THE RELATIONSHIP BETWEEN EARLY INTERVENTION SERVICE

DOSAGE AND CHILD OUTCOME GROWTH PATTERNS

by

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A Thesis Submitted in Partial Fulfillment

of the Requirements for the Degree of

Master of Arts in Psychology

Middle Tennessee State University

December 2017

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ACKNOWLEDGEMENTS

ABSTRACT

The current study examines the relationships between early intervention service dosage, as measured by actual hours of developmental therapy received, and child outcome ratings on (a) positive social-emotional skills, (b) acquisition of knowledge and skills, and (c) the use of appropriate actions to meet his/her needs. States are required to report data on these three child outcomes to the Office of Special Education Programs with the United States Department of Education (U.S. Office of Special Education Programs, 2016). Spearman's rho correlations were used to explore these relationships to gather some preliminary findings. Results indicated that service dosage has positive and nonsignificant relationships with positive social-emotional skills and acquisition of knowledge and skills and a positive and significant relationships with the use of appropriate actions to meet his/her needs. A secondary analysis explored the relationships between age at entry and each child outcome rating and found positive and nonsignificant relationships. Findings from this study support previous research in that dosage should take into account the informal interventions that are happening between early intervention service visits. Additionally, eligibility category should be investigated when considering the impact of the age at entry into early intervention services and its relationship with child outcomes.

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CHAPTER I

INTRODUCTION

Early Intervention Definition

Early intervention (EI), in reference to the current research, is a federally funded program that supports families with infants and toddlers who have developmental delays or disabilities up to the age of 3. Early intervention services have been changing developmental trajectories since their addition to the Individuals with Disabilities Education Act (IDEA) in 1986 (Hebbeler et al., 2007; U.S. U.S. Office of Special Education Programs, 2011a). The program is currently referred to as Part C (National Early Childhood Technical Assistance [NECTAC], 2011). This part of the IDEA law is a program geared towards helping states establish early intervention programs for infants and toddlers of "urgent and substantial need" (National Early Childhood Technical Assistance Center, 2011; Meisels & Shonkoff, 2009). In 2016, 357,715 children in the United States were served by Part C early intervention programs, which made up about 3% of the U.S. population (Early Childhood Technical Assistance, 2016; U.S. Department of Education, 2017). The goal of these services is to help children reach their optimal development in their physical, cognitive, communication, social/emotional, and adaptive skills to decrease the effects of their disorders or delays.

Importance of Early Intervention

Positive early experiences play a critical role in brain development quality, especially during the first few years of life (Center on the Developing Child, 2007; Hawley & Gunner, 2000; Woolley & Grogan-Kaylor, 2006). Positive experiences

include, but are not limited to, healthy relationships with caregivers and peers, safe living conditions, and meeting basic needs such as appropriate nutrition. Families play the most influential role in providing the most stimulating and nurturing experience for children. Natural interaction opportunities (i.e., gesturing, facial expressions, vocalizations) between a caregiver and a child contribute to the child's brain structure by way of appropriate and reliable feedback from the caregiver (Center on the Developing Child, 2007). When this feedback does not occur or is inconsistent, the brain may not shape as expected. Early intervention services intercede to educate children and families, so they can take advantage of this critical time of development, and therefore, in time, make an impact on brain development early versus remediate later on in life (Center on the Developing Child, 2007; Hawley & Gunner, 2000).

The National Early Intervention Longitudinal Study (NEILS), conducted over a 10-year span, was the first to report national key findings on Part C early intervention service and outcomes with children and families across the nation. Participants of this study were identified based on their state's eligibility requirements and being served in early intervention programs (Hebbeler et al.., 2007). The outcomes were reported on early intervention recipients at 36 months in the areas of developmental skills, need for special education, behavior, health, and family perception. Most parents reported that by their child's 3rd birthday, their child learned a number of developmental skills as expected such as playing group games with rules, saying 2 or 3 words in a sentence, and following two-step verbal directions. Sixty-three percent of children from this study went on to need special education services after receiving early intervention. This means there was a considerable number of children who no longer needed services after intervention. In

regard to behavior, it was reported that behaviors became more typical by the age of 3. In addition, it was identified through family interviews that health status remained constant across the 36 months. This may be explained by health status at entry being the strongest predictor of health status at exit of services because of the lack of control of changing medical diagnoses through early intervention services. Also, a majority of families in this study indicated that EI made a positive impact on their children's development. Families who stayed in the program up until 36 months were more likely to perceive such an impact than families who left services before 36 months (Hebbeler et al.., 2007).

