonkoff & Hauser-Cram, 1987).

The Early Intervention Collaborative Study investigated the developmental outcomes of 190 infants and their families after one year of receipt of early intervention services (Hauser-Cram et al., 2001). The study used a non-experimental design and examined 29-community based programs serving children with Down syndrome, motor impairment, and developmental delays of uncertain etiology. Data included information from home visits, child assessments, mother-child interaction observations, maternal interviews, and parental questionnaires (Hauser-Cram et al., 2001). Findings suggest that severity was the greatest predictor of outcome and that gestational age and health characteristics were influential.

The National Early Intervention Longitudinal Study (NEILS) was a national study conducted in the United States investigating the impact of early intervention services for infants and toddlers (ages birth to 31 months) with disabilities or at-risk for developing delays. Findings from the study indicate that more than 30% of children begin receiving services after turning two years old, and approximately two-thirds of the children who receive services continue to receive preschool special education services (Hebbeler et al., 2007). Findings suggest that children who received early intervention progressed in certain functional and development skills (i.e., communication, motor, adaptive skills). The NEILS study offers pertinent information regarding service provision for children ages birth to 2 and their families; however, it is limited in scope with respect to the study design. Children eligible to participate in the study were less than 31 months of age, whereas the infant/toddler system stipulates serving children through the age of 2

(or 35 months). Additionally, the study did not account for children who did not receive early intervention (or offer a control group of comparison). Further, child outcome measures were all parent report.

Summary

There are a multitude of factors that affect outcomes for children in early intervention. The available literature has provided a controversial base for exploring these variables. While a starting body of literature has been established, more research and information are needed to determine which factors have the greatest impact and the considerations necessary to examine their interactions. The current study attempts to contribute to this purpose.

CHAPTER 3: METHODOLOGY

Research Design

This study uses secondary data analysis to examine infants and toddlers with social and behavioral disorders receiving early intervention services. Secondary data analysis is an effective and efficient method for researchers to examine critical research questions and contribute to the literature in meaningful ways (Johnston, 2014). I used data from the National Early Intervention Longitudinal Study (NEILS).

The NEILS was over a decade-long study (funded from 1996-2007) that investigated Part C of the IDEA policy implementation issues. The NEILS was the first and only national study of early intervention that included a nationally representative sample of 3,338 infants and toddlers and their families. NEILS researchers collected data via surveys, interviews, and service records from providers, families, and Individualized Family Service Plans (IFSPs), respectively (Hebbeler et al., 2007). Information was collected during the intake and eligibility determination process for children enrolled in early intervention between September 1997 and November 1998, as well as periodically throughout their time in the program (Hebbeler et. al, 2001). Telephone interviews with families of children eligible for the study were conducted within 16 weeks of enrollment, annually, around the time children were 36 months of age, and when the child entered kindergarten. Families were mailed questionnaires if researchers were unable to reach them by phone to try and collect all study data. Researchers followed children from entry into the early intervention service system through kindergarten.

Research Questions

My study explores research questions that aim to better understand infants and toddlers with social and behavioral disorders enrolled in early intervention. Using data from the National Early Intervention Longitudinal Study, I answered the following questions:

Research question 1: Who are the children with social and behavioral disorders and their families receiving early intervention services?

Sub question 1a: What are the family characteristics of children with a social or behavioral diagnosis receiving early intervention services?

Research question 2: What is the total amount of early intervention services (hours per week) children with social and behavioral disorders were scheduled to receive while enrolled in early intervention?

Sub question 2a: What differences exist in the amount of scheduled services for children with social and/or behavioral disorders? Are there differences by gender? By eligibility determination? By household income? By maternal education? By race/ethnicity?

Sub question 2b: Is there a relationship between age at start and amount of scheduled early intervention services children with social and behavioral disorders in early intervention received? Between number of diagnoses and amount of scheduled services?

Research Question 3: What factors are associated with parent report of impact of early intervention services on children's development?

Research Question 4: What child, family, and service factors are associated with children's declassification from early intervention?

Data Collection

Data Sources

Researchers from the National Early Intervention Longitudinal Study (NEILS) used a wide range of sources to collect data related to children enrolled in early intervention. Numerous instruments were utilized to gather relevant data including family interviews conducted by telephone, provider questionnaires that gathered information from children's service records, and kindergarten teacher surveys. When families were unable to be reached by telephone, a questionnaire was mailed for completion. Table 3 provides an overview of the various tools, respondents, and frequency of data collection.

Table 3

Overview of Survey Tools Used in the NEILS

Data Source	Mode of Collection	Respondents	Data Collection Times
Form A	Forms sent to identified state program Points of Entry (POE)	POE staff	September 1997 - November 1998
Enrollment Family Interview (EFI)	Phone interview (alternately mailed questionnaire)	Primary caregiver	Within 16 weeks of IFSP
Transition Family Interview (TFI)	Phone interview (alternately mailed questionnaire)	Primary caregiver	When children were 35-46 months old
Service Record Forms	Mailed form completed with information from IFSP	Early Intervention Service Provider	Every 6 months while child enrolled in NEILS
Kindergarten Family Interview (KFI)	Phone interview (alternately mailed questionnaire)	Primary caregiver	When children were between 60-84 months old

A brief overview of each interview, survey, and/or data source from the study used for this study is discussed below.

Form A. Form A collected data on all children who entered early intervention during the recruitment period for states and counties who participated in the study. Forms were sent to staff at programs or agencies where families could enter counties' early intervention systems.

Programs or agencies who received Form A were designated as Points of Entry (POE) sites; there were a total of 193 POEs (Hebbeler & Wagner, 1998). Form A can be found in Appendix

1. During the recruitment period, 5,668 children entered early intervention. Of those children, 4,867 were deemed eligible for the study. Eligibility for the study was determined by the following criteria: children were younger than 31 months, families had an English- or Spanish-speaking parent/guardian, and families did not have a sibling already participating in early intervention. Families of eligible children were invited to participate in the study based on data collected from Form A. A total of 3,338 children were enrolled in the study based on family consent.

Family Enrollment Interview. A key data source for this study is the NEILS Family Enrollment Interview. This telephone interview was conducted with families within 16 weeks of enrollment to gather information about child and family demographics, parent report of child functioning, and how families perceived the services they received through early intervention (Hebbeler et al., 2007). Demographic data included in the study are gender, race/ethnicity, and eligibility determination, and child diagnoses. These data will be used to answer the first research question.

Service Record Forms. In the NEILS, early intervention service providers completed service record questionnaires, drawing information from children's Individualized Family Service Plans (IFSPs), that asked about services children and families enrolled in the program received (Hebbeler et al., 2007). Individualized Family Service Plans are created by

multidisciplinary teams (including parents and professionals) when children are determined eligible for enrollment in early intervention. An IFSP is both a written document and process that consists of collaboration between families, staff, and providers who make decisions about children's goal and service provision (Lucas et al., 2006). IFSPs are created at the time of enrollment to document children's developmental goals and the services required to meet identified goals. The IFSP also serves to inform baseline data against which progress toward a child's improvement goals are then measured. The Service Record forms used in the NEILS were completed by service providers who were asked to complete the questionnaire every 6 months until the children exited the program.

For this study, I used the average of all services children were scheduled to receive during their enrollment in early intervention. A study variable was derived to report the average hours per week children were scheduled during the time with the program. These data were used to answer the second and third research questions examining group differences in service provision.

Transition Family Interview. The Transition Family Interview was a telephone survey conducted with families at the time children were transitioning out of the early intervention program. The interview was conducted when the child was between 35 to 46 months of age and included questions about reasons children were leaving the program, parent's perceptions of children's functioning, and their evaluation of services received. The key variable taken from this interview was the impact of early intervention services on children's development (the study outcome variable).

Kindergarten Family Interview. The Kindergarten Family Interview was another telephone interview conducted with families at the time that their children were in kindergarten.

As with other interviews, if families did not have a working phone, a mailed questionnaire was provided. The Kindergarten Family Interview addressed questions related to children's service provision between the time of early intervention services and enrollment in kindergarten. This dataset also includes a key variable for the study related to children having an Individualized Education Plan (or needing ongoing special education services beyond early intervention). This variable particularly speaks to original IDEA legislation that stipulated early intervention may serve as a means of remediating later special education.

Variable Selection

Variables selected for this study were heavily informed by existing literature examining factors leading to improved outcomes for children enrolled in early intervention. Variables include demographic characteristics of children and families, age of enrollment in early intervention, service amount, and declassification from early intervention. NEILS variables used in this study for analyses can be found in Table 4.

Table 4

Selected Variables from the National Early Intervention Longitudinal Study

Variable	Description	Value	Instrument
AGE_IFSP	Age at time of IFSP (in months)	Age in months (continuous variable)	Form A
A8	Reason for child's eligibility for EI services	(1) Developmental delay (2) Diagnosed condition (3) At risk of delay	Form A
Gender	Child's gender	(1) Male (2) Female	Family Enrollment Interview

Table 4 (continued).

INV_RACE5GRP	Race/Ethnicity	(1) White (2) African American/Black (3) Hispanic (4) Asian/Native Hawaiian/ Pacific Islander (5) All other	Family Enrollment Interview
E_A10FIRST	Child's age at first diagnosis/id in months	0 < 1 month 1 - 30 months (continuous variable)	Family Enrollment Interview
Diagnosis	Child's diagnosis by ICD-9 codes	(1) Attention Deficit (2) DD w/hyperkinesis/ hyperactivity/hyperkinesis (3) Tantrums (4) Impulse control (5) Emotional disturbance (6) Social/Psychosocial skills (7) Behavior concerns/with people or objects	Derived from Diagnosis code fields from the Family Enrollment Interview
DxNumber	Number of diagnoses	Continuous variable for the total number of diagnoses children had during their enrollment in EI	Family Enrollment Interview
E_F35_5GRP	Household income	(1) Less than \$15,000 (2) \$15,001-\$25,000 (3) \$25,001-\$50,000 (4) \$50,001-\$75,000 (5) More than \$75,000	NEILS derived variable
E_C_MOM_ED4GRP	Primary female caregiver's education level	(1) Less than high school (2) High school or GED (3) Some college (4) College degree or more	NEILS derived variable
TBD	Service Amount (total minutes/month)	Continuous variable derived from the average amount of services children's were scheduled to receive while enrolled in EI	Service Record Data
C40A	Overall impact of early intervention and therapy services on child's development	(1) No, Little to no impact (2) Yes, A Lot of impact	Derived from Transition Family Interview

Table 4 (continued).

K_CP2A	IEP developed for child around turning three (proxy measure for declassification from EI)	(1) Yes (2) No	Kindergarten Family Interview
--------	---	-------------------	-------------------------------

Table 4. *Note.* A key variable in the study examined was the average of amount of services children were scheduled to receive while enrolled in early intervention. NEILS study data offered information about the amount of services children were scheduled to receive; therefore, reports regarding the average amount of services children were scheduled to receive served as a proxy variable to speak to service provision.

Study Sample

The NEILS study recruited a nationally representative sample of 3,338 infants and toddlers and their families who enrolled in early intervention between September 1997 and November 1998. The national sample included children from 20 states in the United States. Eligibility criteria for enrollment in early intervention varied by state. Various factors contributed to states' criteria, often informed by fiscal resources to accommodate children and families. There are three main eligibility categories allowable by IDEA; those include children with established conditions, children with developmental delay, and/or children at-risk for development delay "if early intervention services were not provided to the individual" (20 U.S.C. §1432, as amended by IDEA, 2004). Figure 1 shows the states that participated in the NEILS.

Figure 1

Map of States That Participated in the NEILS



Note: Taken from: <https://archive.sri.com/work/projects/national-early-intervention-longitudinal-study-neils>

For purposes of this study, I used a subset of children from the NEILS study consisting of infants and toddlers with social and behavioral disorders. When children were enrolled in the NEILS, researchers created categories of disabilities made up of various diagnoses. Researchers created a category consisting of children with diagnosed social and behavioral disorders, using International Classification of Diseases-9 (ICD-9) codes. Infants and toddlers in my study sample had ICD-9 codes related to attention deficit disorder, attention deficit hyperactive disorder, development delay w/hyperkinesis, hyperactivity/hyperkinesis, tantrums, impulse control, emotional disturbance, issues with social/psycho-social skills, and behavior concerns (with objects and people). The available subgroup of children consisted of 112 infants and toddlers who fell under the social/behavior impairment/delay category. As my research questions anchor on service data, only children with complete service record data were included, resulting in a sample size of 81 children.

Statistical Analysis Plan

A multi-prong statistical analysis plan was proposed to answer study questions, including both descriptive and inferential statistics. Both statistical techniques afford a greater understanding of the data and help to accomplish a broader understanding of the implications of variable dynamics and their influence on children's outcomes in early intervention.

Descriptive Statistics

To better understand data and analyze the dynamics and characteristics of a sample, descriptive statistics are a fitting approach (Weiss, 2012). Descriptive statistics serve as a critical analytic tool to organize and describe populations and phenomena (Loeb et al., 2017). In addition, this type of analysis is foundational in understanding and providing information about variables in a dataset ("Descriptive Statistics," n.d.). Trochim (2020) notes that descriptive statistics helps researchers describe their data.

My first research question aimed to better understand the child and family characteristics of children with social and behavioral disorders in early intervention. I examined child characteristics, race, gender, eligibility category, age of start (aka age at enrollment), and number of diagnoses. Likewise, I explored family characteristics related to maternal education and household income. I used basic descriptive statistics (range, means, medians, crosstabulations, etc.) to organize, summarize, and answer the first research question. I also used descriptive statistics to provide an overview of the amount of services children were scheduled to receive.

Inferential Statistics

Inferential statistics offer various methods that help to make inferences from the data and/or judgments of the probability based on observed differences between variables (Trochim, 2006). This mode of analysis offers an extension of looking at "what is" to generate understanding to the broader population (Haden, 2019). Inferential statistics allow researchers to

explore meaningful differences and comparisons between groups, as well as relationships between variables (Maguire & Rowley, 1992). I used inferential statistics to answer my second and third research questions, including t-tests, one-way Analysis of Variance (ANOVA), correlations, and binary logistic regression.

Group Comparisons. For the second research question (2a) addressing questions related to differences in service provision for study categorical variables, I used t-tests and one-way ANOVAs. To explore differences in service provision for gender groups, I conducted t-tests of means. The null hypothesis for the t-test to examine group differences in scheduled service provision for gender groups was $H_0: \mu_1 = \mu_2$ suggesting that male and female means are equal and there are no differences in the average amount of services males and females with social and behavioral disorders were scheduled to receive while enrolled in early intervention. The alternative hypothesis was $H_1: \mu_1 \neq \mu_2$ suggesting that there are group differences by gender and that the two group means are not equal.

To explore differences between the means of race/ethnic groups, eligibility categories, household income, and maternal education, looking at pairwise comparisons, I conducted ANOVAs. For race/ethnicity, the ANOVA model included the average amount of services children were scheduled to receive as the dependent variable and race/ethnicity as the independent variable. The ANOVA model was replicated to account for eligibility categories, maternal education and household income. The null hypothesis for ANOVA tests to examine group differences related to race/ethnicity, maternal education, and/or household income was $H_0: \mu_1 = \mu_2 = \mu_3 \dots = \mu_k$, suggesting that group and/or category means are equal and there are no differences in the average amount of services for children of various race/ethnic groups, differing levels of maternal educational attainment, or household income levels. The alternative

hypothesis was H_1 : not all μ s are equal, suggesting that there is at least one group and population means difference.

Correlations. Pearson correlation was used to examine the relationship between age of start and number of diagnoses with the amount of services (Research Question 2b). As age of start and number of diagnoses are continuous variables, Pearson's correlation was a fitting approach to analyze these data and to also explore the relationship with the total average amount of scheduled services children were to receive. The null hypothesis for the Pearson's correlation was $H_0: \rho = 0$, which indicates no relationship between average amount of service and age of start or number of diagnosis. The alternative hypothesis was $H_1: \rho \neq 0$, suggesting that there is a relationship between amount of scheduled service and age at start and/or number of diagnoses.

Binary Logistic Regression. For the third research question, binary logistic regression explored the factors associated with parent report of the impact early intervention services on children's development. According to Keith (2015), logistic regression is a robust approach to examining the relationship between several independent variables and a dichotomous dependent variable to support answers that determine predictions of improved child outcomes. The outcome (dependent) variable, parent report of the impact of early intervention services on children's development, is a dichotomous variable. Response options include "no, had little to no impact" or "yes, had a lot of impact." Predictors (independent variables) of consideration include the amount of services children were scheduled to receive and child and family characteristics.

I regressed parent report of the impact of early intervention on children's development on the average amount of early intervention services children were scheduled to receive while controlling for child and family characteristics. This research question was intended to determine child, family, and service factors associated with the impact of early intervention on children's

development. This question highlighted the likelihood of services, while controlling for gender, eligibility, race/ethnicity, number of diagnoses, maternal education, and household income as predictors of the impact on children's development for children enrolled in early intervention.

The logistic regression equation for this study was:

$$Y_i = \alpha + \beta_1 X_{\text{services}i} + \beta_2 X_{\text{child}i} + \beta_3 X_{\text{family}i} + \beta_4 X_{\text{eligibilitycategory}i} + \beta_5 X_{\text{AgeStart}i} + \beta_6 X_{\text{Diagnoses}i} + \epsilon_i$$

where Y_i is a dichotomous indicator variable of parental report of impact, coded one if the parent said "yes, had a lot of impact" and zero otherwise; X_{child} is a vector of child characteristics including race and gender; X_{family} is a vector of family characteristics including maternal education and household income; $X_{\text{eligibilitycategory}}$ is a vector for children eligibility; X_{AgeStart} is a vector of the age children started receiving early intervention services; $X_{\text{diagnoses}}$ is a vector for number of diagnoses; and ϵ is a random error term.

In the regression model, the control variables for child characteristics were gender (male or female), race (White, African American/Black, Hispanic, Asian/Native Hawaiian/ Pacific Islander, and Other), eligibility category (developmental delay, medical condition, or at-risk) and number of diagnoses. Family controls consisted of maternal education (what level of education the child's mother attained) and household income (with five categorical income ranging from less than \$15,000 to over \$75,000). The model also included error to account for why some parent report indicated a positive impact, while others did not.