Hume, Bellini, and Pratt (2005) surveyed 195 families of children that are 8 years or under with autism spectrum disorder (ASD) who were receiving early intervention or early childhood services in order to gather more information on the use of services, service intensity, and perceived impact of service from the parents' perspectives. Parents were provided an inclusive list of interventions and asked to identify each service their child had received or was currently receiving and also the number of hours per week they were involved with each intervention. Examples of interventions included strategies and curricular areas such as discrete trial training, occupational therapy, behavior support, music therapy, parent training, and speech therapy. In addition, they were asked to rate the use of intervention service on its effectiveness and its contribution to their child's progress on a 4-point Likert scale with 4 being *Strongly Agree* and 1 being *Strongly Disagree*. Service delivery was evaluated by parent ratings on parent participation, regular reports of progress, integration opportunities (i.e., inclusion with typically developing peers), and case management also on a 4-point Likert scale (4=*Strongly Agree* to 1=*Strongly Disagree)*. To evaluate outcomes of interventions, families were asked to

rate their child's progress using a 4-point Likert scale on eight areas: social, emotional, cognitive, speech and language, physical and motor, adaptive skills, behavior, and overall quality of life.

Hume, Bellini, and Pratt (2005) found 59% of families strongly agreed that they were encouraged to participate in their child's early intervention settings and 47% strongly agreed to receiving regular reports of progress on their child. About 26% strongly agreed to their child having integration opportunities which may be explained by the variety of settings in which early intervention takes place. For example, there may be limited opportunity for inclusion when early intervention takes place through a home visit. The majority of the families of this study rated the intervention that they received as effective. Over 70% of families cited that their children progressed across several developmental areas was due to the services that they had been receiving. Parents perceived most progress in speech/language and cognition. The findings from this study attest to contributions of early intervention on child development and also consumer satisfaction.

Guiding Principles of Early Intervention

One of the most important focuses of early intervention is the relationship between families and professionals. Families are the most well-informed of their child's daily life; they play a key role in the decision-making process about the services that their child receives by prioritizing goals, identifying specific needs, and providing insight on their child's developmental performance (Majnemer, 1998). Developmental professionals from a variety of different educational backgrounds including, but not limited to, physical therapy, speech language, early childhood, and special education provide early

intervention services (Tennessee Early Intervention System, n.d.) using their expertise to promote children's growth in learning and development through direct and/or indirect services (Keilty, 2010). Families and professionals collaborate, exchanging knowledge to contribute to the attainment of early intervention goals.

The Division for Early Childhood (DEC) developed recommended practices that are grounded in scientific literature and experiences of researchers and stakeholders to help professionals and families improve learning outcomes and to promote the development of children (Division for Early Childhood, 2014). DEC's recommended practices contain values and beliefs such as a) respect for all children and families, b) high-quality, comprehensive, coordinated, and family-centered services and supports, and c) rights for all children to participate actively and meaningfully within their families and communities. These foundational values and beliefs help guide practices that are intended to produce high-quality programs that yield positive impacts for children and families. These recommended practices cover 7 categories including leadership, assessment, environment, instruction, interaction, teaming and collaboration, and also
 transition.

IDEA Part C Regulations require the use of assessments for screening purposes, service eligibility, individualized family service plans, progress monitoring, and child outcomes (U.S. Department of Education, 2011b). Assessment is one of the most critical components of decision-making in early intervention services. It aids the practitioners in learning about the current skill level of the child and advises in developing intervention goals. The DEC recommended practices for assessment suggest that early interventionist help families identify preferred assessment procedures, take a collaborative approach to

gathering assessment information, use age-appropriate materials and strategies during assessment, and assess all areas of development to learn as much as possible about the child (DEC, 2014). In addition, DEC specifies that early interventionists should gather assessment information from multiple sources, including the family, and should use clinical reasoning alongside assessment results when determining current level of functioning. Ongoing assessments should be conducted to monitor progress and to develop appropriate learning targets and activities. Lastly, assessment tools should be sensitive to the child's developmental level of functioning, and results should be reader-friendly and useful for families (Division for Early Childhood, 2014).

Services and Service Provision

When a child becomes eligible by state requirements to receive early intervention services, an Individualized Family Service Plan (IFSP) is developed. An IFSP is a plan written collaboratively by a team including the family, the service coordinator, and service providers (Tennessee Department of Education & TN Early Intervention System, 2016). This plan summarizes the child's present level of development, family resources and concerns, and also short- term and long-term goals. Action steps along with services needed to achieve the outcome are also identified (U.S. Department of Education, 1998).

Early intervention service delivery varies by type, setting, intensity, and duration. Services can be received individually, multiple times a week, from minutes to hours, and in multiple settings. The services can last until the child ages out at 36 months or is no longer eligible for services. Often times, the age of entry determines how long children are able to participate in these services. IDEA requires that services be provided in the child's natural environments such as the home and the community, but other settings are

acceptable if the natural environment is unavailable (U.S. Department of Education, 1998). According to the 37th Annual Report to Congress (U.S. Office of Special Education Programs, 2016), 96.6% of infants and toddlers were being served in a natural environment, with home being the most common setting. In 2013, 88.7% of infants and toddlers served under Part C received services primarily in the home while 6.9% were served in a community-based setting (U.S. Office of Special Education Programs, 2016). According to Tennessee's Early Intervention System's (TEIS) 2016 report, 4,390 infants and toddlers (1.8% of population of children under 3) were served during the 2014-2015 fiscal year, with almost 81% being served in the home and/or in the community.

Dosage Decisions

Fundamentally, dosage is the amount of an intervention offered and received, but the language describing the components are not standardized (Wasik, Materra, Lloyd, & Boller, 2013). According to the IDEA federal regulations *303.344* (2011), frequency is defined as the number of days or sessions that intervention service is provided. Intensity refers to whether the service is provided on an individual or a group basis. Length means the length of time the service is provided during each session a service is provided. Duration identifies the end of the service commitment. Specific guidelines on making service dosage (frequency, intensity, and duration) decisions for Part C early intervention services are nonexistent. However, dosage is a very important piece in intervention research and practice (Wasik et al., 2013). Dosage aids in understanding in what way and to what degree intervention is being delivered. The lack of specific guidelines for making dosage decisions permits the services to be driven by individual needs.

Though there has been a lack of research on dosage decisions, there has been some research to assist in understanding factors that may play a role in the decision making. Using Kentucky's state-wide early intervention data system, Hallam, Rous, Grove, and LoBianco (2009) researched a number of factors that may impact the level and intensity of early intervention services that are provided. For this study, level and intensity were measured by the number of events, units, and services. Events were defined as the number of times a service was provided. Units were defined as the amount of time a service was provided which were recorded in 15-min increments. Service was defined by the actual service that was provided through early intervention. Factors included in this study were child and family factors (i.e., age, race, eligibility determination), system-level factors (i.e., third-party insurance, Medicaid eligibility), and community-level factors (i.e., type of service provider, poverty level). The participants of this study received an average of 82 events and almost 67 hr of early intervention service throughout a 6-month period. A regression analyses was conducted to better understand level and intensity with multiple factors. Results showed that child and family factors were one of the most predictive of early intervention service delivery. Findings predicted that if children have global deficits (social, emotional, communication, physical, cognitive, and adaptive), are eligible for Medicaid, and use third-party insurance, they will receive more service, more events, and more units. In addition, it was also shown that the earlier a child enters an early intervention program, the higher the intensity of services. Race, gestational age, and gender did not have a significant effect on level and intensity of services.

According to the National Early Intervention Longitudinal Study (Hebbeler et al., 2007), most (63%) children and families planned to receive early intervention services for 2 hr per week or less, 16% more than 4 hr a week, and 13% were scheduled for less than 30 min a week. It was noted that these service hour percentages only take into account direct face-to-face service time and not additional time spent preparing, in transit, gathering additional information, and so forth.