The null hypothesis for the logistic regression model was $H_0: b_1 = b_2 = \dots = b_k = 0$ suggesting that none of the independent variables in the model are significant in predicting parent report on the impact of early intervention on children's development. The alternative hypothesis was $H_a: b_k \neq 0$ for at least one of the independent variables in the model suggesting at

least one of the independent variables in the model is useful in explaining parent report on impact.

A direct logistic regression approach was conducted to help explain the odds of the influence of variables on parent report of the impact of early intervention on children's development. Logistic regression requires multiple assumptions to be met to reduce error in analyses. Logistic regression allows for non-linear relationships between dependent and independent variables. Unlike linear regression, error terms do not need to be normally distributed and homoscedasticity is not required (Keith, 2015). This form of regression requires little to no multicollinearity among the independent variables and assumes linearity of log odds and independent variables (Menard, 2010). Finally, logistic regression requires a large sample size to ensure that, parameter estimates do not inflate which would subsequently produce large standard errors. Power analyses confirmed the current sample of children with social and behavioral disorders met the requirements of sample size. I conducted analyses to observe if the assumptions of logistic regression were met.

The logistic regression approach affords the ability to understand the odds that early intervention would have a significant impact on children's development based on the amount of scheduled services while controlling for gender, race, maternal education, household income, age at start, and number of diagnoses. In this question, the regression informs whether these independent variables have a predictive effect on the odds of parents' reporting early intervention services having a significant impact on children's development.

The fourth research question modeled the statistical analysis approach (i.e. bivariate logistic regression) from the third research question; however, the outcome (dependent) variable was declassification from early intervention. This variable is dichotomous (declassified or not

declassified) and was informed by the proxy variable of whether children received an IEP around the age of three. Independent variables include the average amount of services children were scheduled to receive, gender, race, eligibility category, mother's education, household income, age of start, number of diagnoses, and also include the parent report of impact on children's development. The equation for the fourth research question was as follows:

$$Y_i = \alpha + \beta_1 X_{\text{services}i} + \beta_2 X_{\text{child}i} + \beta_3 X_{\text{family}i} + \beta_4 X_{\text{eligibilitycategory}i} + \beta_5 X_{\text{AgeStart}i} + \beta_6 X_{\text{Diagnoses}i} + \beta_7 X_{\text{Impact}i} + \epsilon_i$$

where Y_i is a dichotomous indicator variable of declassification from early intervention, coded one if the child had no IEP and zero otherwise; X_{child} is a vector of child characteristics including race and gender; X_{family} is a vector of family characteristics including maternal education and household income; $X_{\text{eligibilitycategory}}$ is a categorical variable consisting of the three children's eligibility categories; X_{AgeStart} is a continuous variable of children's age in months when children started receiving early intervention services; $X_{\text{diagnoses}}$ is a continuous variable for number of diagnoses; X_{impact} is a dichotomous indicator variable of parental report of impact, coded one if the parent said "yes, had a lot of impact" and zero otherwise, and ϵ is a random error term.

The null hypothesis for the logistic regression model was $H_0: b_1 = b_2 = \dots = b_k = 0$ suggesting that none of the independent variables in the model are significant in predicting declassification from early intervention. The alternative hypothesis was $H_a: b_k \neq 0$ for at least one of the independent variables in the model, suggesting that at least one of the independent variables in the model is useful in explaining declassification.

In the regression model, I used gender (male or female), race (White, African American/Black, Hispanic, Asian/Native Hawaiian/ Pacific Islander, and Other), and eligibility

category (developmental delay, medical condition, or at-risk) as control variables for child characteristics. Family controls consisted of maternal education, household income, and parent report of the impact of early intervention on children's development ("no or little impact" or "yes, a lot of impact"). This regression informs whether these independent variables have a predictive effect on the odds of children becoming declassified from early intervention. The model also includes error to account for why some were or were not declassified from early intervention. As discussed in the previous research question, analyses were conducted to test that the basic assumptions of logistic regression were met.

Validity and Reliability

Two critical aspects of research quality are validity and reliability. Both validity and reliability are foundational in determining the quality of instruments and data gathered from studies. In addition, they are essential in interpretation of data to inform research findings (Olutwatayo, 2012). Of note, when speaking to validity and/or reliability of research for children in early intervention, is that the Part C program and early intervention services afforded to families is based on the premise of individualization. Furthermore, as children's early development and family contexts are so dynamic, there are many layers to how data are viewed as valid and/or reliable. This section provides an overview of the definitions of validity and reliability and considerations related to instruments used in the NEILS.

Validity has been defined as "the degree to which a test accurately and meaningfully measures what it is supposed to measure" (Olutwatayo, 2012; Peeters et al., 2013). There are multiple forms of validity; however, a few key types of validity specific to survey and educational research are face, content, and construct validity (Cohen et al., 2008; Olutwatayo, 2012; Bolarinwa, 2015). While face and content are closely related, they are not identical. Face validity is an estimation of whether a survey is measuring a phenomenon, while content validity

discusses the degree to which the survey covers the complete concept being measured (Olutwatayo, 2012). Construct validity speaks to the extent that the survey measures what it intends to measure. According to Sullivan (2011), validity “can be viewed as constructing an evidence-based argument regarding how well a tool measures what it is supposed to do” (p. 119). Internal and external validity also are critical factors in determining how accurately instruments quantify what they intend to measure and whether instruments gather accurate data from study samples (in reference to the population), respectively (Bolarinwa, 2015).

Reliability is a critical aspect in quantitative research that speaks to consistency and stability of measurement. In other words, are the tools, data gathered, and findings from the study replicable and reproducible, with minimal error (Drost, 2011; Olutwatayo, 2012)? Reliability can contribute to validity; however, these two concepts are not synonymous (Etchegaray & Fischer, 2006; Bolarinwa, 2015). Reliable instruments and/or data are not necessarily valid; they can include a systematic error of inaccurate or invalid information. Alternately, if an instrument is not reliable, it is also not likely to have a high level of validity.

The NEILS’s interviews and questions included hundreds of items that were used to gather data on children and family demographics, disability diagnoses and classifications, experiences with early intervention, and received services. While the available NEILS reports and published literature do not speak specifically to the processes researchers used to ensure validity or reliability, researchers did report that intensive research, a year-long design phase, and the conceptual framework guided the design and development of interviews, questionnaires, and surveys as well as analyses conducted throughout the study (Hebbeler et al., 2007). The lead researchers of the NEILS were national content experts on early intervention, and therefore provided a level of credibility and validity to constructs measured. In addition to the experts

informing instrument creation, researchers included redundancies of questions (particularly demographic information) across the various interviews, surveys, and questionnaires that afforded validity amongst those data points and a way to triangulate the data. Triangulation of data is a “method to help increase the validity, reliability, and legitimization, which encompasses credibility, dependability, confirmability, and transferability of research findings” (Moon, 2019, p. 103).

There was one explicit reference to validity in one of the NEILS publications from 2001. Researchers noted that in the initial analyses of the data, they questioned the discriminant validity of the eligibility categorical data due to inconsistencies received from service records (Hebbeler et al., 2001). To address this issue of categories, a team of four researchers conducted a reliability test of classifications. Team members independently categorized eligibility conditions and subsequently reached consensus for items where there was disagreement (Hebbeler et al., 2011).

Limitations of the Study

Whereas this research helps to contribute to the emergent area of literature in early intervention and early childhood mental health, this study had a few limitations. This section discusses limitations of the study.

Age of Study

First and foremost, it is important to note the study and data are not recent. The NEILS was completed more than a decade ago and was funded to conduct a nationally representative study of the implementation of Part C of IDEA at the time. Since the study was completed, the Part C landscape has changed. The population dynamics and number of children enrolled in Part C early intervention programs has grown. In addition, IDEA was reauthorized in 2004 and regulations related to Part C in 2011 were subsequently updated (Center for Parent Information and

Resources, 2014). In addition, Federal appropriations for Part C have also changed and have impacted different states' determination of eligibility categories for early intervention to make eligibility more stringent (i.e., enrolling children with more severe disabilities). Further, the Office of Special Education Programs incorporated a set of federal indicators that included child outcomes data that would provide additional quantitative data on social and emotional outcomes for children in early intervention. Also, research and practice has evolved to include a greater awareness of the importance of social emotional development and more sensitive tools and interventions to support this aspect of young children's development. Therefore, states may have shifted service provision and administrative processes that could potentially impact identification and services for children identified with social and behavioral disorders.

Questions included in the NEILS were informed and derived by the policy, practice, and research context during the study's implementation. Despite these limitations, these data and this study offer researchers and policymakers information about how Part C has served infants and toddlers with social and behavioral disorders. In addition, the study provides a potential method for programs to delve deeper into understanding children enrolled in early intervention with social and behavioral disorders. Likewise, this study can help programs understand the significance of examining this subset of their population. By understanding factors that positively influence children with social and behavioral disorders in the earliest years, programs can establish a framework for evaluating their own resources to best serve children and families.

Self-report Biases

The NEILS relied heavily on parent report, also referred to as self-report more broadly in research methods. Various biases exist when asking respondents to answer survey questions. Bias can play a significant role in the reliability and validity of the data gathered. Social desirability and recall bias could affect the reliability and validity of the data (West, 2014;

Althubaiti, 2016). In the NEILS, many questions were asked about families' perceptions of their children's health and behavior and experiences with early intervention. In their responses, families could have indicated more positive responses to "be nice" or portray their children's wellbeing in a better light. Likewise, as families were interviewed/surveyed over extended periods of time, recall bias could have occurred due to families providing inaccurate responses due to error in recall of events (Althubaiti, 2016). Researchers took measures to triangulate data collected from families, teachers, and providers to ensure more consistency and to mitigate self-report bias; however, such information can rarely be verified with absolute certainty, especially in a large-scale survey study like the NEILS.

Survey Methods Limitations

As noted earlier, the data collected through the NEILS were primarily gathered by surveys. While surveys are a valuable tool to collect large amounts of data about people's thoughts, feelings, and perceptions, they often lack depth in capturing individual respondents' unique perspectives. Also, large-scale longitudinal surveys are well known to have issues with missing data. Further, as discussed earlier, surveys may have issues with validity and reliability. As the NEILS surveys did not report any statistics related to reliability and/or validity of instruments, there is no quantitative evidence to the processes and/or tests that may have occurred to ensure confidence in the tools. Related to this, the secondary data analysis conducted for this study is limited to existing data in the dataset that were largely determined from questions asked in the original study. Issues of missingness and sufficiency of the study sample size posed methodological challenges throughout analyses. Further, as this study is descriptive in nature, findings do not make causal claims as to the impact of early intervention on children with social and behavioral disorders.

Summary of Limitations

Despite the limitations noted above, the NEILS is still relevant and useful in evaluating early intervention. If NEILS was replicated, tests for validity and reliability could be conducted, and additional variables and data could be available to account for recent policy and fiscal implications, as well as new measurements to help identify children and social and behavioral disorders. This study provides descriptive information on a sample of infants and toddlers with social and behavioral disorders with service record data who were once enrolled in early intervention. With these data, a better landscape can be drawn to fuel further research efforts to investigate the effects of early intervention on developmental outcomes for young children with social emotional and/or behavioral disorders.

Ethical Consideration

Permission was sought from the N. C. State University (NCSU) Institutional Review Board (IRB) prior to data analyses and reporting of findings. The application to the NCSU IRB included an overview of the NEILS, interview and data collection tools, and plans for analysis. As part of the NEILS, all participants were provided an informed consent. The NEILS is a public use data set, addressing confidentiality and privacy concerns. All participant data were deidentified and provided a unique study ID. The NCSU IRB indicated that my study did not qualify for human subjects research as defined by the regulations that govern the use of human subjects, and therefore, this study did not require IRB approval.

CHAPTER 4: FINDINGS

The National Early Intervention Longitudinal Study (NEILS) was a national study that examined implementation of the Part C of the Individuals with Disabilities Education Act (IDEA). Part C focuses on providing services and supports to families with infants and toddlers with disabilities, established medical conditions, and/or who are at risk for developmental delays. This study investigated the influence of child and family characteristics and the average amount of services children were scheduled to receive based on children's outcomes as measured by declassification from early intervention and parent report of impact of early intervention on children's development. Research questions explored the 1) demographics of children and family characteristics for children with social and behavioral disorders receiving early intervention services, 2) average amount of services children were scheduled to receive and group differences in service provision, and 3) factors associated with the odds of report of the impact of early intervention on children's development and 4) factors associated with the odds of children's declassification from early intervention.

Statistical methods used to analyze the sample included descriptive statistics and inferential statistics, including t-tests, one-way analysis of variance (ANOVA), correlations, and logistic regression. Stata was used to conduct analyses for all research questions.

Study Sample

The study sample included extant data from the National Early Intervention Longitudinal Study (NEILS) and included a sub-sample of infants and toddlers with social and behavioral disorders with service record data reporting the amount of services children were scheduled to receive. Using these study inclusion criteria, a sample of 81 children were included for analysis. I included the following variables to address study research questions: gender, eligibility, race/ethnicity, age at start, number of diagnoses, maternal education, household income, average

amount of services children were scheduled to receive (as reported by hours per week), parent report of impact of early intervention on children's development, and declassification (parent report of children without an IEP as a proxy measure). Appendix B provides a data dictionary of variables used in the study.

Missing Data

Missing data can lead to biased estimates of parameters and increased standard errors, subsequently leading to invalid conclusions and weakened generalizability of findings (Cheema, 2014; Cox et al., 2014; Dong & Peng, 2013; Kang, 2013; Lodder, 2013; Schafer & Graham, 2002). Further, missing data can impact an overall study sample size thereby having a direct impact on the statistical power of a study, which assists researchers in their ability to interpret results and accurately report statistically significant findings (Suresh & Chandrashekara, 2012).

Missingness also poses challenges to statistical analysis methods employed by researchers (Little & Rubin, 1989). The literature identifies multiple considerations and approaches to deal with missingness (Lodder, 2013; Schafer & Graham, 2002). To determine the best approach for dealing with missing data, multiple factors must be considered to justify decisions for handling missingness. The amount and patterns of missing data are key considerations for how to deal with missing data (Lodder, 2013).

My study dataset included item nonresponse missing data, particularly related to the dependent variables selected for the study. Table 5 shows key study variables and the frequency of missing data.

Table 5*Table of Missing Values in Study Sample*

Variable Name	Number Missing	Percent Missing
Gender	0	0.00%
Race/ethnicity	0	0.00%
Maternal education	1	1.23%
Household income	1	1.23%
Eligibility	8	9.88%
Number of diagnoses	0	0.00%
Age at start	0	0.00%
Total Average Service	0	0.00%
Impact	6	7.41%
<u>Declassified</u>	<u>7</u>	<u>8.64%</u>

Note. $n = 81$. The number and percent of missing values of all study variables.

Due to the missing data, I will report the n -counts for all analyses and missing data related to each research question is discussed. Missing data can affect overall study sample size and subsequently study power. These are critical factors in determining appropriate statistical analysis methods.

Study Power

Power is defined as the probability of rejecting the null hypothesis when it is false, notated as 1-beta (β) where the beta value is the probability of a type II error (Shadish et al., 2002). Study sample size is a critical aspect in the power of any research study, including studies conducting secondary data analysis (Boo & Froelicher, 2013). In secondary data analysis studies, the data are previously collected, subsequently resulting in a fixed sample size. Studies using

large-scale secondary data can offer the promise of larger samples that can afford greater statistical power. However, in studies examining smaller subgroups, researchers are confined to smaller sample sizes. Weston et al. (2019) state that “Given the potentially limited sample size of these smaller-scale investigations, considerations of statistical power cannot be ignored when analyzing their data” (p. 214). A study can be underpowered with small sample sizes and subsequently have an increased risk of type II errors.

All power analyses includes four parameters in their calculations: (i) alpha level (α), typical set to .05, represents the probability of incorrectly rejecting the null hypothesis when it is true, also known as a type 1 error; (ii) power ($1-\beta$) (iii) sample size; and (iv) effect size (Saba, Pocklington, & Miller, 1998). Typically, a power value of 80% or higher is desirable (Sullivan, n.d.; Suresh & Chandrashekara, 2012). In secondary data analysis studies, a sensitivity power analysis can be performed using the alpha level, power, and the existing study sample size to calculate the required population effect size (Cribbie et al., 2019; Faul et al., 2007; Perugini et al., 2018). Faul et al. (2007) state “it may be useful to perform sensitivity analyses before conducting a study to see whether, given a limited N , the size of the effect that can be detected is at all realistic” (p. 177). Sensitivity power analyses provide the minimum detectable difference or minimum effect size for the population of interest.

For my study, since the sample size was fixed, I performed a sensitivity power analysis using G*power to calculate the population effect size. I ran a sensitivity power analysis for my t-test, ANOVAs, and correlations. Table 6 shows the results of the various effect sizes to address my study hypotheses.

Table 6*Sensitivity Power Analyses Results*

Test	Variable Used to Determine Group Sample Size	Effect size	Effect Size Benchmark
t-test	Gender	$d = 0.63$	medium to large
ANOVAs	Maternal education, Household income, Race/ethnicity	$f = 0.38$ to 0.40	large
Correlations	Age at start, Number of diagnoses	$\rho = 0.59$	large

Note. For all analyses in G*power, I included an alpha level of .05 and a power value of 0.80.

Each test required different information regarding my sample. For my t-test, I included the sample group sizes for males ($n = 56$) and females ($n = 22$). For ANOVAs, I used the overall available sample size ($n = 78$) and the number of subgroups per variable (i.e., maternal education and race/ethnicity each had 4 subgroups and household income had 5 subgroups). For correlations, I included the sample size in the calculation which resulted in the reported effect size. Effect size benchmarks were taken from Cohen (1988) and Lipsey et al. (2012).

The results of the sensitivity power analyses suggest that given the limited sample size I inherited from the secondary data set, I can expect to detect medium to large effect sizes, according to Cohen's effect size benchmarks (1988). Therefore, if the results yield effect sizes that are smaller than the ones reported in Table 6, one can conclude that the study was not sufficiently powered to detect the smaller effect sizes yielded by the *t* test, correlations, and one-way ANOVAs.

Furthermore, G*power was used to determine the minimal sample size required to detect small, medium, and large effect sizes given a statistical power of 0.80. The results in Table 7 show that given the study's sample size of 78, the study will meet the minimal sample size

requirements to achieve statistical power for t-tests and ANOVAs (4 group tests) that yield large effect sizes.