Kuhn and Marvin (2016) noted that when describing *dosage* in regard to educational interventions, the definition should capture the learning opportunities between and during services and more than just the amount of service provided. For example, a definition such as "amount of time that an individual child must engage and participate in an early childhood intervention program or service to show measurable functional progress" would be the best description of dosage (Kuhn & Marvin, 2016). The learning opportunities that occur within and between service visits must be provided with the most appropriate amount of frequency and intensity in order to see significant gains. It is recommended that dosage decisions be guided by considerations of families' strengths and main priorities along with professional expertise to guide appropriate decision making. Children's early learning experiences with their caregivers are an essential piece to the plan due to their ability to engage in everyday learning opportunities between service contacts. Additional considerations for dosage decision making include traits of the adult learner(s), social and cultural factors that influence service delivery, parent-professional partnership necessities, and provider strengths.

Early Childhood Outcomes

In order to know if early intervention programs are making a difference, the Office of Special Education Programs (OSEP) requires programs to report on specified developmental outcomes for every child receiving services to assess academic readiness. An outcome is defined as a benefit experienced as a result of services and supports received, not as a measure of receipt or satisfaction of service (Eary Childhood Outcomes, 2017). Outcome measures to be reported include positive social-emotional skills, acquiring knowledge and skills, and appropriate behaviors to meet the child's needs (Early Childhood Technical Assistance Center, 2016b).

Positive social-emotional skills include building of relationships, experiencing rich and rewarding interactions with adults and peers, beginning to learn how to behave in the environment, and maintaining positive social relationships in age-appropriate ways (Early Childhood Technical Assistance Center, 2016b). Children display a variety of behaviors in this outcome including demonstrating trust in others, initiating and maintaining social interactions, regulating emotions, and understanding and following rules (Early Childhood Outcomes, 2005).

The acquisition of knowledge and skills refers to the skills children are learning from natural learning opportunities and nurturing and stimulating environments (Early Childhood Outcomes, 2005). These knowledge and skills relate to preliteracy, prenumeracy, and communication. Children display a variety of behaviors in this outcome, including exploring the environment, showing imagination and creativity in play, engaging in daily learning opportunities by manipulating objects in an appropriate manner, and displaying curiosity for learning.

Taking appropriate action to meet needs includes becoming more proficient at addressing the child's own needs with increasing independence over time while integrating developing skills such as fine motor and communication (Early Childhood Outcomes, 2005; Keilty, 2010). Children display a variety of behaviors in this outcome, including meeting self-care needs, seeking help when necessary, communicating, and following safety rules. Overall, there are many ways to achieve capability in these outcome areas, and it may take additional support for some children.

In order to meet OSEP's annual reporting requirements, states must collect outcome data at a child's entrance into the program and also at exit, with a minimum of 6 months in between (Tennessee Early Intervention System, 2016). States have the option to complete the process more often if they would like to gather more outcome data for their own purposes. For example, the state of Tennessee collects data at initial, 6-month, and annual IFSP meetings (Tennessee Early Intervention System, 2016).

The Early Child Outcomes Center created a mechanism called the Child Outcome Summary (COS) Process to collect and summarize outcome data on each child (Early Childhood Technical Assistance Center, 2016a). COS is not considered an assessment tool but a way to combine multiple sources of information to a single score on a scale from 1 to 7, with 1 being *Not Yet* and 7 being *Completely Age Appropriate (*Greenwood, Walker, Hornbeck, Hebbeler, & Spiker, 2007). Ratings 1-5 are considered *Overall Not Age-Appropriate* and ratings 6-7 are considered *Overall Age Appropriate* (Early Childhood Outcomes Center, 2017). Multiple sources of information are considered in the evaluation of a child's functioning in the three outcome areas previously mentioned

above including observations and family input (Early Childhood Outcomes Center, 2016).

Preliminary findings from Kansas's adoption of the COS process lead to insight regarding the psychometric properties of Early Childhood Outcomes's COS process (Greenwood et al.., 2007). Results indicated that the outcome ratings are perceptive to the differences between children, and each rating contributed to the description of a child's functioning. In addition, to gain the best understanding of a child's performance, multiple sources of information are taken into account during the development and the completion of the process.

Barton, Taylor, Spiker, and Hebbeler (2016) also examined the validity of the ECO ratings that are made through the COS process. Results showed that that the COS process does produce ratings that are valid. One of the key findings was that the ECO ratings were related to the child's functional abilities. In addition, the majority of states had steady percentages of children making greater than expected growth or reached age-appropriate expectations before exiting early intervention services.

The COS process provides insight on growth patterns of children with disabilities and delays in comparison to their typically developing peers. Growth patterns are determined by the outcome rating differences between entry and exit time points. Most recent national highlights from 2014-2015 show that greater than expected growth was between 67% and 75% across positive social-emotional skills, acquisition of knowledge and skills, and the use of appropriate action to meet his/her needs (Early Childhood Technical Assistance Center, 2016a). This means that there was an overall increased rate of skill acquisition at the child's exit of the program compared to that at entry. In

conjunction with elevated growth scores, about 50% to 60% of children across the United States exited the program functioning within age expectations in each individual outcome. According to Tennessee's latest Part C performance plan (Tennessee Early Intervention System, 2017) about 44% of infants and toddlers were functioning within age expectations in positive social-emotional skills by the time they exited the program. For infants and toddlers who entered the program below age expectations, 68.41% significantly increased their rate of growth by the time they exited the program. In regard to acquisition and use of knowledge and skills, 29.11% of infants and toddlers were functioning at age expectations at exit and 72% had an increase in their rate of growth. For the third outcome, use of appropriate behaviors to meet their needs, about 37.5% of children exited the program within age expectations and 76.1% made significant improvement in their growth rate. It is apparent that early intervention is beneficial to helping children with disabilities/delays make significant gains.

Intersection of Services and Outcomes

Early intervention is a favorable approach to improving quality of life for families and children with developmental delays and disabilities. Though professionals are able to spend a great amount of time with children and families through visits, caregivers have daily opportunities to intervene into their child's development. Jung (2003) highlights the benefits of professionals implementing a consultative model, helping caregivers to "maximize natural learning opportunities using everyday activities that children experience" (p. 22) and to "embed intervention in daily routines incorporating a designed intervention into a typical activity or routine" (p. 22). Veering this approach, children can receive more intervention and more natural learning opportunities through caregivers and

not professionals. It seems most logical to think that children with more severe disabilities should receive intervention services more frequently to achieve better outcomes, but this may be disempowering to caregivers. One of the goals of early intervention is to provide knowledge and resources to families so that they have the ability to improve their child's developmental functioning (Jung, 2003). Studies have shown that parent training was the most effective service that contributed to their child's developmental success (Hume et al., 2005). Therefore, finding and providing the right level of support that a family needs will help parents to feel competent in providing daily learning opportunities to their children. Overall, Jung (2003) confirms that more is better. To receive more, it may be more effective to teach caregivers the necessary skills to provide opportunities between visits rather than increasing the frequency of the visits.

Purpose of the Current Study

The purpose of the present study is to investigate the relationship between dosage, the total amount of actual developmental therapy services received in early intervention, and a child's outcome ratings on positive social-emotional relationships, acquiring knowledge and skills, and taking appropriate action to meet his/her needs. Understanding the relationship between these variables can help improve program effectiveness, tailor service delivery, and enhance developmental outcomes. There is currently a lack of evidence on service dosage and its association on child outcomes in early intervention.

Hypotheses

Hypothesis 1. It was hypothesized that there would be a positive and significant correlation between early intervention service dosage as measured by the total number of hours of developmental therapy received and a child's growth pattern in positive social-

emotional skills as measured by differences in child outcome summary ratings between entry and exit.

Hypothesis 2. It was hypothesized that there would be a positive and significant correlation between early intervention service dosage as measured by the total number of hours of developmental therapy received and a child's growth pattern in acquisition of knowledge and skills as measured by differences in child outcome summary ratings between entry and exit.

Hypothesis 3. It was hypothesized that there would be a positive and significant correlation between early intervention service dosage measured by the total number of hours of developmental therapy received and a child's growth pattern in the use of appropriate actions to meet his/her needs as measured by differences in child outcome summary ratings between entry and exit.

Hypothesis 4. It was hypothesized that age at entry into early intervention services, as measured by the days between the participant's date of birth and the initial date on the IFSP, would significantly correlate, in a negative direction, with growth patterns in positive social-emotional skills from entry to exit.

Hypothesis 5. It was hypothesized that age at entry into early intervention services, as measured by the days between the participant's date of birth and the initial date on the IFSP, would significantly correlate, in a negative direction, with growth patterns in knowledge and skills from entry to exit.