Table 7

Minimal Sample Size Requirements to Achieve Statistical Power at Varying Effect Sizes

Test	Small	Medium	Large
t-test	972	158	64
ANOVA: 5 groups	1200	200	80
ANOVA: 4 groups	1096	180	76
Correlations	779	82	26

Agresti's (2007) guidance of having 10 participants per independent variable to achieve statistical power was used as the guide to determine whether the minimal sample size requirement was met for the logistic regression analyses. Given that 10 to 11 independent variables were used to answer Research Questions 3 and 4, the minimal sample required was 100 and 110, respectively. Including a sample size of 78, did not meet the minimal sample size requirements for either research question. Thus, the analysis was not sufficiently powered.

In order to address the issue of statistical power for my regression analyses, I modified my regression models by changing the race/ethnicity variable from 4 subgroups (White, African American/Black, Hispanic, Other) to two subgroups (White and Persons of Color that consisted of children with the African America, Hispanic, and Other categories) and performed a series of bivariate analyses to explore reducing the number of independent variables. I performed bivariate analyses (chi-square tests of contingency and correlational analyses) that assessed the strength of relationships between independent and both dependent variables (impact and declassification). I also conducted bivariate analyses among independent variables to assess multicollinearity to determine whether all independent variables should remain in the regression.

The results of bivariate analyses to assess the strength of relationship between independent and dependent variables is shown in Tables 8 and 9. Results show no statistically significant relationships between independent variables and parent report of impact of early intervention on children's development. However, results show two statistically significant relationships between the independent variables and declassification. Table 8 shows that the Number of Diagnoses variable was strongly associated with declassification ($p = .01$). Table 9 shows that the variable "Hours per Week" was strongly associated with declassification ($p = .01$).

Table 8

Chi-square Tests of Contingency for Independent and Dependent Variables

	Impact			Declassified		
	χ^2	<i>df</i>	<i>P</i>	χ^2	<i>df</i>	<i>p</i>
Gender	0.87	1	0.35	2.11	1	0.15
Persons of Color	0.001	1	0.97	0.44	1	0.51
Number of Diagnosis	3	7	0.89	18.36	7	0.01
Maternal Education	3.11	3	0.38	0.91	3	0.82
Income	4.81	4	0.31	4.56	4	0.34
Impact	NA	NA	NA	2.31	1	0.13

Table 9*Correlational Analysis of Independent and Dependent Variables*

	Impact			Declassified		
	R	df	p	R	df	p
Age at Start	-0.12	70	0.31	-0.04	70	0.74
Hours Per Week	0.048	70	0.69	-0.3	70	0.01

I performed bivariate analyses among independent variables to assess multicollinearity.

If the correlations between two independent variables were high and significant, one of the two was dropped from the regression analysis. Table 10 shows that two significant relationships among independent variables emerged - one between maternal education and income and the other between hours per week and number of diagnosis. With these findings, I removed maternal education and number of diagnoses from the regression analyses to avoid multicollinearity.

Table 10*Correlational Analysis of Independent Variables to Assess Multicollinearity*

	Income		
	χ^2	df	p
Maternal Education	26.86	12	0.008
Number of Diagnosis			
	R	df	p
Hours per Week	0.22	76	0.05

Based on the results of findings from my bivariate analyses, I modified my logistic regression model for Research Question 3 that examines predictors of impact to include only 5

predictors. The predictors are hours per week, gender (male), race (whether child is a person of color), age at start, and income. By reducing my regression model, I increased the statistical power of this test, and the analytic sample of 78 now exceeds the minimal sample of 50 that was initially required to achieve adequate statistical power. This modification also minimizes multicollinearity or high redundancy among predictors. Likewise, for Research Question 4 examining predictors associated with declassification, I reduced my logistic regression model to include 6 predictors. The predictors are hours per week, impact, gender (male), race (whether child is a person of color), age at start, and income. Mirroring the advantages noted in my regression model modification for Research Question 3, the reduced logistic regression model increases statistical power; the analytic sample of 78 exceeds the minimal sample of 60 that is required to achieve adequate statistical power. This modification also addresses the issue of multicollinearity among predictors.

Patterns of Missing Data

Understanding patterns of missing data is critical to better understand potential sample bias and ensures that selected treatments, such as excluding missing data or imputing data, handle missing data appropriately. There are three main categories of missing data patterns. Missing completely at random (MCAR) is a pattern where variables in the dataset or unobserved values of the variable itself predict whether a value will be missing (Li, 2013; Lodder, 2013; Rubin, 1976). That is to say, there is no existing association between variables or values of variables that would predict missingness. Data that is MCAR can result in larger standard errors because of the reduced sample size. Despite larger standard errors, data that is MCAR does not render a systematic error or bias, as the collected data remain representative of the entire sample (Jakobsen et al., 2017; Little & Rubin, 2002). Missing at random (MAR) is a condition when variables, other than the variable itself, can be used to predict missingness on a given variable

(Li, 2013; Lodder, 2013; Rubin, 1976). Missing not at random (MNAR) is a condition when the value of unobserved variables predicts missingness (Li, 2013; Little & Rubin, 2002; Lodder, 2013; Rubin, 1976).

Little's test is a useful tool to examine whether there are significant differences between the means of different missing-value patterns. Results from Little's test help determine if data are considered missing completely at random (Li, 2013; Little, 1988). For my study, I performed Little's test with the total study sample. Of the 78 observations in the sample, this test gave a χ^2 distance of 63.46 with 59 degrees of freedom and a *p*-value of .32. The *p*-value is significantly larger than .05, indicating evidence that missing values across variables were missing at random and suggesting that there is no significant relationship between variables. Information about my study power and that my sample was MCAR helps inform statistical analyses approaches that minimizes biased parameters estimates and/or large standard errors.

Statistical Approach for Study Analysis

Statistical approaches to missing data include complete case analysis (including listwise or pairwise deletion) to sample weighting and multiple imputation. Approaches rely on patterns and types of missing data as well as sample size in a study (Little, 1992; Lodder, 2013; Piggott, 2001; Schafer & Graham, 2002;). In the field of education, sophisticated statistical approaches to missing data have become more common that attempt to estimate missing values, such as multiple imputation (Lodder, 2013). While multiple imputation is useful in helping to retain study sample sizes in studies with large sample sizes, small sample sizes challenge the validity of this approach (Barnes, Lindborg, & Seaman, 2006). Further, Von Hippel (2007) states that the “complete-case analysis and multiple imputation are equivalent” when missing data occur in the dependent variable, and that in those instances, “complete-case analysis is preferred since it is easier, more efficient and more robust” (p. 48). Further, this statistical approach is widely used in

the field of education. In a study conducted by Peng et al. (2006) that surveyed educational and psychological quantitative studies published from 1998 to 2004, authors report that of studies that discussed missing data, 97% used the listwise deletion (LD) or the pairwise deletion (PD) method to deal with missing data. While complete cases analysis may increase variance of estimates, this approach provides unbiased parameter estimates when the subset of subjects with complete data is representative of the population. Also, complete case analysis is assumed to be valid when the data are MCAR. Further justification for listwise deletion is noted by Schafer and Graham (2002) who state that, “If a missing data problem can be resolved by discarding only a small part of the sample, then the [listwise deletion] method can be quite effective” (p. 156). As my dataset is assumed to have missing data that are MCAR and sufficiently sized, complete case analysis with listwise deletion was used.

Handling Missing Data and Small Cell Sizes in Study Analyses

The challenges and strategies for dealing with missing data previously discussed highlight the need to articulate information about missing data and how they are handled in this study. Missing values rendered slightly different n -counts in my statistical analyses conducted for each of the four research questions. To address this, I provide information about missing data for each research question.

An additional consideration in quantitative research that impacts sample size and usable data for analyses is subgroup sample size, also known as cell size. While there is not a universal benchmark about the size of subgroups that are small enough to be excluded from analyses, key considerations around confidentiality and size sufficiency are paramount to ensuring statistically sound data (Seastrom, 2017). My study sample draws from a public use data set that eliminates the concern of confidentiality and privacy issues. However, insufficient cell sizes for analyses is

an additional critical factor, which could lead to imprecise parameter estimates. For the purposes of this study, I excluded or collapsed cell sizes that included less than five values for analyses. I also excluded subgroups when they could not be meaningfully collapsed into other categories.

Research Question 1: Descriptive Statistics of Child and Family Characteristics

The first research question describes child and family characteristics of infants and toddlers with social and behavioral disorders with service record data enrolled in early intervention. For Research Question 1, I included the variables gender, race/ethnicity, eligibility, number of diagnoses, and age at start to examine descriptive characteristics of children with social and behavioral disorders who were scheduled to receive services while enrolled in early intervention. I included additional information related to the types of social and behavioral disorders with which children in the study presented, comorbidity with other disorders/delays, and the length of time children were enrolled. My sample include 81 infants and toddlers with social and behavioral disorders with complete service record data (that reported the average number of services children were scheduled to receive while enrolled in early intervention) to respond to my first research question.

Child Demographics and Characteristics

Research Question 1: Who are the children with social and behavioral disorders and their families receiving early intervention (EI) services?

To respond to my first question, I used multiple variables, including gender, race/ethnicity, when a child started receiving early intervention services (“age at start”), eligibility determination, and number and type of diagnoses. My sample size consisted of 81 children. My analyses of child characteristics showed that the age children with social and behavioral disorders began (“age at start”) in early intervention between 1997 and 1998 ranged from 6.34 to 31.28 months ($M = 24.1$, $SD = 5.1$). Findings showed that males accounted for

approximately 72% of the sample. With respect to race and ethnicity, White children made up approximately 37% of the sample, African American/Black children made up approximately 31%, Hispanic children made up approximately 23%, Asian children made up approximately 3%, and children categorized as Other made up approximately 8%. As discussed earlier, subgroups with less than five children were excluded from further analyses when they could not be collapsed into other meaningful categories. Children categorized as Asian/ Native Hawaiian/Pacific Islander represented a total of three children and were therefore excluded from the sample for remaining questions due to insufficiency of subgroup cell size, resulting in 78 children for analyses.

I further explored child demographics by performing crosstabulation analysis of gender and race. My findings showed that males made up more than two thirds of all racial categories. Table 11 shows results of descriptive statistics related to child gender and race/ethnicity.

Table 11

Summary of Child Demographics

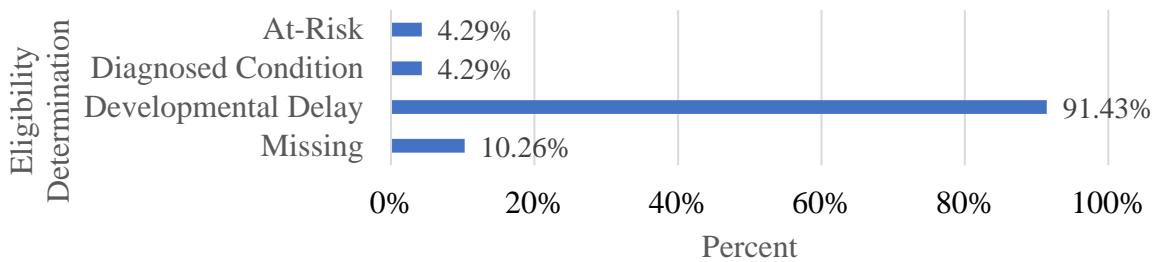
Race/Ethnicity	Male		Female		Total	
	n	Percent	n	Percent	n	Percent
White	20	35.72%	9	40.91%	29	37.18%
African American/Black	17	30.36%	7	31.82%	24	30.77%
Hispanic	13	23.21%	6	27.27%	19	24.36%
Other/Multiple	6	10.71%	0	0.00%	6	7.69%
Total	56	100.00%	22	100.00%	78	100.00%

Note. n = 78. Table represents crosstabulation of race and gender for children in the sample. n- counts and percentages show the breakdown by gender groups and sample total.

An additional variable I explored was eligibility determination. Children were deemed eligible based on three eligibility categories: Developmental Delay, Diagnosed Condition, or At-Risk. Children with a developmental delay accounted for most children in the sample ($n = 64$). Children with diagnosed conditions ($n = 3$) or at risk ($n = 3$) accounted for six children in the sample. There were participants that had missing data. Figure 2 demonstrates the breakdown of eligibility categories.

Figure 2

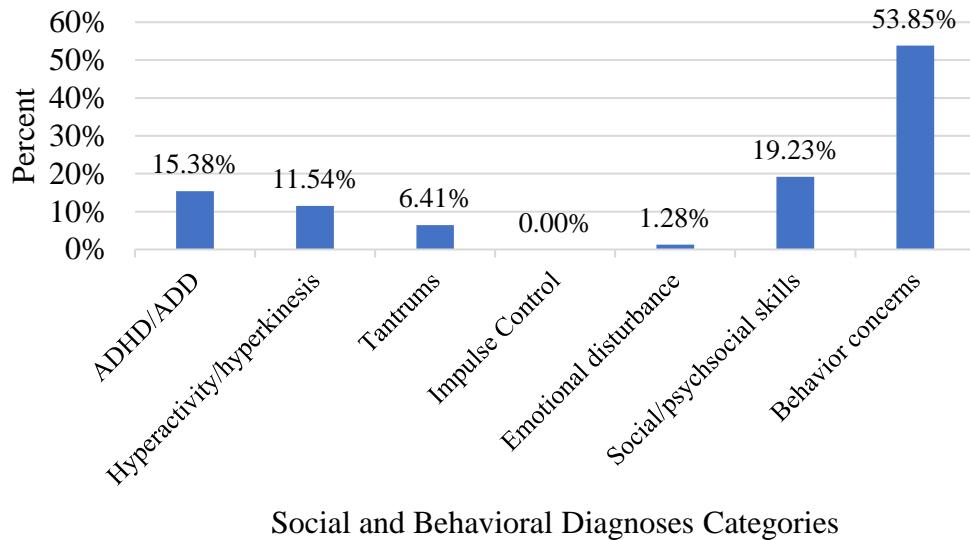
Eligibility Category for Children with Social and Behavioral Disorders



Note. $n = 78$. Eligibility determination categories vary across states, however, children with developmental delay makeup the greatest proportion of children in the sample.

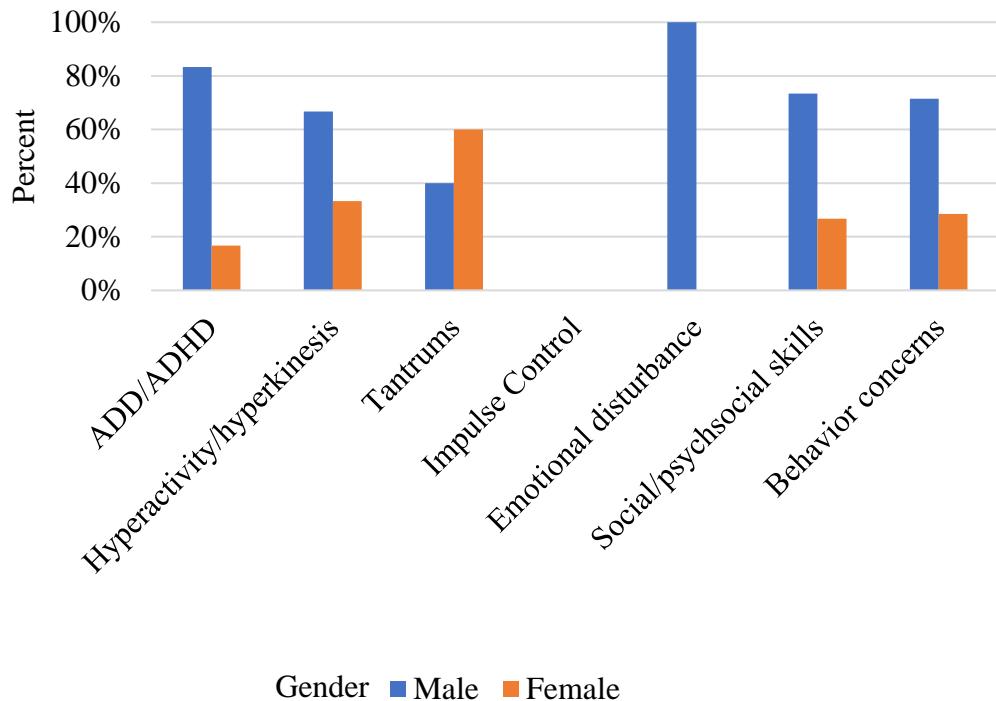
Two of the three eligibility categories, “Diagnosed Condition” and “At-Risk,” met the exclusion criteria related to cell sizes, therefore, this variable was dropped from further analysis as no group differences could be examined.

Children’s diagnoses were a foundational variable of interest for this study. Diagnoses for children with social and behavioral disorders included ADHD/ADD ($n = 12$), tantrums, hyperactivity/hyperkinesis ($n = 9$), impulse control ($n = 0$), emotional disturbance ($n = 1$), social/psychosocial skill ($n = 15$), and behavioral concerns ($n = 42$). Figure 3 shows the percentages of children with various social and behavioral diagnoses in the sample.

Figure 3*Breakdown of Social and Behavioral Diagnoses*

Note. $n = 78$. Percent of infants and toddlers with social and behavioral diagnoses enrolled in early intervention. These diagnosis categories were not mutually exclusive; some children presented with multiple social and behavioral diagnoses.

Analyses exploring cross tabulations of gender and diagnoses demonstrated the difference between the rates of certain disorders between males and females. Overall, males demonstrated higher rates of social and behavioral diagnoses for every diagnosis category except tantrums. Figure 4 shows results from crosstabulation analyses examining gender and social and behavioral diagnoses.

Figure 4*Crosstabulation of Gender and Social and Behavioral Diagnoses*

Note. $n = 78$. Percent of males and females in the study sample by diagnosis category.

Additional analyses were conducted to explore race/ethnicity and social and behavioral diagnoses. Crosstabulations found that White children made up the greatest proportion of all racial/ethnic groups with diagnoses related to ADD/ADHD, social/psychosocial skills, and behavioral concerns. African American/Black and Hispanic children represented triple the number of infants and toddlers diagnosed as having either hyperactivity or hyperkinesis. With respect to tantrums, White and Hispanic subgroups of children each represented 40% of the sample, while African American/Black children represented 20%. For diagnoses in the behavioral concerns category, African American/Black infants and toddlers represented over one third, and Hispanic children represented approximately one fifth of the sample. Children in the “Other” racial/ethnic groups represented less than 10% of children and only presented with two

of the six social and behavioral diagnostic categories, social/psychosocial skills, and behavior concerns. Table 12 shows results of the crosstabulation analysis of race/ethnicity and diagnoses.