Hypothesis 6. It was hypothesized that age at entry into early intervention services, as measured by the days between the participant's date of birth and the initial date on the

IFSP, would significantly correlate, in a negative direction, with growth patterns in use of appropriate actions to meet his/her needs from entry to exit.

CHAPTER II

METHODS

Participants

Participants included a total of 55 children enrolled in Part C early intervention services, specifically developmental therapy. More than half of the children were girls (52%). Children were from a variety of racial and ethnic backgrounds including, Caucasian (69.1%), African American (10.9%), Hispanic or Latino (12.7%), and two or more races (7.3%). Language and use of an interpreter were noted for approximately 84% of the sample. Of the 46 participants, 84.8% had English as their primary language and 10.9% needed an interpreter. Possible eligibility categories for the state of Tennessee are developmental delay or developmental disability. A child must have a qualifying medical diagnosis that puts him/her at risk for a developmental delay or assessment results must show a 25% delay in two developmental areas or a 40% delay in one of the following areas: adaptive, social, communication, cognitive, or motor (Tennessee Early Intervention System, n.d.). Overall, 60% of participants were eligible due to a developmental delay. Participants' age at entry into Part C services ranged from 1 month to 23 months of age. On average, children's age at the entry of Part C services was around 8 months ($SD = 5.5$). Participants were in the program on average 22.2 months, ranging from 4.5 months to 2.5 years.

Procedure

Approval was obtained from the Institutional Review Board (IRB; see Appendix A) with a letter of support from the participating program. An Excel document with de-identified data was provided to the primary investigator from the program after IRB

approval. Variables included in the provided document were gender (1= male, 2 = female), race and ethnicity (1=*White*, 2=*African American*, 3= *Hispanic*, 4=*Hawaiian*, 5 =*Asian*, 6 = *two or more races*), language (1 = *English*, 2 = *Spanish*), use of an interpreter (1=*Yes*, 2 = *No*), eligibility category (1= *developmental delay*, 2 = *diagnosed condition*), and age at entry. In addition, entry and exit child outcome ratings for each of the three early childhood outcomes, length of time between entry and exit ratings, and amount of developmental therapy provided by the program were provided. Statistical Package of Social Science (SPSS) was used to perform the statistical analyses by exporting the data stored in the excel document to the SPSS software.

Measures

Child Outcomes. The Child Outcome Summary (COS; See Appendix B) process was designed to assess three broad child outcomes: positive social-emotional skills (including social relationships), acquisition and use of knowledge and skills (including early language/communication), and taking appropriate action to meet needs. The COS process includes two items (e.g.,1a, 1b) per outcome area: (a) To what extent does this child show age-appropriate functioning, across a variety of settings and situations, on this outcome? and (b) Has the child shown any new skills or behaviors rated to this outcome since the last outcomes summary process? Respondents rate the first item using a 7-point rating scale with descriptors 1= *Not Yet,* 3 = *Nearly*, 5 = *Somewhat*, and 7 = *Completely*. The second item is a qualitative item that applies only if the COS process has been completed previously. It assesses if the child has shown any new skills or behaviors in the outcome area since the last rating with response options as *yes* or *no*. Data for the second item of the COS process were not provided by the program.

At the time these data were collected, in Tennessee, the COS process was completed at minimum once at program entry and again every 6 months by the Individualized Family Service Plan (IFSP) team, including family members and a professional who was providing services (i.e., service coordinator or developmental therapist). In this study, rating decisions were based on a consensus through a conversation amongst the service coordinator and family members (Greenwood et al., 2007; Tennessee Early Intervention System, 2016). The last set of ratings completed before exit from the program are considered exit outcome scores. Ratings reflect the child's current level of functioning at present time of the COS process.

Calculation of Growth. In order to determine the change in COS process ratings between entry and exit, a growth score was calculated. Growth was calculated for each outcome and child by subtracting entry score from exit score. Therefore, there were three resulting growth scores; growth in positive social-emotional skills, acquiring and using knowledge and skills, and taking appropriate action to meet needs.

Dosage. Intervention dosage was determined by the total amount of developmental therapy service hours provided between the date of the entry outcome rating and the date of the exit outcome rating. The program provided in an Excel document the amount of developmental therapy service provided each month and the total amount between entry and exit ratings.