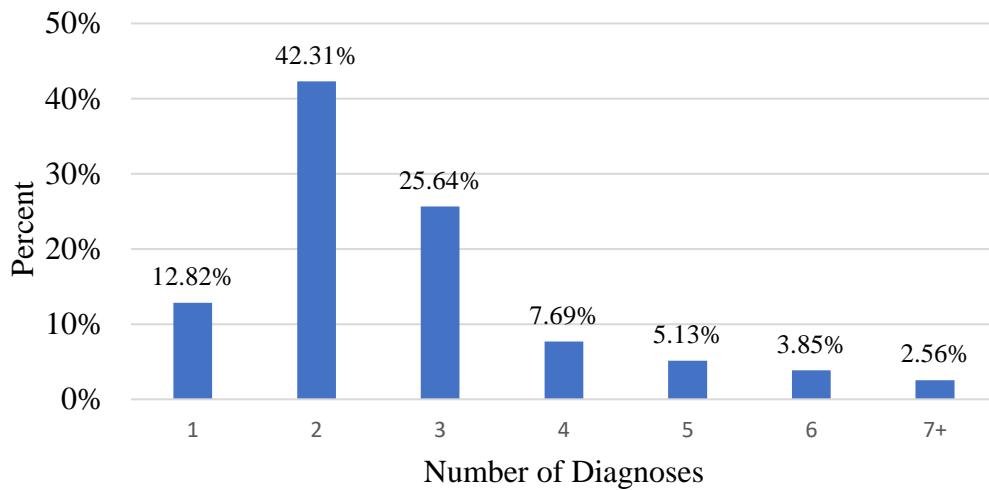
Table 12

Crosstabulation Analysis of Race/Ethnicity and Social and Behavioral Diagnoses

Social/Behavioral Diagnosis	Race/Ethnicity			
	White	African American/Black	Hispanic	Other
		n (%)	n (%)	n (%)
ADD/ADHD	6 (50.00%)	4 (33.33%)	2 (16.67%)	0
Hyperactivity/Hyperkinesis	0 (0.00%)	5 (55.56%)	4 (44.44%)	0
Tantrums	2 (40.00%)	1 (20.00%)	2 (40.00%)	0
Emotional Disturbance	0	0	1 (100%)	0
Social/Psychosocial Skills	6 (40.00%)	3 (20.00%)	3 (20.00%)	3 (20.00%)
Behavior Concerns	16 (38.10%)	15 (35.17%)	8 (19.05%)	3 (7.14%)

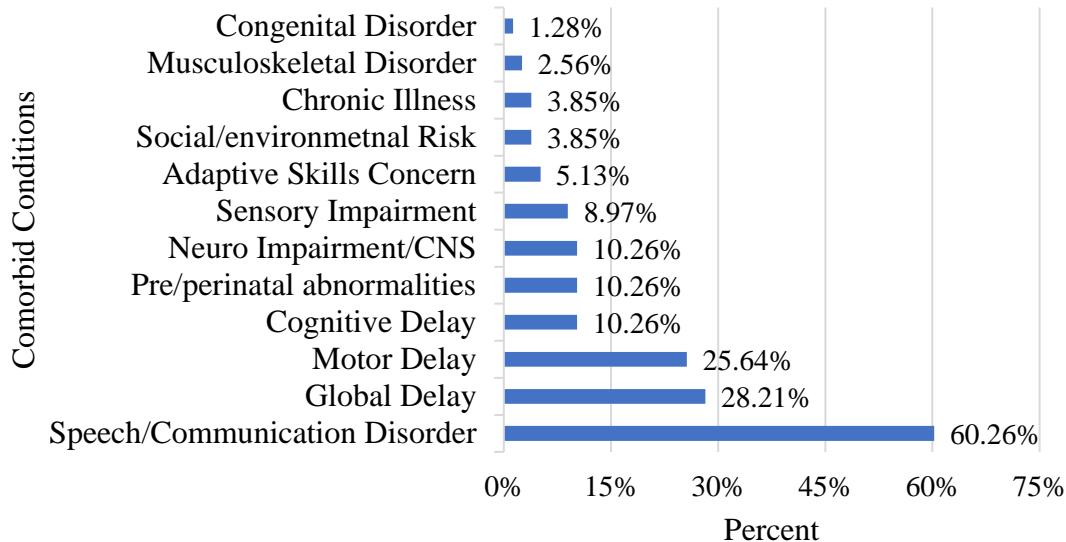
Note. n = 78.

In addition to social and behavioral diagnoses, children presented with multiple diagnoses and comorbid conditions. The number of diagnoses ranged from one to nine ($M = 2.7$, $SD = 1.5$). Ten children in the sample, accounting for 12.82%, had only one social and behavioral diagnoses. Of the remaining 87.19% of infants and toddlers with social and behavioral disorders, 33 had two conditions, 20 had three conditions, 6 had four conditions, 4 children had five conditions, 3 had six conditions, and 2 children had seven or more conditions in the sample. Figure 5 demonstrates the distribution of the number of diagnoses for children with social and behavioral disorders enrolled in early intervention.

Figure 5*Number of Diagnoses for Children with Social and Behavioral Disorders*

Note. $n = 78$. Number of diagnoses for infants and toddlers with social and behavioral disorders enrolled in early intervention.

In addition to the number of diagnoses, I explored the various conditions children were diagnosed with in addition to social and behavioral disorders. Conditions ranged from congenital and genetic disorders (e.g., Fragile X) that were determined before birth to social and environmental conditions (e.g., incarcerated parents). Infants and toddlers with social and behavioral diagnoses presented with a wide range of other developmental, medical, and social conditions. Figure 6 provides a pictorial breakdown of the types of comorbid conditions children with social and behavioral disorders had in the study sample.

Figure 6*Comorbid Conditions for Children with Social and Behavioral Disorders*

Note. $n = 78$. Data presented in the graph represent all conditions that existed in addition to social and behavioral diagnoses. As children presented with as many as nine conditions, data are not mutually exclusive.

The greatest number of children ($n = 47$) had a Speech/Communication delay in addition to a social behavioral diagnosis. Twenty-two infants and toddlers were diagnosed with a global delay and a social and behavioral disorder. Twenty children had both a social/behavioral disorder and a motor delay. Cognitive delays, pre/perinatal abnormalities, and neuro impairments/central nervous system disorders accounted for 8 children each within the sample. Seven children had sensory impairments in addition to social and behavioral diagnoses. Four children had adaptive behavioral concerns, and three children in each of the diagnostic categories of social/environmental concerns and chronic illness also demonstrated comorbidity with social and behavioral disorders. Appendix C provides the diagnoses associated with each of the diagnosis categories.

Family Characteristics

For my descriptive statistics examining family characteristics, I included the variables maternal education and family income. In the section, I report a summary of subgroup sizes and percentages.

Sub question 1a: What are the family characteristics of children with a social or behavioral diagnosis receiving early intervention services?

To answer my research question related to family characteristics, I conducted descriptive statistics using the maternal education and household income variables. For maternal education, the highest percentage of mothers, over one third of the sample, had a high school degree or GED followed by mothers with a college degree or higher, representing over a quarter of the overall sample. Just over one fifth of mothers reported having some college, while mothers with less than a high school degree made up the smallest proportion of the sample.

Over a third of respondents had a household income of less than \$15,000. Families with incomes ranging from \$25,001-\$50,000 accounted for just under a quarter of the sample, followed by approximately one fifth of families whose household incomes ranged from \$15,000-\$25,000. Less than 10% of the sample had a household income of over \$75,000. See Table 13 for a summary of family demographics, including the *n*-count and percent of maternal education levels and household income subgroups.

Table 13*Summary of Family Characteristics*

	<i>n</i>	Percent
Family Characteristics		
Maternal Education		
Less than high school	12	15.38%
High school or GED	28	35.90%
Some college	17	21.79%
College degree or more	21	26.92%
Missing	0	0.00%
Household Income		
Less than \$15,000	26	33.33%
\$15,001-\$25,000	16	20.51%
\$25,001-\$50,000	18	23.08%
\$50,001-\$75,000	12	15.38%
More than \$75,000	5	6.41%
Missing	1	1.28%

Note. *n* = 78.

Research Question 2: Understanding Service Provision for Children with Social and Behavioral Disorders in Early Intervention

Research Question 2 examines service data for children with social and behavioral disorders in early intervention. The sample size included 78 infants and toddlers. Service record forms from the NEILS provided information about the amount and type of services children received during their enrollment in early intervention. Data on services were collected every 6

months the child was enrolled in the program. The number of service record forms collected was dependent on the length of time children were enrolled in early intervention and whether the form was completed by service providers. Data collected from children's Individualized Family Service Plans reported the average amount of minutes per month that children were scheduled to receive services across various settings (home, childcare, centers with specialized services, clinics, or other). NEILS researchers derived a variable that reported an average of the total amount of services children were scheduled to receive (as reported by minutes/month) within the 6-month period that the Service Record form captured. Children could have had up to seven service record forms completed during their enrollment in the NEILS. Within my study sample, the number of service records ranged from one to five ($M = 1.8$, $SD = .9$).

For this study, I derived a new variable that captured the average amount of services children with social and behavioral disorders were scheduled to receive while enrolled in early intervention. I calculated the variable using the average of time values across all service records for each individual child. While the unit of analysis in the NEILS was originally calculated in minutes per month, I converted the time values to hours per week so that findings were more easily understood.

Research Question 2: What is the total amount of services (hours per week) children with social and behavioral disorders were scheduled to receive while enrolled in early intervention?

Service data for children with social and behavioral disorders enrolled in early intervention showed that, on average, children spent approximately 10 months enrolled in the program. The enrollment length ranged from 4.82 months to 29.16 months ($M = 10$, $SD = 4.7$). The total average amount of scheduled services across all settings ranged from 0.25 to 45.75 hours per week ($M = 5.9$, $SD = 7.7$).

Examining Group Differences Related to Service Provision

For my sub questions, I examine differences in the average amount of service children were scheduled to receive by child and family characteristics. To explore group differences, I performed an independent-samples *t*-test and ANOVAs. In addition, I conducted correlations to explore the relationship between age at start in early intervention and number of diagnoses with the amount of services children were scheduled to receive.

Sub Question 2a: What differences exist in the amount of services for children with social and/or behavioral disorders? Are there differences by gender? By household income? By maternal education? By race/ethnicity?

To examine if any group differences existed by gender, I performed an independent-samples *t*-test. Based on analysis results, I found no statistically significant difference between males ($M = 5.6$, $SD = 6.7$, $n = 56$) and females ($M = 6.5$, $SD = 9.9$, $n = 22$) in the amount of services scheduled to be received, $t(76) = -0.46$, $p = .64$, $d = 0.12$. Therefore, we fail to reject the null hypothesis and conclude no significant gender difference in the amount of services children were scheduled to receive while enrolled in early intervention.

To examine group difference by race/ethnicity, maternal education, and household income and the average amount of services children with social and behavioral disorders were scheduled to receive while enrolled in early intervention, I conducted three separate ANOVA tests. The results of the first ANOVA shows that no statistically significant group differences in service amount were found as a function of household income, $F(4,72) = 0.90$, $p = .47$, $\eta^2 = 0.05$. As with the *t*-test and previous ANOVAs conducted, we fail to reject the null hypothesis and thus conclude that service amount does not differ statistically as a function of household income. Table 14 shows the means across groups.

A second one-way ANOVA was used to determine whether significant maternal education differences exist on the total average amount of services infants and toddlers with social and behavioral disorders were scheduled to receive while enrolled in early intervention. There were no statistically significant differences in the service amount as a function of maternal education, $F(4,74) = 0.27, p = .84, \eta^2 = 0.01$. Therefore, we fail to reject the null hypothesis.

Table 14 shows the means across maternal education groups.

A third one-way ANOVA was used to explore race/ethnicity differences as well. The results showed statistically significant differences in the total average amount of scheduled services children with social and behavioral disorders as a function of race/ethnicity, $F(3,74) = 3.26, p = .03, \eta^2 = 0.12$. Therefore, we reject the null hypothesis. Table 14 shows the means across race/ethnicity groups. A Tukey's honestly significant difference (HSD) post-hoc test with the Bonferroni correction of 0.01 provided information to identify which specific groups differed (Salkind, 2010). Paired comparisons that have p values of 0.01 or lower are considered statistically different. As shown in Table 15, the difference between individuals identifying as Other and those identifying as White was the only statistically significant racial/ethnicity difference in the amount of scheduled services. Specifically, individuals identifying as "Other" reported more scheduled services than White individuals ($M_D = 10.4, SE = 3.32$). However, none of the other racial/ethnic differed significantly from the Other racial/ethnic group or each other.

Table 14

One-Way Analysis of Variance of Average Hours per Week of Scheduled Service Across Demographic Groups

Variable	Service Amount				
	M	SD	F	η^2	p
Income			0.90	0.05	.47
Less than \$15,000	4.77	0.89			
\$15,000-\$25,000	7.63	2.90			
\$25,000 - \$50,000	4.20	0.71			
\$50,000-\$75,000	8.54	3.47			
\$75,000 or more	6.52	1.98			
Maternal Education			0.27	0.01	.84
Less than high school	4.50	1.47			
High School/GED	6.48	1.68			
Some college	6.64	2.33			
College degree or more	5.27	1.24			
Race/Ethnicity			3.26*	0.12	.03
White	3.9	3.2			
African-American/Black	5.9	9.6			
Hispanic	5.9	5.2			
Other	14.4	15.2			

Table 15*Tukey Post Hoc Test Results Comparing Racial/Ethnic Group Means*

Race/Ethnic Group	Contrast	Standard Error	t	P> t
African American/Black – White	1.99	2.04	0.97	.77
Hispanic – White	2.00	2.18	0.92	.80
Other – White	10.38	3.32	3.13	.01
Hispanic - African American/Black	0.02	2.27	0.01	.99
Other - African American/Black	8.39	3.38	2.48	.07
Other – Hispanic	8.38	3.47	2.42	.08

Note. n = 78. Tukey Post Hoc test was performed to examine where differences occurred between racial/ethnic groups.

To further explore the relationship between the amount of scheduled services and key child variables, I correlated the amount of services children were scheduled to receive and the age at start for children entering early intervention. I also examined the correlation between the amount of services children were scheduled to receive and their number of diagnoses.

Sub Question 2b: Is there a relationship between age at start and amount of services children with social and behavioral disorders were scheduled to receive while enrolled in early intervention? Between number of diagnoses and amount of scheduled services?

The Pearson's R correlation revealed no statistically significant relationship between the amount of services children were scheduled to receive and the age at start in early intervention for children with social and behavioral disorders, $r(78) = .13$, $p = .25$. In other words, there is no strong association between the average amount of services children were scheduled to receive and when children began early intervention.

I also measured the relationship between the average amount of services received and the number of diagnoses for infants and toddlers with social and behavioral disorders in early intervention using Pearson's r correlation. The results indicated a marginally significant association between these two variables, $r(78) = 0.22, p = .06$.

Logistic Regression Analyses

I used logistic regression to examine important determinants of improved outcomes for infants and toddlers with social and behavioral disorders enrolled in early intervention. Specifically, the regression analyses explored the outcomes of parent report of impact of early intervention on children's development and declassification (i.e., exiting early intervention/special education). In my original regression model, I included the variables race/ethnicity (as defined by four subgroups), eligibility, maternal education, and number of diagnoses. However, as noted earlier, the eligibility variable was excluded from all inferential statistical analyses due to small cell sizes. Also, to enhance statistical power, I reduced the number of independent variables by modifying the race/ethnicity variable to include the subgroups "White" and "Persons of Color." Also, maternal education and number of diagnoses were removed from my regression model due to issues of multicollinearity. My regression analyses included the following predictors: average hours per week a child was scheduled to receive services, gender, race/ethnicity (being a Person of Color), household income, and age at start.

To ensure appropriate power for logistic regression, the literature recommends having at least 10 participants for each predictor variable included in the model (Agresti, 2007). My study sample included 78 participants. As discussed, my regression models for Research Questions 3 and 4 include multiple independent variables (5 and 6 independent, respectively) which meet the criteria necessary for statistical power.

Two hypotheses explored whether factors related to child and family characteristics were associated with improved outcomes (i.e., parent report of impact and declassification) for children with social and behavioral disorders. I performed logistic regression analyses to test this prediction. The independent variables average hours per week of scheduled service, being male, being a person of color, household income, and age at start were used in both models. For the model examining declassification, I included the additional independent variable, parent report of impact, in the regression. The dependent variables “parent report of impact of early intervention on child development” and “declassification” were dichotomous (no = 0; yes = 1).

Missing Data

Both independent and dependent variables (declassified and parent report of impact of early intervention) for regression analyses accounted for approximately 17% of missing data in the sample. My selected statistical approach for this study was complete case analysis using listwise deletion. By using listwise deletion, missing data from my outcome variables of interest and other independent variables are excluded from analyses.

Research Question 3: Factors Associated with Impact of Early Intervention

Research Question 3: What factors are associated with parent report of impact of early intervention services on children’s development?

The third research question examined the probability that parent report of an impact of early intervention on children’s development was associated with child and family characteristics. Parent report of the impact of early intervention on children’s development was regressed on the average amount of scheduled service while controlling for gender, race/ethnicity, household income, and the age the child started in early intervention. With the missing data from independent and dependent variables, 71 complete cases remained to calculate the regression.

The overall logistic regression was not statistically significant, $\chi^2(5) = 4.38, p = .50$. A common measure of model fit, pseudo- R^2 reveals a low value of 0.05. As shown in Table 16, none of the independent variables had a statistically significant effect on parent-reported impact on early intervention because none had p -values that were less than .05. With these finding, we fail to reject the null hypothesis. Therefore, gender, race/ethnicity, age at start, race/ethnicity, and household income are not associated with parental report of impact of early intervention on children's development. These child and family characteristics do not influence the odds that parents will report a positive impact of early intervention on children's development.

Table 16*Logistic Regression Predicting Parent Report of Impact of Early Intervention*

	Odds Ratio	Standard Error	<i>z</i>	<i>p</i>
Hour per Week	1.02	0.04	0.61	.54
Male	1.55	0.89	0.76	.45
Person of Color	0.71	0.39	-0.62	.53
Income	1.23	0.26	1.01	.32
Age at Start	0.91	0.05	-1.60	.11
Constant	8.46	13.09	1.38	.17

Note. $n = 71$. Listwise deletion eliminated 7 cases with missing values.

Research Question 4: Factors Associated with Declassification

The fourth research question examined the odds that the amount of services children were scheduled to receive and child and family characteristics would be associated with children's declassification from early intervention. Like Research Question 3, the eligibility, maternal education, and number of diagnoses variables were excluded from analysis. In the revised

regression model, declassification was regressed on the average amount of scheduled services while controlling for gender (being male), race/ethnicity (being a Person of Color), age at start, household income, and parent report of the impact of early intervention on children's development.

Research Question 4: What child, family and service factors are associated with children's declassification from early intervention?

For Research Question 4, declassification from early intervention (using no IEP as a proxy variable) was regressed on the amount of services children receive in early intervention while controlling for child characteristics (gender, race, age at start) and family characteristics (household income and parent report of impact of early intervention services on children's development).

The overall logistic regression was statistically significant, $\chi^2(6) = 18.67, p < .01$. A common measure of model fit, pseudo- R^2 reveals 0.22, which is a relatively low value. The average number of hours per week a child was scheduled to receive services was the only variable that was significantly associated with declassification from early intervention. Specifically, fewer hours spent on services was associated with greater odds of declassification. None of the other independent variables (gender, race/ethnicity, household income, age at start, and parent report of impact of early intervention) had a statistically significant effect on the odds of declassification. The results are presented in Table 17.

Table 17*Logistic Regression Predicting Parent Report of Declassification*

	Odds Ratio	Standard Error	<i>z</i>	<i>p</i>
Hour per Week	0.77	0.10	-2.58	.01
Male	0.51	0.68	-0.99	.32
Person of Color	2.55	0.65	1.44	.15
Income	0.73	0.25	-1.24	.22
Age at Start	1.03	0.06	0.51	.61
Impact	0.74	0.63	-0.46	.64
Constant	1.43	1.80	0.20	.84

Note. $n = 69$. Listwise deletion eliminated 9 cases with missing values.

With the information provided from this analysis, we reject the null hypothesis. These results suggest that the amount of time spent on services does influence the odds of a child's declassification from early intervention and that this effect holds even after gender, race/ethnicity, household income, and parent report of impact are taken into account.

Chapter Summary

This chapter provides findings from quantitative methods and statistical approaches employed to answer research questions examining child, family, and services characteristics associated with positive outcomes for children with social and behavioral disorders in early intervention. I found no significant differences by gender, maternal education, or household income, or number of diagnoses with respect to the number of services provided to children enrolled in early intervention. Further, selected child and family characteristics do not predict a change in the odds of parents reporting a positive impact of early intervention on children's

development. The number of hours per week spent on services was the only variable that was significantly associated with the declassification from early intervention. In Chapter 5, I discuss study findings further and offer suggestions on future research to explore alternate models and/or variables that affects the odds of improved outcomes for children with social and behavioral disorders enrolled in early intervention.

CHAPTER 5: DISCUSSION

In this chapter, I provide a summary of this study and a discussion of results from the four research questions examining infants and toddlers with social and behavioral disorders enrolled in early intervention. I reference findings from this study to other research findings. I also discuss study limitations learned through analyses as well as implications from findings for policy, practice, and future research.

Summary of Major Findings

This study aims to better understand infants and toddlers with social and behavioral disorders served in Part C early intervention programs. Extant data from the National Early Intervention Longitudinal Study (NEILS) was used to explore child, family, and service characteristics for infants and toddlers with social and behavioral disorders who enrolled in early intervention programs across 20 states between September 1997 and November 1998. The study sample consisted of a total of 81 infants and toddlers enrolled in early intervention with disorders ranging from broad behavioral concerns to ADHD. The Asian/Native Hawaiian/Pacific Islander subgroup in the race/ethnicity variable only consisted of three children and was therefore dropped from analyses, resulting in a subsequent sample size of 78 children.

My statistical analyses questions included descriptive statistics of child demographics and family dynamics, inferential statistics examining group differences in service amount, and logistic regressions to examine factors associated with parent report of impact of early intervention on children's development and declassification from early intervention. Findings indicate that over two thirds of infants and toddlers with social and behavioral disorders in early intervention were male. Most children (approximately 91% of the sample) were eligible for early intervention due to a development delay; therefore, results from this study overarchingly examine infants and toddlers with social and emotional disorders who were determined eligible for early

intervention services based on a developmental delay (rather than a diagnosed condition or being at-risk). The average amount of services children were scheduled to receive did not differ significantly by gender, maternal education, or household income. Children categorized as “Other” had a greater amount of scheduled services in comparison to their White counterparts. The relationships among age at start in early intervention, number of diagnoses, and the average amount of scheduled service were not statistically significant. Lastly, the number of hours per week spent on services was the only variable that was significantly associated with the declassification from early intervention.

Discussion

This study examined child and family characteristics, including variables related to a child’s gender, race/ethnicity, age at start, diagnoses, and comorbidity of disorders, maternal education, and household income. Appendix D includes a table that provides an overview of findings related to child and family characteristics from the NEILS data as compared to the study sample to highlight differences for the subset of infants and toddlers in early intervention with social and behavioral disorders with service information. In this section, I discuss my findings, organized by child, family, and service variables that were explored in analyses.

Gender

The study findings fill a gap in the literature about what is known about prevalence of social and behavioral disorders for children birth to 3 years old, specifically those enrolled in IDEA Part C early intervention programs. Descriptive statistics from the study found the majority of the sample (72%) was male, suggesting that boys have higher rates of social and behavioral disorders than girls. The NEILS study reported that 61% of the overall population of children enrolled in early intervention were male (Blackorby et al., 2010; Hebbeler et al., 2007).

My study findings are consistent with the available literature that indicates that Part C program enrollment rates consistently show a higher rate of males than females.

Examination of gender and diagnoses indicated that males were over twice as likely to present with diagnoses related to ADD/ADHD, hyperactivity/hyperkinesis, impulse control, emotional disturbance, social/psychosocial skills disorders, and behavioral concerns. These findings are consistent with available literature reporting higher rates of behavioral disorders in boys (Cooper et al., 2009; Kraemer, 2000; Lavigne et al., 1996). The current study's findings differ somewhat from existing literature related to prevalence rates of specific social and behavioral diagnoses by gender. With respect to hyperactivity, this study found that males represented twice the number of infants and toddlers with hyperactivity disorders, while Kraemer (2000) found that hyperactivity occurs three to four times more in boys than girls. Another area of divergence from the existing literature related to gender differences and the prevalence of tantrums. In this study, females made up a greater percentage of children diagnosed with tantrum disorders, while other literature suggests that there are no group differences in gender related to tantrums (Sisterhen & Wy, 2019).

With respect to service provision, there were no statistically significant group differences between males and females related to the total average amount of services children were scheduled to receive while enrolled in early intervention. No significant difference in service amount suggests a positive outlook, that the amount of services that males and females were scheduled to receive is equitable. For outcomes explored in this study, gender was not found to be associated with parent report of impact of early intervention on children's development or declassification from Part C. Findings from the Infant Health and Development Program (IHDP)

for low-birth-weight premature infants also showed no differences in gender related to early intervention (Berlin et al., 1998).

Race/Ethnicity

The literature identifies race/ethnicity as a salient factor related to differences in young children's social emotional development, access to services, and household income. Evidence suggests that African American/Black children demonstrate lower social emotional skills, lower access to services, and more frequently come from low income families (Aratani et al., 2011; Rosenberg et al., 2013). My findings indicate that over half of the sample (53%) were children of color (African American/Black and Hispanic) as compared to the NEILS that found 37% of the population of children enrolled in early intervention as children of color (Hebbeler, 2007). Further exploration identified that African American/Black and Hispanic infants and toddlers represented a greater proportion of children as having hyperactive disorder, as compared to their White peers. The study findings supplement the literature indicating that African American/Black children demonstrate more frequent negative behaviors and social disorders as compared to White peers (Aratani et al., 2011).

With respect to racial/ethnic group differences for the total average amount of service children were scheduled to receive, no statistically significant difference was found for most racial/ethnic groups. This finding is inconsistent with that of past research that shows that in comparison to other racial/ethnic groups, African American/Black children receive fewer services (Feinberg et al., 2011; Rosenberg, 2008).

However, a significant difference was found for children categorized in the "Other" race/ethnicity as compared to their White peers, with the group of children categorized as "Other" receiving a greater average amount of service. Many potential factors exist that could have influenced this finding that merit further exploration. For example, evidence suggests

culture plays a critical role in decision making related to health care and education (Nápoles-Springer et al., 2005). This subgroup could have comprised of racial/ethnic groups that believe and seek out care and support more than White families. Other factors not included in the dataset, such as availability of services, could have also played a part in this difference. While this subgroup sample size was very small, it is difficult to make strong inferences from these findings. However, it is worthy of further investigation. For the rest of the racial/ethnic groups, these findings suggest an equitable amount of services.

Age at Start

The existing literature relating to age at start for children in early intervention has shown varying evidence due to factors of disability type and severity, and/or children from disadvantaged backgrounds. Findings from this study showed children's ages ranged from 6 to 31 months. Only one child in the sample began receiving early intervention services at 6 months and was an outlier in the sample (over 3.5 SD from the mean age of 24 months). The child who began at 6 months presented with 4 diagnoses, including prenatal cocaine/crack exposure and issues with feeding skills, in addition to neuromotor delays and tantrums. Three children in the sample were around 31 months of age (approximately 1.5 SD from the mean). These children had a wide range of diagnoses; one child had 2 diagnoses (including articulation/phonological disorder, issues with social/psychosocial skills), another child had 4 diagnoses (including delays in cognition, delays in developmental speech/language, behavior concerns, delays in physical development), and the eldest child in the sample had only one diagnosis of hyperactivity/hyperkinesis.

Developmental science literature, however, suggests that social and behavioral disorders emerge as children develop into their toddler years. My study findings demonstrated the average age that infants and toddlers with social and behavioral disorders were enrolled in early

intervention was around 24 months, which was approximately 8 months older than the average age of children entering early intervention as found by NEILS researchers. Identification at approximately 2 years old for social and behavioral disorders is consistent with the developmental literature that indicates children's expressive behaviors become more prominent (with their concurrent developmental stages of language and adaptive development). As children become toddlers, they begin to assert more independence and are more able to express frustration and anger, which subsequently can lead to tantrums, issues of impulse control, and/or aggression (Gadow et al., 2001; Malik & Marwaha, 2020).

Children in Part C early intervention programs "age out" or exit at 36 months. The study findings indicate the average length of time infants and toddlers with social behavioral disorders were enrolled in the program was approximately 10 months. Therefore, outcomes for children in the sample were largely based on less than a year of intervention.

A correlational analysis of age at start and the total average amount of service infants and toddlers with social and behavioral disorders were scheduled to receive showed no significant relationship. These findings indicate that service amount and when a child starts early intervention are not related. With respect to age at start and parent report of impact and declassification, no significant findings presented from this study. Whereas previous literature considered disability severity as a critical factor in age at start and declassification, this study used number of diagnoses and comorbidity as an alternate hypothesis for exploring questions related to children with social and behavioral disorders as potentially affecting service provision and outcomes.

Number of Diagnoses and Comorbidity

The findings related to the number and types of diagnoses children presented with validated existing literature related to comorbidity for children with disabilities and social and behavioral disorders. A key finding from this study was that the greatest proportion of children with social and behavioral disorders presented with at least two additional diagnoses. Most infants and toddlers receiving early intervention with a social and behavioral disorder also had a diagnoses of a communication delay. Feldman et al. (2000) found that children with developmental disabilities demonstrate an increased risk of behavior problems, such as tantrums, hyperactivity, and aggression beginning in as young as two years of age. Findings from this study validate not only the age at which social and behavioral disorders emerge but also the increased chances of comorbid conditions with developmental disabilities. Additional evidence from the literature reinforce the present study's findings that comorbidity between social, emotional, and behavioral disorders exist with cognitive delays and linguistic deficits, which become more present and evident as children age into toddlerhood (Cheng et al., 2014; Sisterhen & Wy, 2019; Thurm et al., 2018).

While findings from this study affirmed literature related to comorbid conditions for children with developmental delays and social and behavioral disorders, results from correlational analysis examining number of diagnoses and the total average amount of service were marginally significant, suggesting that children with fewer diagnoses also potentially receive less services. While this study examined the quantity of diagnoses, it did not explore the severity/quality of diagnoses, which could merit further research.

Maternal Education

Maternal education findings differed from the existing literature examining this factor in early intervention. According to the present study, descriptive statistics indicated that mothers with a high school diploma/GED made up the largest proportion of levels of maternal education while mothers with less than high school education made up the smallest group. While these findings were consistent with the NEILS, the current study found mothers with a bachelor's degree the second largest percentage of mothers, while NEILS findings indicated mothers with some college as the second largest group.

Maternal education has been found to be a key determinant in children's academic success (Harding, Morris, & Hughes, 2015; Reardon, 2011). Lower maternal education has been repeatedly established as a risk factor for poorer educational outcomes from birth through adolescence (Delgado & Scott, 2006; Hebbeler et al., 2001; Wagner & Blackorby, 2002). In this study, ANOVAs were used to examine group differences in maternal education level and the amount of service children were scheduled to receive, and regression analyses were used to explore association with improved outcomes for children in the sample (as indicated by parent report of impact and declassification). Although existing literature clearly identifies maternal education as a significant factor in children's development, my study results found no significance with this variable as it related to any of the inferential statistics conducted. My findings suggest infants and toddlers with social and behavioral disorders in early intervention receive an equitable amount of service despite their mothers' education levels. My findings also suggest that maternal education is not associated with parent report of positive impact of early intervention or declassification.

Household Income

Household income has been shown to play a significant role in children's development and education. In the current study, descriptive statistics indicated that approximately 50% of the sample had household incomes of less than \$25,000, as compared to the NEILS which reported approximately 43% of households making less than \$25,000 (Hebbeler, 2007). These findings are consistent with the literature that cites lower household income was associated with children's negative behaviors (Knapp, 2007).

Evidence identifies lower income to be associated with poorer academic outcomes. Keogh (2000) and Land and Legters (2005) assert that poverty (household incomes less than \$20,000) is associated with lower educational attainment. The current study investigated household income using ANOVA analyses to examine differences in household income and the amount of service children were scheduled to receive and in regression analyses to examine if household income was a factor in parent report of impact of early intervention or declassification. In these analyses, household income was not found to differ significantly from existing evidence in the literature.

Parent Report of Impact of Early Intervention on Children's Development

Parent report of positive impact with early intervention had been the primary measure for helping evaluate the effects of early intervention since Part C of IDEA was established (Bailey & Bruder, 2005). The present study found that almost three quarters of families reported that early intervention had a lot of impact on children's development, consistent with findings from the NEILS (Hebbeler, 2007). In Part C early intervention programs, families are partners in the decision making related to children's goals, services children receive, and continued enrollment in special education. This data point is important because family satisfaction and perception of the value of early intervention can play a role in the decision to continue to pursue special

education services in the future. More recently the Office of Special Education Programs has included an indicator related to family outcomes that offers another means of evaluating the impact of early intervention.

To help explore factors related to the odds of parents reporting a positive impact on children's development, regression analyses included child and family characteristics discussed above. Findings from this study suggest that child and family variables included in the model were not associated with parent report of positive impact of early intervention. While almost three quarters of families reported a positive impact of early intervention on children's development, results from the regression model and independent variables were found to be statistically insignificant. Other factors not examined in this study, such as parent engagement in interventions, could serve as explanatory variables that do ultimately affect the odds of caregiver's reporting a positive impact of early intervention.

Declassification

In the sample, approximately 32% of children with social and behavioral disorders were declassified from early intervention. Findings were consistent with NEILS findings for the overall population of children exiting early intervention with an IEP; NEILS found that approximately one third of children were declassified from early intervention (Hebbeler, 2007). The literature related to declassification from early intervention is sparse and riddled with methodological limitations, such as sample size and representativeness. This study supports NEILS findings, however, mirrors methodological issues with previous studies (Bailey et al., 1999; Innocenti, 2004).

Declassification or continued receipt of special education services after early intervention is related to family choice, professional input, and eligibility criteria for states' Part B programs. In addition, because a child is declassified from Part C, this does not mean that they do not or are

not eligible to receive targeted services outside of Part C early intervention programs. However, if a family chooses, and a child is eligible to receive special education services with an Individualized Education Plan, there are legal provisions in place to ensure children receive services under the regulatory provisions of a Free and Appropriate Public Education (FAPE).

To explore factors associated with declassification, the regression model used in the study was found to be statistically significant. The number of hours per week spent on services was the only variable that was significantly associated with the declassification from early intervention; the children who received less services had greater odds of being declassified. This finding suggest that children may be more likely to exit because their conditions are less severe. Previous studies suggested that disability severity is a significant factor in rates of declassification (Daley et al., 2009; Innocenti, 2004). Although this study did not examine disability severity per se, number of diagnoses (as referenced earlier) served as a proxy for children that may have presented with multiple disorders. As number of diagnoses was found to be marginally positively correlated with the average hours per week children were scheduled to receive services, results suggested that children with fewer diagnoses also received fewer services. Other than the average amount of scheduled services, findings from this study suggest that independent variables included in the model are not associated with declassification from early intervention. Other variables not examined in this study could serve as explanatory variables that do ultimately affect the odds of declassification. To help increase the declassification for infant and toddlers' with social and behavioral disorders, early intervention programs should consider additional factors, developmental interventions and/or evidence-based practices that may have a direct influence on children no longer needing special education services.

Implications for Research

While this study offers foundational evidence about infants and toddlers with social and behavioral disorders in Part C early intervention, future research is necessary to address issues related to present day population representativeness, policy updates related to Part C, improved tools and measures to identify early childhood mental health disorders, increased standardized measures to evaluate effectiveness of early intervention, and methodological robustness.