Data Analyses

Descriptive statistics, including cross-tabulations, means, and standard deviations, were calculated for each entry and outcome rating for the outcome areas. A Spearman's *rho* correlation analysis was conducted to explore the relationship between dosage and

growth on child outcome ratings (i.e., social skills, knowledge and skills, and actions to meet needs) and also age at entry, and growth on child outcome ratings.

CHAPTER III

RESULTS

Descriptive Statistics

Several analyses were conducted to address the research questions. Descriptive

statistics including cross-tabulations, means, and standard deviations were calculated.

The means and standard deviations for dosage, age at entry, and the child outcome

variables are presented in Table 1. Cross-tabulation analyses were conducted to examine

the frequency distribution of entry and exit scores for each outcome and are summarized

in Tables 2 through 4. As expected, most children's scores increased for each outcome

from entry to exit. Next, a combination of Spearman's *rho* correlations were conducted to

determine the extent to which variables were related.

Table 1 *Means and SDs of Variables*

	Mean	Standard Deviation
Dosage (total # of hr from entry to exit)	33.49	20.46
Age at Entry (days)	256.31	170.88
Social-Emotional Skills Growth Pattern Score	.84	1.91
Knowledge and Skills Growth Pattern Score	1.09	1.68
Action to Meet Needs Growth Pattern Score	1.09	1.96

Table 2 *Social-Emotional Skills Cross-Tabulation*

		Exit Score Ratings (N = 55)							
		1	**2**	**3**	**4**	**5**	**6**	**Total**	**%**
Entry Score	**1**	1	0	0	1	0	2	4	7.3
Ratings	**2**	0	1	4	3	3	2	13	23.6
	3	0	1	1	2	2	2	8	14.5
	4	0	0	1	2	4	4	11	20.0
	5	0	2	1	1	6	3	13	23.6
	6	0	0	0	0	0	2	2	3.6
	7	0	0	0	2	2	0	4	7.3
Total		1	4	7	11	17	15	55	100
%		1.8	7.3	12.7	20.0	30.9	27.3	100	

Table 3 *Acquisition of Knowledge and Skills Cross-Tabulation*

		Exit Score Ratings (N = 55)							
		1	**2**	**3**	**4**	**5**	**6**	**Total**	**%**
Entry Score	**1**	1	2	2	3	1	1	10	18.2
Ratings	**2**	0	3	3	3	5	1	15	27.3
	3	0	0	2	2	1	2	7	12.7
	4	0	1	1	7	3	2	14	25.5
	5	0	1	1	0	4	2	8	14.5
	6	0	0	0	0	0	0	0	0
	7	0	0	0	1	0	0	1	1.8
Total		1	7	9	16	14	8	55	100
%		1.8	12.7	16.4	29.1	25.5	14.5	100	

Table 4 *Use of Appropriate Actions to Meet Needs Cross-Tabulation*

		Exit Score Ratings (N = 55)								
		1	**2**	**3**	**4**	**5**	**6**	**7**	**Total**	**%**
Entry Score	**1**	2	3	1	1	1	1	0	9	16.4
Ratings	**2**	0	2	3	2	5	2	1	15	27.3
	3	0	1	2	3	5	2	0	13	23.6
	4	0	1	1	4	2	2	0	10	18.2
	5	0	1	0	0	1	0	0	2	3.6
	6	0	0	0	1	0	3	0	4	7.3
	7	0	1	0	1	0	0	0	2	3.6
Total		2	9	7	12	14	10	1	55	100
%		3.6	16.4	12.7	21.8	25.5	18.2	1.8	100	

Dosage and Outcomes

Hypothesis 1 was partially supported with a positive correlation between developmental therapy service dosage and a child's growth in positive social-emotional relationships, but the correlation was not statistically significant, r_s (53) = .04, p = .74. Hypothesis 2 was also partially supported with a positive correlation between developmental therapy dosage and a child's growth in knowledge and skills, but the correlation was not statistically significant, r_s (53) =.14, p = .29. Hypothesis 3 was supported with a positive and statistically significant correlation (r_s = .28, p =.03) between hours of developmental therapy received and a child's growth in the use of appropriate action to meet his/her needs.