Since the NEILS, the number of children being served in early intervention has increased, and the demographics of the United States has changed substantially. Part C early intervention programs nationally have seen a marked increase in the number of Hispanic children and significant decline in enrollment of the African American/Black children enrolled in Part C early intervention. Data from the U.S Department of Education IDEA Section 618 Data Products report that in 2018, Hispanic children made of 27% of enrollment in Part C early intervention programs, and African American/Black children accounted for 12% of infants and toddlers enrolled in Part C early intervention programs; enrollment of Hispanic children has increased 11% and decreased 9% for African American/Black children (U.S. Department of Education, 2019) . Future research could explore the current population of children enrolled in Part C early intervention programs and offer evidence representing the present-day demographics of the U.S. population. Studies could also examine issues of racial equity and identification of children of color, utilizing the Critical Race Theory as the theoretical framework for further examination.

Conducting a nationwide study, mirroring the NEILS, could affirm the prevalence of disorders and examine additional factors affecting improved outcomes for children exiting early intervention. My study found the greatest proportion of children with ADHD/ADD were White children. This finding is consistent with older children in the K-12 years (K. Hoffmann, personal communication, August 24, 2020). At the same time, African American/Black children made up

the greatest proportion of children diagnosed with Hyperactivity/Hyperkinesis (and no White children received this diagnosis). Additional research could examine shared variance of social and behavioral disorders, particularly the overidentification of students with ADHD by race/ethnicity. Future research could also incorporate additional policy considerations related to Part C IDEA changes that have occurred since the reauthorization in 2004, such as the requirement to serve all families regarding of linguistic ability and also federal indicator data that include a specific outcome variable examining improved social emotional outcomes for children in early intervention.

Future research could also address methodological limitations of the current study by including a larger sample of children, incorporating valid and reliable standardized assessments to further eliminate bias that self/caregiver report presents, and utilizing different measures to ensure higher quality service record data. With the growth in data science and technological advances to support research, additional future research could also include examination of existing electronic medical health records (using deidentified data). By accessing existing large-scale datasets, key issues related to sample size could be addressed. In the current study, a key challenge was related to missing data and small subgroup sample sizes. Future research could explore using different statistical approaches, such as multiple imputation if large amounts of data are missing. Further, future studies could incorporate more robust methodological approaches for causal analyses, such as case control or quasi-experimental designs, to better examine the effectiveness of early intervention on infants and toddlers with social and behavioral disorders. Studies could examine families who did not enroll in early intervention as a point of comparison.

With respect to measuring child outcomes, measures could include the federal child outcomes indicator that measures social emotional outcomes and/or improved performance on direct child assessments, which may offer more valid and reliable evidence. Investigation of additional family characteristics, such as familial engagement in service provision, could also inform whether additional family factors impact improved outcomes. Finally, future research that could expand on the current study should include qualitative investigation to gain deeper knowledge about families with infants and toddlers with social and behavioral disorders in early intervention. Qualitative methodologies could be instrumental in unearthing additional variables for further examination in future large-scale studies.

Implications for Policy and Practice

Evidence in the scientific and professional literature has established the critical period of brain development in the first three years of life and social emotional foundations established during this time. In addition, literature and public awareness related to the impact of toxic stress, adverse childhood experiences, and trauma have also helped shed light on the importance of early childhood mental health. While the available information typically links early childhood mental health issues with poverty, this study creates a stronger link to the reality of early childhood mental health and children with developmental delays. Part C of IDEA promotes eligibility for children with or at-risk for developmental delay. While the emphasis has historically been placed on physical and cognitive delays, findings from this study reinforce the need to consider the realities of social, emotional, and behavioral delays as well.

The national policy landscape is evolving to include a greater emphasis on early childhood mental health and ensuring that infants and toddlers at-risk are linked to Part C early intervention programs. Policies such as the Child Abuse Prevention and Treatment Act that stipulates automatic referrals for children suspected of child abuse and neglect to Part C and

Project LAUNCH that fosters early childhood systems of care inclusive of Part C early intervention, explicitly place children at-risk in early intervention. In addition to policies, emergent practices such as early childhood mental health consultation and the growing needs for a professional workforce reared in competencies to address social and emotional development are becoming more pervasive in the early childhood field.

With evidence to support how Part C early intervention programs serve (or could meaningfully serve) infants and toddlers with social and behavioral disorders, additional funding can support states to expand eligibility criteria to make room for more children with social and behavioral diagnoses. Federal appropriations for Part C have changed since the NEILS. Overall, federal appropriations to Part C have increased with the increasing population; however, even with these allocations, there has been a decrease in dollars per child. At the time of the study, from 1997 to 2007, federal appropriations ranged from \$1777 to \$1428 dollars per child. The most recent public available data from 2018 indicate an approximate one-third decrease of federal appropriations, with current funding accounting for \$1209 dollars per child (Lazara, 2019). As noted earlier, federal appropriations and state funding often impact states' determination of eligibility for early intervention. Increased funding and a permanent reauthorization of IDEA could support states to include more children at-risk from lower socioeconomic statuses (which would include children living with toxic stress, experiencing trauma) who demonstrate an increased incidence, or are at greater risk for, social, emotional, and/or behavioral issues.

This current study offers insight into the field of early childhood mental health and fills a gap within the literature related to infants and toddlers with early childhood mental health disorders in the field of Part C early intervention. Findings from this study can provide some

evidence about the prevalence of social and behavioral disorders in infants and toddlers, child and family characteristics related to children under 3 with social and behavioral disorders, and the role that Part C has historically played in serving infants and toddlers with developmental delays, including social, emotional and behavioral disorders.

Study findings reinforce the available literature regarding the prevalence of early childhood mental health issues in children of color. While most of the available evidence speaks to children in preschool and older, this study extends what we now know about infants and toddlers in early intervention. Recent Census data from 2019 show that the greatest proportion of infants born in the United States were children of color (Keating et al., 2019). Findings from this study highlight the prevalence of social and behavioral disorders amongst children of color and can help serve to better understand these populations of infants and toddlers. With these contributions to the field, additional evidence is available to draw policy and practice changes to further support early intervention programs to better serve families with young children with early childhood mental health needs.

Concluding Thoughts

With this study, I hoped to establish a baseline of knowledge related to infants and toddlers with early childhood mental health (social, emotional, and behavioral) issues in Part C early intervention programs. In addition to the study limitations discussed in the Methods chapter, additional limitations emerged through the analyses.

While secondary data analysis using the NEILS afforded me access to a large, nationally representative data set of children who had been enrolled in Part C early intervention, my study sample was markedly small and therefore not generalizable to the population of children in early intervention. First, the small subsample of children with social and behavioral disorders posed challenges to this study, especially with the amount of missing data, which led to changes in

analyses conducted. Also, small subgroups led to the exclusion of certain subgroups and variables that further limited the study sample size and subsequently limited findings that could be drawn from the sample. The small sample size challenged the ability to make inferences about the national population from the study's sample. Future research should identify additional strategies to prevent missing data. Conducting large-scale national longitudinal studies are costly, which is a possible reason a more current study like the NEILS has not been implemented and are not conducted more frequently. The total funding to conduct the NEILS was approximately \$10.1 million (K. Hebbeler, personal communication, August 25, 2020). One year of continuation funding from the Office of Special Education programs for the National Early Intervention Longitudinal Study was \$1,200,000 in 2001 (Office of Special Education Programs, 2002).

Another perceived limitation was the large proportion of males as compared to females. While the predominance of males in the sample may be perceived as a limitation, it is not necessarily a limitation. Evidence from the literature has shown a greater proportion of males with certain genetic and congenital disorders, such as Fragile X and autism. In addition, males are also more frequently diagnosed with social and behavioral disorders. My sample closely reflects the proportion of males in the early intervention population.

Findings from this study contribute to the research literature, practice, and policy landscape for infants and toddlers with social and behavioral disorders in Part C early intervention programs. There is a dearth of published literature related to infants and toddlers with early childhood mental health issues in Part C early intervention. Literature cited throughout this paper is based on what is currently available. Franco et al. (2014) conducted a study to examine the notion of publication bias by examining 221 National Science Foundation-funded survey studies.

Their study found that almost two thirds of studies that found no significant findings were never published, which creates a bias within the scientific evidence available for researchers. Knowing this leaves questions as to what else may in fact be known, or still not known related to this field. Further, their study affirms that while most study findings were found to be statistically insignificant, data from the study can still contribute to the literature, which has a substantial gap in understanding infants and toddlers with developmental delays and social and behavioral disorders in Part C early intervention programs.

The field of infant mental health is still growing, and more research, policy, and practice efforts are needed. Part C of IDEA placed a call to action and legal entitlements to families with infants and toddlers to ensure the nation's youngest and most vulnerable were provided the services and supports to have the best foundation and start to life. These entitlements were established to help children and the society at large achieve their greatest potential. Despite gains, considerable issues still remain related to public understanding of what healthy social emotional development looks like, clinically and culturally-relevant valid and reliable tools for identification, and evidence-based practices and service provision to serve young children with social and behavioral disorders (Brauner & Stephens, 2006). More research and evaluation is necessary to elucidate the factors associated with improved outcomes for infants and toddlers with mental health disorders.

REFERENCES

- Ackerman, B. P., Brown, E. D., & Izard, C. E. (2004). The relations between contextual risk, earned income, and the school adjustment of children from economically disadvantaged families. *Developmental Psychology, 40*(2), 204–216.
- Ageranioti-Bélanger, S., Brunet, S., D'Anjou, G., Tellier, G., Boivin, J., & Gauthier, M. (2012). Behaviour disorders in children with an intellectual disability. *Paediatrics & Child Health, 17*(2), 84–88.
- Althubaiti A. (2016). Information bias in health research: definition, pitfalls, and adjustment methods. *Journal of Multidisciplinary Healthcare, 9*, 211–217.
- Aratani, Y, Wight, V. R., & Cooper, J. L. (2011). *Racial gaps in early childhood: Socio-emotional health, developmental, and educational outcomes among African American boys*. New York, NY: National Center for Children in Poverty, Columbia University.
- Bagner, D. M., Frazier, S. L., & Berkovits, M. (2014). Getting ready for preschool: linking early intervention and family mental health for infants and toddlers with developmental delay. *Administration and Policy in Mental Health, 41*(6), 707–711.
- Bailey, D. B., & Bruder, M. B. (2005). *Family outcomes of early intervention and early childhood special education: Issues and considerations*. Washington, D.C.: Office of Special Education Programs, Early Childhood Outcomes Center.
- Bailey, E., & Bricker, D. (1984). The efficacy of early intervention for severely handicapped infants and young children. *Topics in Early Childhood Special Education, 4*(3), 30-51.
- Bailey, D. B., Aytch, L. S., Odom, S. L., Symons, F., & Wolery, M. (1999). Early intervention as we know it. *Mental Retardation and Developmental Disabilities Research Reviews, 5*(1), 11-20.
- Baker, B. L., Neece, C. L., Fenning, R. M., Crnic, K. A., & Blacher, J. (2010). Mental disorders

- in five-year-old children with or without developmental delay: Focus on ADHD. *Journal of Clinical Child and Adolescent Psychology* 39(4), 492–505.
- Barger, B., Rice, C., Simmons, C. A., & Wolf, R. (2018). A systematic review of part C early identification studies. *Topics in Early Childhood Special Education*, 38(1), 4–16.
- Barnes, S., Lindborg, S., & Seaman, J. (2006). Multiple imputation techniques in small sample clinical trials. *Statistics in Medicine*, 25(2), 233-45.
- Barnett, W. S., & Escobar, C. (1987). The economics of early educational intervention: A review. *Review of Educational Research*, 57(4), 387–414.
- Barnett, W. S., & Escobar, C. M. (1998). The economics of early intervention for handicapped children: What do we really know? *Journal of the Division for Early Childhood*, 12(2), 169-181.
- Bendersky, M., & Lewis, M. (1994). Environmental risk, biological risk, and developmental outcome. *Developmental Psychology*, 30(4), 484–494.
- Berlin, L. J., Brooks-Gunn, J., McCarton, C. & McCormick, M. C. (1998). The effectiveness of early intervention: examining risk factors and pathways to enhanced development. *Preventive Medicine*, 27(2), 238-245.
- Blackorby, J., Schiller, J.E., Mallik, S., Hebbeler, K., Huang, T., Javitz, H., Marder, C., Nagle, K., Shaver, D., Wagner, M., & Williamson, C. (2010). *Patterns in the identification of and outcomes for children and youth with disabilities* (NCEE 2010-4005). Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education.

- Bolarinwa, O. A. (2015). Principles and methods of validity and reliability testing of questionnaires used in social and health science researches. *Nigerian Postgraduate Medical Journal*, 22(4), 195-201.
- Boo, S. & Froelicher, E.S. (2013). Secondary analysis of national survey datasets. *Japan Journal of Nursing Science*, 10(1), 130–135.
- Boyce, G. C., Smith, T.B., Immel, N., Casto, G., & Escobar, C. (1993). Early intervention with medically fragile infants: Investigating the age-at-start question. *Early Education and Development*, 4(4), 290-305.
- Boyle, A., & Lee, K. (n.d.). *Title I at 50: A retrospective*. American Institutes of Research.
Title-I-at-50-rev.pdf
- Boyle, C. A, Boulet, S., Schieve, L. A., Cohen, R. A., Blumberg, J., Yeargin-Allsopp, M., Visser, S., & Kogan, M.D. (2011). Trends in the prevalence of developmental disabilities in US children, 1997–2008. *Pediatrics*, 127(6), 1034–1042.
- Brauner, C. B., & Stephens, C. B. (2006). Estimating the prevalence of early childhood serious emotional/behavioral disorders: Challenges and recommendations. *Public Health Reports*, 121(3), 303–310.
- Briggs-Gowan, M., Carter, A., Bosson-Heenan, J., Guyer, A., & Horwitz, S. (2006). Are infant-toddler social-emotional and behavioral problems transient? *Journal of the American Academy of Child and Adolescent Psychiatry*, 45(7), 849–858.
- Bronfenbrenner, U. (1992). Ecological systems theory. In R. Vasta (Ed.), *Six theories of child development: Revised formulations and current issues* (pp. 187-249). London, England: Jessica Kingsley Publishers.
- Burchinal, M. R., Peisner-Feinberg, E., Pianta, R., & Howes, C. (2002). Development of

- academic skills from preschool through second grade: Family and classroom predictors of developmental trajectories. *Journal of School Psychology*, 40(5), 415-436.
- Castro, G., & Mastropieri, M.A. (1986). The efficacy of early intervention programs: A meta-analysis. *Exceptional Children*, 52, 417-442.
- Center for Parent Information and Resources. (2014). Early intervention, then and now. Retrieved January 3, 2020 from <https://www.parentcenterhub.org/ei-history/>
- Center on the Developing Child. (2007). *In brief: The science of early childhood development*. Retrieved from: <https://46y5eh11fhgw3ve3ytpwxt9r-wpengine.netdna-ssl.com/wp-content/uploads/2007/03/InBrief-The-Science-of-Early-Childhood-Development2.pdf>
- Cheema, J. R. (2014). A review of missing data handling methods in education research. *Review of Educational Research*, 84(4), 487-508.
- Cheng, H. G., & Phillips, M. R. (2014). Secondary analysis of existing data: Opportunities and implementation. *Shanghai Archives of Psychiatry*, 26(6), 371–375.
- Cheng, E. R., Palta, M., Kotelchuck, M., Poehlmann, J., & Witt, W. P. (2014). Cognitive delay and behavior problems prior to school age. *Pediatrics*, 134(3), e749–e757.
- Child Care and Early Education Research Connections. (n.d.). Descriptive statistics. Retrieved from <https://www.researchconnections.org/childcare/datamethods/descriptivestats.jsp>
- Coates, K. M. (1985). The Education for All Handicapped Children Act since 1975. *Marquette Law Review*, 69(1), 51-81.
- Cohen, J. (1988). *Statistical power analysis for the behavior sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.
- Cohen, L., Manion, L., & Morrison, K. (2008). *Research methods in education* (6th ed.). London

- & New York: Routledge Taylor & Francis Group.
- Congressional Research Service. (2019). *The Individuals with Disabilities Education Act (IDEA)*, *Part C: Early Intervention for Infants and Toddlers with Disabilities*. Retrieved March 5, 2020 from <https://files.eric.ed.gov/fulltext/ED597894.pdf>
- Conroy, M. (2004). Early identification, prevention and early intervention for young children at risk for emotional, behavioral disorders: Issues, trends, and a call to action. *Behavioral Disorders*, 29(3), 224-236.
- Cooper, J. L., Masi, R., & Vick, J. (2009). *Social-emotional development in early childhood: What every policymaker should know*. New York, NY: National Center for Children in Poverty.
- Cox, B., McIntosh, K., Reason, R. D., & Terenzini, P. T. (2014). Working with missing data in higher education research: A primer and real-world example. *The Review of Higher Education*, 37(3), 377–402.
- Cribbie, R., Beribisky, N., & Alter, U. (2019). A Multi-faceted Mess: A Review of Statistical Power Analysis in Psychology Journal Articles. Retrieved from https://www.researchgate.net/publication/333839303_A_Multi-faceted_Mess_A_Review_of_Statistical_Power_Analysis_in_Psychology_Journal_Articles
- Crosby, E. (2004). *Meta-analysis of second generation early intervention efficacy research involving children with disabilities or delays*. (Unpublished doctoral thesis).

- Pennsylvania State University, University Park, Pennsylvania.
- Daley T. C., Simeonsson R. J., & Carlson, E. (2009). Constructing and testing a disability index in a US sample of preschoolers with disabilities. *Disability and Rehabilitation*, 31(7), 538–552.
- Das, S., & Rahman, R.M. (2011). Application of ordinal logistic regression analysis in determining risk factors of child malnutrition in Bangladesh. *Nutrition Journal*, 10(1), 1-11.
- Dekker, M. C., Koot, H. M., van der Ende, J., & Verhulst, F. C. (2002). Emotional and behavioral problems in children and adolescents with and without intellectual disability. *Journal of Child Psychology and Psychiatry*, 43(8), 1087–1098.
- Delgado, C. E., Vagi, S. J., & Scott, K. G. (2006). Tracking preschool children with Developmental delay: Third grade outcomes. *American Journal on Mental Retardation*, 111(4), 299-306.
- Delgado, C. E. F., & Scott, K. G. (2006). Comparison of referral rates for preschool children at risk for disabilities using information obtained from birth certificate records. *The Journal of Special Education*, 40(1), 28-35.
- Dong, Y., & Peng, C. Y. (2013). Principled missing data methods for researchers. *SpringerPlus*, 2(1), 222.
- Drost, E. A. (2011). Validity and reliability in social science research. *Education Research and Perspectives*, 38(1), 105-123.
- Dunlap, G., Strain, P. S., Fox, L., Carta, J. J., Conroy, M., Smith, B. S., Kern, L., Hemmeter, M. L., Timm, M. A., Mccart, A., Sailor, W., Markey, U., Markey, D. J., Lardieri, S., & Sowell, C. (2006). Prevention and intervention with young children's challenging

- behavior: Perspectives regarding current knowledge. *Behavioral Disorders*, 32(1), 29-45.
- Dunst, C. J., & Rheingrover, R. M. (1981). An analysis of the efficacy of infant intervention programs with organically handicapped children. *Evaluation and Program Planning*, 4(3-4), 287–323.
- Dunst, C. J. (1990). Revisiting "rethinking early intervention." *Topics in Early Childhood Special Education*, 20(2), 95-104.
- Early Childhood Mental Health. (n.d.). Retrieved from
<https://developingchild.harvard.edu/science/deep-dives/mental-health/>
- Early Childhood Outcomes Center. (2005). The Early Childhood Outcomes Center: Overview. Retrieved April 28, 2020, from <http://www.fpg.unc.edu/eco/pages/overview.cfm>
- Early Childhood Technical Assistance Center. (2015). *States' and territories' definitions of criteria for IDEA Part C eligibility*. Retrieved January 3, 2020 from
https://ectacenter.org/~pdfs/topics/earlyid/partc_elig_table.pdf
- Early Childhood Technical Assistance Center. (2019). Part C federal fiscal year 2017 SPP/APR indicator analysis. Retrieved April 28, 2020 from
<https://ectacenter.org/~pdfs/grads360/18280.pdf>
- Elbaum, B. (2016, January). *Early intervention under I.D.E.A.: Access, services, and outcomes for infants with or at risk for developmental delays*. Presentation at the Mailman Center Grand Rounds, Miami, FL.
- Emerson, E. (2003). Prevalence of psychiatric disorders in children and adolescents with and without intellectual disability. *Journal of Intellectual Disability Research*, 47(1), 51–58
- Enders, C. K. (2003). Using the expectation maximization algorithm to estimate coefficient alpha for scales with item-level missing data. *Psychol Meth*, 8(3), 322–337.

- Erdfelder, E., Faul, F., & Buchner, A. (1996). GPOWER: A general power analysis program. *Behavior Research Methods, Instruments & Computers*, 28(1), 1–11.
- Etchegaray, J. M., & Fischer, W. (2006). Survey research: be careful where you step ... *Quality & Safety in Health Care*, 15(3), 154–155.
- Families and Work Institute. (1996). Rethinking the brain: New insights into early development. Executive Summary of the Conference on Brain Development in Young Children: New Frontiers for Research, Policy, and Practice. University of Chicago.
- Farran, D. C. (2000). Another decade of intervention for children who are low income or disabled: What do we know now? In J. P. Shonkoff & S. J. Meisels (Eds.), *Handbook of early childhood intervention* (pp. 510–548). New York, NY: Cambridge University Press.
- Faul, F., Erdfelder, E., Lang, A. & Buchner, A.G. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods Instruments & Computers*, 39(2), 175-191.
- Feldman, M. A., Hancock, C. L., Rielly, N., Minnes, P., & Cairns, C. (2000). Behavior problems in young children with or at risk for developmental delay. *Journal of Child and Family Studies*, 9, 247–261.
- Feldman, M. A. (2004). *Early intervention: The essential readings*. Malden, MA: Blackwell Publishing Ltd.
- Fish, E. (2002). The benefits of early intervention. *Stronger Families Learning Exchange Bulletin*, 2, 8-11.
- Franco, A., Malhotra, N., & Simonovits, G. (2014). Publication bias in the social sciences: Unlocking the file drawer. *Science*, 345(6203), 1502-1505.
- Gadow, K. D., Sprafkin, J., & Nolan, E. E. (2001). DSM-IV symptoms in community and clinic preschool children. *Journal of the American Academy of Child and Adolescent Psychiatry*, 40(10), 1100–1106.

- Psychiatry*, 40(12), 1383–1392.
- Gamoran, A. (2013). *Educational inequality in the wake of No Child Left Behind*. William T. Grant Foundation Spencer Foundation Award Lecture to the Association for Public Policy and Management, November 7, 2013.
- Germany, K. (2019). Lyndon B. Johnson: Domestic affairs. University of Virginia Miller Center. <https://millercenter.org/president/lbjohnson/domestic-affairs>
- Gettings, R. M. (1974). The education amendments of 1974: An analysis of P.L. 93-380. *Programs for the Handicapped*, 5, 13-15.
- Gilliam, W. S. (2005). *Prekindergartners left behind: Expulsion rates in state prekindergarten systems*. New Haven, CT: Yale University Child Study Center.
- Gleason, M. M., Goldson, E., & Yogman, M. W. (2016). Addressing early childhood emotional and behavioral problems. *Pediatrics*, 138(6), e1-e13.
- Green C. A. (2006). Gender and use of substance abuse treatment services. *Alcohol Research & Health*, 29(1), 55.
- Guralnick, M. J. (1998). Effectiveness of early intervention for vulnerable children: A developmental perspective. *American Journal of Mental Retardation*, 102, 319-345.
- Haartsen, R., Jones, E. J. H., & Johnson, M. H. (2016). Human brain development over the early years. *Current Opinion in Behavioral Sciences*, 10(1), 149–154.
- Haden, P. (2019). Inferential statistics. In S. Fincher & A. Robins (Eds.), *The Cambridge Handbook of Computing Education Research* (pp. 133-172). Cambridge: Cambridge University Press. doi:10.1017/9781108654555.007
- Halle, T., Forry, N., Hair, E., Perper, K., Wandner, L., Wessel, J., & Vick, J. (2009). *Disparities*

- in early learning and development: Lessons from the Early Childhood Longitudinal Study – Birth Cohort (ECLS-B).* Washington, DC: Child Trends.
- Harding, J., Morris, P., & Hughes, D. (2015). The relationship between maternal education and children's academic outcomes: A theoretical framework. *Journal of Marriage and Family*, 77(1), 60-76.
- Hebbeler, K. M., Smith, B. J., & Black, T. L. (1991). Federal early childhood special education policy: A model for the improvement of services for children with disabilities. *Exceptional Children*, 58(2), 104-112.
- Hebbeler, K., & Wagner, M. (1998). *The National Early Intervention Longitudinal Study (NEILS): Design overview.* Menlo Park, CA: SRI International.
- Hebbeler, K., Wagner, M., Spiker, D., Scarborough, A., Simeonsson, R., & Collier, M. (2001). *The National Early Intervention Longitudinal Study (NEILS): A first look at the characteristics of children and families entering early intervention services.* NEILS Data Report No. 1. Menlo Park, CA: SRI International.
- Hebbeler, K., Spiker, D., Bailey, D., Scarborough, A., Mallik, S., Simeonsson, R., Singer, M., & Nelson, L. (2007). *Early intervention for infants and toddlers with disabilities and their families: Participants, services, and outcomes.* [NEILS Data Report]. Menlo Park, CA: SRI International.
- Hebbeler, K., Levin, J., Perez, M, Lam, I., & Chambers, J. (2009). Expenditures for early intervention services. *Infants & Young Children*, 22(2), 76-86.
- Heckman, J. (2012). The developmental origins of health. *Health Economics*, 21(1), 24-29.
- Individuals with Disabilities Education Act. (n.d.). Sec. 303.1 Purpose of the early intervention

- program for infants and toddlers with disabilities. Retrieved from
<https://sites.ed.gov/idea/regulations/c/a/303.1>
- Hedges, L. & Rhoads, C. (2009). Statistical Power Analysis in Education Research (NCSER 2010-3006). Washington, DC: National Center for Special Education Research, Institute of Education Sciences, U.S. Department of Education.
- Individuals with Disabilities Education Act of 2004, 20 USC §1432.
- Individuals with Disabilities Education Act: Early Intervention Program for Infants and Toddlers with Disabilities, 76 Fed Reg. § 188 (final rule September 28, 2011 (to be codified at 34 C.F.R. pts. 300 and 303)).
- Innocenti, M. S., & White, K. R. (1993). Are more intensive early intervention programs more effective? A review of the literature. *Exceptionality*, 4(1), 31-50.
- Innocenti, M. S., & Price, C. (2005). Exiting special education as a measure of early intervention success: The Utah Early Intervention Project. *The Utah Special Education*, February 2005, 38-39.
- Invest in Early Childhood Development: Reduce Deficits, Strengthen the Economy. (2017, February 15). Retrieved from <https://heckmanequation.org/resource/invest-in-early-childhood-development-reduce-deficits-strengthen-the-economy/>
- Jakobsen, J.C., Gluud, C., Wetterslev, J. & Winkel, (2017). When and how should multiple imputation be used for handling missing data in randomised clinical trials – a practical guide with flowcharts. *BMC Medical Research Methodology*, 17(162), 1-10.
- Jesinoski, M. S. (2006). *Predicting school placement outcomes of children with disabilities who was once enrolled in early intervention* [Unpublished or master's thesis]. Utah State University.

- Johnston, M. (2014). Secondary data analysis: A method of which the time has come. *Qualitative and Quantitative Methods in Libraries*, 3, 619-626.
- Kang, H. (2013). The prevention and handling of the missing data. *Korean Journal of Anesthesiology*, 64(5), 402–406.
- Keating, K., Daily, S., Cole, P., Murphey, D., Pina, G., Ryberg, R., Moron, L., & Laurore, J. (2019). State of babies yearbook 2019. Retrieved March 12, 2020 from https://stateofbabies.org/wp-content/uploads/2019/05/State-of-Babies-Yearbook_full-digital-yearbook_5.14.19.pdf
- Keith, T. (2015). *Multiple regression and beyond* (2nd ed.). New York, NY: Routledge.
- Keogh, B. K. (2002). *Foreword*. In R. Bradley, L. Danielson, & D. P. Hallahan (Eds.), *Identification of learning disabilities: Research to practice* (pp. xix–xxi). Mahwah, NJ: Erlbaum.
- Kilburn, M., & Karoly, L. (2008). *The economics of early childhood policy*. Santa Monica, CA: Rand Corporation.
- Kim, Y. W., Innocenti, M., & Kim, J. K. (1996). *When should we begin? A comprehensive review of age at start in early intervention*. Paper presented at the 10th Annual World Congress of the International Association for the Scientific Study of Intellectual Disabilities, Helsinki, Finland.
- Knapp, P. E., Ammen, S., Arstein-Kerslake, C., Poulsen, M. K., & Mastergeorge, A. (2007). Feasibility of expanding services for very young children in the public mental setting. *Journal of the American Academy of Child and Adolescent Psychiatry*, 46(2), 152-161.
- Koldoja M. L., & Kolk, A. (2015). Does gender matter? Differences in social-emotional behavior among infants and toddlers before and after mild traumatic brain injury: A

- preliminary study. *Journal of Child Neurology*, 30(7), 860-867.
- Kraemer, S. (2000). The fragile male. *BMJ* (Clinical research ed.), 321(7276), 1609–1612.
- Land, D., & Legters, N. (2005). The extent and consequences of risk in U.S. education. *Yearbook of the National Society for the Study of Education*, 101(1), 1-28.
- Lavigne, J., Gibbons, R., Christofel, K. K., Arend, R., Rosenbaum, D., Binns, H. et al. (1996). Prevalence rates and correlates of psychiatric disorders among preschool children. *Journal of the American Academy of Child and Adolescent Psychiatry*, 35(2), 204-214.
- Lazara, A. (2019). Federal appropriations and national child count 1987-2018. Retrieved December 21, 2019, from <https://ectacenter.org/~pdfs/growthcompPartC-2019-05-20.pdf>
- Lee, S., Aos, S., Drake, E., Pennucci, A., Miller, M., & Anderson, L. (2012). Return on investment: Evidence-based options to improve statewide outcomes, April 2012 (Document No. 12-04-1201). Olympia: Washington State Institute for Public Policy.
- Lipsey, M.W., Puzio, K., Yun, C., Hebert, M.A., Steinka-Fry, K., Cole, M.W., Roberts, M., Anthony, K.S., Busick, M.D. (2012). Translating the Statistical Representation of the Effects of Education Interventions into More Readily Interpretable Forms. (NCSE 2013-3000). Washington, DC: National Center for Special Education Research, Institute of Education Sciences, U.S. Department of Education.
- Little, R. J. A. (1988). A test of missing completely at random for multivariate data with missing values. *Journal of the American Statistical Association*, 83(404), 1198–1202.
- Little, R. J. A., & Rubin, D. B. (1989). The analysis of social science data with missing values. *Sociological Methods Research*, 18(2–3), 292–326.
- Little, R. J. A. (1992). Regression with missing X's: A review. *Journal of the American Statistical Association*, 87(420), 1227-1237.

- Lodder, P. (2013). *To impute or not impute: That's the question*. Paper Methodological Advice. University of Amsterdam, Amsterdam, The Netherlands.
- Loeb, S., Dynarski, S., McFarland, D., Morris, P., Reardon, S., & Reber, S. (2017). *Descriptive analysis in education: A guide for researchers*. (NCEE 2017-4023). Washington, DC: U.S. Department. of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance.
- Luster, T., & McAdoo, H. (1996). Family and child influences on educational attainment: A secondary analysis of the high/scope Perry Preschool data. *Developmental Psychology*, 32(1), 26–39.
- Madley-Dowd, P., Hughes, R., Tilling, K., Heron, J. (2019). The proportion of missing data should not be used to guide decisions on multiple imputation. *Journal of Clinical Epidemiology*, 110(1), 63-73.
- Maguire, T., & Rowley, G. (1992) Roles for inferential statistics in educational research. *Educational Philosophy and Theory*, 24(2), 56-77.
- Malik, F., & Marwaha, R. (2020). Developmental stages of social emotional development in children. Retrieved April 3, 2020 from
<https://www.ncbi.nlm.nih.gov/books/NBK534819/>
- Markowitz, J., Carlson, E., Frey, W., Riley, J., Shimshak, A., Heinzen, H., Strohl, J., Klein, S., & Lee, H. (2006). *Preschoolers with disabilities: Characteristics, services and results. wave 1 overview report from the Pre-Elementary Education Longitudinal Study (PEELS)*. Rockville, MD: Westat.
- McLean, M., Sandall, S., & Smith, B. J. (2016). A history of early childhood special education. In B. Reichow, B. A. Boyd, E. E. Barton, & S. Odom (Eds.),

- Handbook of early childhood special education* (pp. 3-19). Springer Publishing Co.
- Meisels, S. J., & Shonkoff, J. P. (1990). *Handbook of early childhood intervention*. New York City, NY: Cambridge University Press.
- Menard, S. (2010). *Logistic regression: From introductory to advanced concepts and applications*. Thousand Oaks, CA: Sage Publications.
- Moon, M.D. (2019). Triangulation: A method to increase validity, reliability, and legitimization in clinical research. *Journal of Emergency Nursing*, 45(1), 103–105.
- Moore, T. G., Arefadib, N., Deery, A., & West, S. (2017). *The first thousand days: An evidence paper*. Parkville, Victoria: Centre for Community Child Health, Murdoch Children's Research Institute.
- Murray, J., & Palaiologou, I. (2018) Young children's emotional experiences. *Early Child Development and Care*, 188(7), 875-878.
- Nápoles-Springer, A. M., Santoyo, J., Houston, K., Pérez-Stable, E. J., & Stewart, A. L. (2005). Patients' perceptions of cultural factors affecting the quality of their medical encounters. *Health Expectations: An International Journal of Public Participation in Health Care and Health Policy*, 8(1), 4–17.
- National Academies of Sciences, Engineering, and Medicine. (2016). *Parenting matters: Supporting parents of children ages 0-8*. Washington, DC: The National Academies Press.
- National Scientific Council on the Developing Child. (2004). *Children's emotional development is built into the architecture of their brains: Working Paper No. 2*. Cambridge, MA: Harvard University, Center on the Developing Child.
- Natriello, G., McDill, E. L., & Pallas, A. M. (1990). *Schooling disadvantaged children: Racing*

- against catastrophe.* New York: Teachers College Press.
- Nowakowski, R. S. (2006). Stable neuron numbers from cradle to grave. *Proceedings of the National Academy of Sciences of the United States of America*, 103(33), 12219-12220.
- Office of Special Education and Rehabilitative Services. (2010). Thirty-five years of progress in educating children with disabilities through IDEA.
<https://www2.ed.gov/about/offices/list/osers/idea35/history/idea-35-history.pdf>
- Office of Special Education Programs. (2007). Twenty-five years of progress in educating children with disabilities through IDEA.
<https://www2.ed.gov/policy/speced/leg/idea/history.html>
- Office of Special Education Programs. (2002). Individuals with Disabilities Education Act IDEA: Program-funded activities Fiscal Year 2001.
<http://www.ed.gov/offices/OSERS/OSEP/>
- O'Hare, W. (2011). *The changing child population of the United States: Analysis of data from the 2010 Census: Kids count working paper*. Baltimore, MD: Annie E. Casey Foundation.
- Oluwatayo, J. A. (2012). Validity and reliability issues in educational research. *Journal of Educational and Social Research*, 2(2), 391-400.
- Pampaka, M., Hutcheson, G., & Williams, J. (2016). Handling missing data: Analysis of a challenging data set using multiple imputation. *International Journal of Research & Method in Education*, 39(1), 19-37
- Peeters, M. J., Beltyukova, S. A., & Martin, B. A. (2013). Educational testing and validity of conclusions in the scholarship of teaching and learning. *American Journal of*

- Pharmaceutical Education*, 77(9), 186-195.
- Peng, C. Y. J., Harwell, M., Liou, S. M., & Ehman, L. H. (2006). Advances in missing data methods and implications for educational research. In: S. S. Sawilowsky (Ed.). *Real data analysis* (pp. 31-78). Charlotte, NC: Information Age Publication.
- Perugini, M., Gallucci, M., & Costantini, G. (2018). A practical primer to power analysis for simple experimental designs. *International Review of Social Psychology*, 31(1): 20, 1–23.
- Phellas, C., Bloch, A., & Seale, C. (2012). Structured methods: Interviews, questionnaires and observation. In C. Seale (Ed.), *Researching Society and Culture* (3 ed.) (pp. 181-205). London: Sage Publications Ltd.
- Pigott, T. D. (2001). A review of methods for missing data. *Educational Research and Evaluation*, 7(4), 353-383.
- Ramey, C. T., & Ramey, S. L. (1998). Early intervention and early experience. *American Psychologist*, 53(2), 109-20.
- Ramey, C. T., & Ramey, S. L. (2005). Early childhood education: The journey from efficacy research to effective practice. In D. Teti (Ed.), *Handbook of research methods in developmental science* (pp. 233-248). Malden, MA: Blackwell Publishing.
- Raver, C. C., & Knizter, J. (2002). *Ready to enter: What research tells policymakers about strategies to promote social and emotional school readiness among three- and four-year-old children*. New York: Columbia University Mailman School of Public Health National Center for Children in Poverty.
- Reardon, S. F. (2011). The widening academic achievement gap between the rich and the poor: New evidence and possible explanations. In G. J. Duncan & R. M. Murnane (Eds.), *Whither opportunity? Rising inequality, schools, and children's life chances* (pp. 91–

- 116). New York City, NY: Russell Sage Foundation.
- Rosenberg, S. A., Robinson, C. C., Shaw, E. F., & Ellison, M. C. (2013). Part C early intervention for infants and toddlers: Percentage eligible versus served. *Pediatrics*, 131(1), 38-46.
- Rosenberg, S. A., Zhang, D., & Robinson, C. C. (2008). Prevalence of developmental delays and participation in early intervention services for young children. *Pediatrics*, 121(6), e1503-e1509.
- Salkind, N. J. (2010). *Encyclopedia of research design* (Vols. 1-0). Thousand Oaks, CA: Sage Publications, Inc.
- Sameroff, A. J., & Chandler, M. J. (1975). Reproductive risk and the continuum of caretaking casualty. In F. D. Horowitz, M. Hetherington, S. Scarr-Salapatek, & G. Siegel (Eds.), *Review of child development research* (Vol. 4, pp. 187–244). Chicago, IL: University of Chicago Press.
- Sameroff, A. J., & Fiese, B. H. (2000). Models of development and developmental risk. In C. H. Zeanah, Jr. (Ed.), *Handbook of infant mental health* (pp. 3–19). New York, NY: Guilford Press.
- Scarborough, A., Spiker, D., Mallik, S., Hebbeler, K., Bailey, D., & Simeonsson, R. (2004). Who are the children and families receiving early intervention services? Findings from the National Early Intervention Longitudinal Study (NEILS). *Exceptional Children*, 70(4), 469-483.
- Schafer, J. L., & Graham, J. W. (2002). Missing data: Our view of the state of the art. *Psychological Methods*, 7(2), 147–177.
- Schiller, P. (2010). Early brain development research review and update. *Exchange*, 196

- (November/December), 26-30.
- Seastrom, M. (2017). *Best practices for determining subgroup size in accountability systems while protecting personally identifiable student information.* (IES 2017-147). U.S. Department of Education, Institute of Education Sciences. Washington, DC. Retrieved May 21, 2020 from <http://ies.ed.gov/pubsearch>.
- Shadish, W., Cook, T., and Campbell, D. (2002). *Experimental and Quasi-Experimental Designs for Generalized Causal Inference.* Boston: Houghton Mifflin.
- Shapiro, B. J., & Derrington, T. (2004). Equity and disparity in access to services: An outcomes-based evaluation of early intervention child find in Hawai`i. *Topics in Early Childhood Special Education, 24*(4), 199-212.
- Sherman, C. (2014). Environmental influence on the developing brain: A report from the Fifth Annual Aspen Brain Forum. Retrieved March 27, 2020 from <https://dana.org/article/environmental-influence-on-the-developing-brain/>
- Shonkoff, J. P., & Meisels, S. J. (Eds.). (2000). *Handbook of early childhood intervention* (2nd Ed). New York City, NY: Cambridge University Press.
- Shonkoff, J. P., & Phillips, D. A. (2000). *From neurons to neighborhoods: The science of early childhood development.* Washington, DC: National Academy Press.
- Sisterhen L. L., & Wy, P. A. W. (2019). *Temper tantrums.* Treasure Island, FL: StatPearls Publishing.
- Smith, B. J., & McKenna, P. (1994). Early intervention public policy: Past, present, and future. In L. J.. Johnson, R. J. Gallagher, M. J. LaMontagne, J. B. Jordan, J. Gallagher, P. L. Hutinger, & M. B. Karnes (Eds.), *Meeting early intervention challenges: Issues from birth to three* (pp. 251—264). Baltimore: Paul H. Brookes Publishing Co.

- Smith, J. D. (2004). The historical contexts of special education. In A. McCray Sorrells, H. Rieth, & P. T. Sindelar (Eds.), *Critical issues in special education* (pp. 1-14). Boston, MA: Pearson Education.
- Smith, A. K., Ayanian, J. Z., Covinsky, K. E., Landon, B. E., McCarthy, E. P., Wee, C. C., & Steinman, M. A. (2011). Conducting high-value secondary dataset analysis: an introductory guide and resources. *Journal of General Internal Medicine*, 26(8), 920–929.doi:10.1007/s11606-010-1621-5
- Sontag, J. C. (1996). Toward a comprehensive theoretical framework for disability research: Bronfenbrenner revisited. *Journal of Special Education*, 30(3), 319-344.
- Spiker, D., & Hopmann, M. R. (1997). The effectiveness of early intervention for children with Down Syndrome. In M. J. Guralnick (Ed.), *The effectiveness of early intervention* (pp. 271-305). Baltimore, MD: Brookes.
- Sullivan, G. M. (2011). A primer on the validity of assessment instruments. *Journal of Graduate Medical Education*, 3(2), 119–120.
- Suresh, K., & Chandrashekara, S. (2012). Sample size estimation and power analysis for clinical research studies. *Journal of human reproductive sciences*, 5(1), 7–13.
- The Arc. (n.d.). Our history: Power of parents. <https://thearc.org/about-us/history/>
- Thompson, R. A. (1998). Early sociopersonality development. In W. Damon (Ed.), & N. Eisenberg (Vol. Ed.), *Handbook of Child Psychology, Vol. 3* (5th Ed., pp. 25-104), New York City, NY: Wiley.
- Thompson, R. A., & Nelson, C. A. (2001). Developmental science and the media: Early brain development. *American Psychologist*, 56(1), 5–15.
- Thurm, A., Manwaring, S. S., Jimenez, C., Swineford, L., Farmer, C., Gallo, R., & Maeda, M.

- (2018). Socioemotional and behavioral problems in toddlers with language delay. *Infant Mental Health Journal*, 39(5), 569-580.
- Tierney, A. L., & Nelson, C. A., 3rd (2009). Brain development and the role of experience in the early years. *Zero to Three*, 30(2), 9–13.
- Trochim, W. M. K. (2006). Web center for social research methods: Inferential statistics. Taken from <http://www.socialresearchmethods.net/kb/statinf.php>.
- Trochim, W. M. K. (2020, March 2020). Research methods knowledge base: Descriptive statistics. Retrieved from <https://socialresearchmethods.net/kb/statdesc.php>
- Trohanis, P. (2002). *Progress in providing services to young children with special needs and their families* (NECTAC Notes No. 12). Chapel Hill, NC: University of North Carolina, FPG Child Development Institute, National Early Childhood Technical Assistance Center.
- Turnbull, H. R. (2005). Individuals with Disabilities Education Act Reauthorization: Accountability and personal responsibility. *Remedial and Special Education*, 26(6), 320-326.
- Urban Institute. (n.d.). Baby's brain begins now: Conception to age 3.
<http://www.urbanchildinstitute.org/why-0-3/baby-and-brain>
- U.S. Department of Education Office for Civil Rights. (2014). Civil Rights Data Collection Data Snapshot: School Discipline. Retrieved from <https://ocrdata.ed.gov/Downloads/CRDC-School-Discipline-Snapshot.pdf>
- U.S. Department of Education. (2019, November 7). Individuals with Disabilities Education Act: Section 1431. Retrieved from <https://sites.ed.gov/idea/statute-chapter-33/subchapter-iii>

- U.S. Department of Education. (2019, July 10). EDFacts metadata and process system (EMAPS): “IDEA Part C Child Count and Settings Survey,” 2018. Retrieved from <https://www2.ed.gov/programs/osepidea/618-data/static-tables/index.html>
- van Buuren, S. (2018). When to use multiple imputation. In Keiding, N., Morgan, B.J.T., Wikle, C.K., van der Heijden, P. (Eds.). *Flexible imputation of missing data, Second Edition* (pp. 48-49). New York, NY: Chapman and Hall/CRC.
- van Ginkel, J. R., Linting, M., Rippe, R. C. A., & van der Voort, A. (2020) Rebutting existing misconceptions about multiple imputation as a method for handling missing data. *Journal of Personality Assessment, 102*(3), 297-308
- von Klitzing, K., Döhnert, M., Kroll, M., & Grube, M. (2015). Mental disorders in early childhood. *Deutsches Arzteblatt International, 112*(21-22), 375–386.
- Wagner, M., & Blackorby, J. (2002). *Disability profiles of elementary and middle school students with disabilities*. Menlo Park, CA: SRI International.
- Weiss C. L. A., & Mettrick J. E. (2015). Individuals with Disabilities Education Act (IDEA). In Clauss-Ehlers, C.S. (Ed.), *Encyclopedia of cross-cultural school psychology* (pp. 11-24). Boston, MA: Springer.
- Werner, E. E., & Smith, R. S. (1982). *Vulnerable but invincible: A longitudinal study of resilient children and youth*. New York City, NY: McGraw Hill.
- Weston, S.J., Ritchie, S. J., Rohrer, J.M., Przybylski, A.K. (2019). Recommendations for increasing the transparency of analysis of preexisting data sets. *Advances in Methods and Practices in Psychological Science, 2*(3), 214-227.
- Article first published online: June 11, 2019; Issue published: September 1, 2019
- Wood, M. E. (1981). Costs of intervention programs. In C. Garland, N. W. Stone, J. Swanson, &

G. Woodruff (Eds.), *Early intervention for children with special needs and their families: Findings and recommendations* (pp. 15-25). WESTAR Series paper No. 11, Seattle: University of Washington.

APPENDICES

Appendix A: Form A from the National Early Intervention Longitudinal Study

STATE	COUNTY	SITE	Child ID#:	FOR SRI USE ONLY
Child's initials	Person completing form (Last name, First name)	Program/agency	Area code	Phone number

NEILS Family Information Form—Form A

*Complete for **EVERY** family who reside in this county and who have completed their first IFSP.*

1. Child's date of birth (MM/DD/YY) _____
2. Child's gender (Circle one number) 1—Female 2—Male
3. Is child of Hispanic origin? (Circle one number) 1—Yes 2—No 3—Don't know
4. Child's race (Circle one number):

1—White	2—Black or African American	3—American Indian or Alaskan Native
4—Asian or Pacific Islander	5—Other	6—Don't know
5. Is child in foster care? (Circle one number) 1—Yes 2—No
6. Does family have a working phone at home? (Circle one number) 1—Yes 2—No
7. Does family receive any kind of public assistance? (Circle one number) 1—Yes 2—No
8. Reasons for child's eligibility for early intervention services (Circle one number)
 - 1—Diagnosed condition—Please specify: _____
 - 2—Developmental delay—Please describe: _____
 - 3—At risk—Please describe: _____
9. Date of referral for early intervention services (MM/DD/YY) _____
10. Date IFSP signed/completed (MM/DD/YY) _____

NEILS INVITATION CRITERIA

1. Was the child younger than 31 months old on the date the IFSP was signed? (Circle one number)
1—Yes 2—No
2. Is there an English- or Spanish-speaking adult in the household to respond to a phone interview?
(Circle one number)
1—Yes 2—No
3. ONLY ONE CHILD PER FAMILY IS ELIGIBLE FOR NEILS. Is this the **only child** from this family starting early intervention OR if there are multiple children from the same family in early intervention, is this the **one child** eligible for NEILS (as per instructions on pages 5-6 of the NEILS Enrollment Procedures Manual)?
1—Yes 2—No

If YES to ALL of the criteria above, invite the family to participate in NEILS.

Go to the NEILS Enrollment Form—Part B.

If NO to ANY of the criteria above, the family is not eligible for NEILS.

STOP HERE. Return form to the NEILS Enrollment Coordinator for your site for mailing to SRI

Questions? Call the NEILS Hotline toll free: 1-800-682-9319

Appendix B: Data Dictionary for Variables Used in Study

Variable Name	NEILS Form	Definition	Values
gender	Form A	Gender of child	1) Male 2) Female
eligibility	Form A	Eligibility reason for enrolling in early intervention	1) Developmental delay 2) Diagnosed condition, no mention of delay 3) At risk of delay
INV_RACE5GRP	EFI	Race/ethnicity of child	1) White 2) African American/Black 3) Hispanic 4) Asian/ Native Hawaiian/Pacific Islander 5) All other / Multiple
E_DIS_CNT	EFI	Number of disability codes	Values 1-9
E_C_MOM_ED4GRP	EFI	Maternal education	1) Less than HS 2) HS or GED 3) Some college 4) College degree or higher

E_F35_5GRP	EFI	Household Income	1) <= \$15,000 2) \$15,001-\$25 K 3) \$25,001-\$50 K 4) \$50,001-\$75 K 5) Over \$75,000
Age_ifsp	Form A	Age at IFSP (in months)	Values 0-31 months
AvgSrvHrsWeek	Derived from Service Records	Total average amount of service children were scheduled to receive all settings	Values 0-45.75
declassified	Derived from TFI and KFI	Child receiving special education services (having an IEP) at 3	0) Not declassified 1) Classified
impact	TFI	Overall impact of early intervention/ therapy services on child's development	0) No or some impact 1) A lot of impact

Note. Variables were modified or dropped throughout the analyses to account for small subgroup sizes and missingness.

Eligibility was dropped after descriptive analyses conducted in Research Question 1 because the Diagnosed Condition and At risk of delay category subgroups were too small for group comparisons.

INV_RACE5GRP was modified to exclude the Asian/Native Hawaiian/Pacific Islander subgroup because the subgroup cell size was too small.

E_F35_5GRP was modified for Research Question 4 to collapse families with household incomes over \$75,000 into a new value for value 4 renamed 4) Over \$50,001

Appendix C: Diagnosis Categories with Associated Disability Codes Used in NEILS

Disability Category	Disability Codes
Social and Behavioral Disorders	314: Attention deficit 314.01: ADHD 314.1: Development delay w/hyperkinesis 314.9: Hyperactivity, hyperkinesis 312.1: Tantrums 312.3: Impulse control 313: Emotional disturbance a700: Social skills, psycho-social D19: Behavior concerns Oa: Behavior: With objects Ob: Behavior: With people
Global Delay	315.5: Mixed development disorder 315.9: Developmental disorder, NOS Aa: Development: Physical 319: Disorder of infancy, NOS 783.4: Lack of expected physical growth
Sensory Impairment	C: Sensory Systems 368: Vision impaired, blind 389.9: Hearing loss, deaf
Motor Delay	315.4: Gross motor delay, neuro-motor 781.2: Abnormality of gait

	a306: Fine motor
Neurological Impairment and Disorder	466: Bronchotic disease 493.9: Asthma 757.4: Hair loss 307.4: Sleep disturbance
Cognitive Delay	a101: Learning i00400: Cognitive, cognition 299: Autism, Asperger's syndrome 299.8: PDD, pervasive development disorder
Speech/Communication Delay	315.3: Developmental speech/language 7 315.31: Expressive language delay 7 315.32: Receptive language delay 7 315.39: Articulation, phonological disorder a201: Communication delays, disorders
Adaptive delays	a500: Adaptive self-skills
Congenital delays	758.9: Other chromosome/genetic anomaly
Pre/perinatal abnormalities	765: Prematurity, low birth weight 760.7: Prenatal substance exposure 760.71: Fetal alcohol syndrome, FAS 760.75: Prenatal cocaine/crack exposure
Chronic disease	285.9: Anemia
Musculoskeletal disorders	832: Nursemaid's elbow

Social environment risk factors	995.5: Child neglect/abuse, unspecified 984.9: Lead poisoning
---------------------------------	--

Appendix D: Findings from NEILS Compared to Study Sample

Variables	NEILS (N = 3,338)	Study Findings (N = 78)	NEILS Final Report
Gender (percent)			p. 2-6
Male	61%	72%	
Female	39%	28%	
Race/Ethnicity (percent)			p. 2-7
White	53%	37%	
African American/Black	21%	31%	
Hispanic	16%	24%	
Asian/Native Hawaiian/American Indian	5%	3%	
Other	5%	8%	
Age at IFSP (months)	<i>M</i> = 15.8 <i>SD</i> = 9.5 Min = .95 Max = 31.3	<i>M</i> = 24.0 <i>SD</i> = 5.1 Min = 6.3 Max = 31.3	
Maternal Education			p. 2-7
Less than HS	16%	15%	
GED/HS Degree	32%	36%	
Some College	28%	22%	
Bachelors or higher	24%	27%	
Household Income			p. 2-7
\$15,000 or less	27%	33%	

\$15,001-\$25,000	16%	21%	
\$25,001-\$50,000	29%	23%	
\$50,001-\$75,000	16%	15%	
Over \$75,000	13%	6%	
Number of Diagnoses			
1	60%	13%	
2	24%	42%	
3	9%	26%	
4	4%	8%	
5	1%	5%	
6	<1%	4%	
7+	<3%	<3%	
Number of Diagnoses (Min = 1 Max = 9)	$M = 1.7$ $SD = 1.1$	$M = 2.7$ $SD = 1.5$	
Diagnoses/Comorbid Conditions			p. 2-9
Speech/language Delay	41%	60%	
Low birth weight/pre-perinatal abnormalities	19%	10%	
Motor delays	18%	26%	
DD (global)	12%	28%	
Congenital Disorders	9%	10%	
IDD/Cognitive Delay	7%	10%	
CNS/Neuro Impairment	7%	10%	
Sensory Impairment	3%	9%	

Social/Behavioral	4%	100%	
Social/Environmental	4%	4%	