Age at Entry and Outcomes

A Spearman's *rho* correlation was also used for Hypotheses 3-6 to explore the relationship between age at entry of early intervention services and growth in child outcome areas (social-emotional skills, knowledge and skills, and actions to meet needs). There were no significant negative correlations between age at entry and a child's change in ratings on social-emotional skills, knowledge and skills, or use of actions to meet needs, r_s = .18, .09, .12, respectively, n = 55, *ns*.

CHAPTER IV

DISCUSSION

The purpose of this study was to examine the relationship between dosage, measured by actual developmental therapy hours a family received, and growth patterns on child outcome ratings specified and required by the Office of Special Education programs. These outcomes include positive social-emotional skills, acquisition of knowledge and skills, and the use of appropriate action to meet his/her needs. There is a lack of research in regard to the association between these variables. This study provided more insight on developmental outcomes and service delivery. It was expected that service dosage, measured by the hours of developmental therapy a child received, would be significantly and positively correlated with a child's growth pattern on positive social-emotional skills, acquisition of knowledge and skills, and also the use of appropriate actions to meet needs.

Hypotheses 1 and 2 are only partially supported with these data. As children and families received more developmental therapy services, positive social-emotional skills, and acquisition of knowledge & skills improved but not to a significant degree. However, there was full support for Hypothesis 3. As children and families received more developmental therapy, children's ratings on their use of appropriate actions to meet their needs increased. The use of appropriate behavior to meet his/her needs outcome involves behaviors such as transitioning from place to place, dressing, using objects such as toothbrush or eating utensils, and toileting. Due to these behaviors contributing to a child's overall well-being, health, and safety, this outcome may be a high priority for caregivers. In addition, this outcome includes daily basic needs which means that there

may be daily intervention opportunities to practice the use of appropriate behaviors to meet his/her needs.

These inconsistent results across outcomes align with the recommendations of Jung (2003) in that more visits from an interventionist does not impact improvement in a child's development as much as the learning opportunities that are happening in between visits by caregivers. Jung (2003) noted that too many visits can be a hindrance to caregivers' desire to follow-through with intervening on their own. In addition, frequent service hours by professionals may indicate to families that the interventionists are the only ones that are competent enough to provide the service. This may contribute to the belief that only professionals or experts can help their child. Empowering families to be the interventionists in their home can possibly lead to increased opportunities for improvement in child outcomes (Jung, 2003). These results support that more intervention service is not necessarily better or lead to better outcomes.

In the current study, it was also hypothesized that age at entry would be significantly and negatively correlated with the growth pattern on positive social-emotional skills, acquisition of knowledge and skills, and the use of appropriate actions to meet needs. Therefore, it was expected that the younger a child is at entry of early intervention services, the more improvement a child would make on the outcomes. Data analyses resulted in Hypotheses 3-6 not being supported. Findings from the National Early Intervention Longitudinal Study (NEILS) report (Hebbeler et al., 2007) can help explain the results of the current study in regard to age at entry. On average, parents searched for early intervention services for their child around 11 months of age, but the average age at entry of Part C services was not until about 16 months of age (Hebbeler et

al., 2007). The almost 5-month difference between the search and entrance into early intervention services may be explained by the time it takes for an EI program to receive the referral and also the time it takes to develop and Individualized Family Service Plan (IFSP) and meet with all of those involved. One of the most influential correlates of age at entry begins with the nature of the developmental concern. Similar to the demographics of the current study, 64% of participants in the NEILS study were eligible for developmental delay. Twenty percent were eligible under developmental diagnosis and the other 16% were at-risk. Results from the NEILS study shows that children with developmental diagnoses or at-risk tended to start early intervention services earlier, specifically in the first year, before children with developmental delay. Children with a developmental delays entered early intervention services closer to age 2 years. The average time between the first concern and entry of Part C services for children eligible under developmental delay was 8.9 months, whereas, 7.1 months for developmental diagnoses and 5.7 for at-risk (Hebbeler et al., 2007). With previous research demonstrating the importance of receiving intervention earlier, the current age of entry is a concern in which current policies should be considered. There is a difference in the identification of children with developmental delays versus developmental diagnoses which may suggest the need to improve child find procedures based on eligibility category (Hebbeler, 2007). It is possible that if children were identified earlier than the average 16 months, there may be more improved growth patterns in outcome ratings from entry to exit.

Limitations

There are several limitations in this study. This study only included 55 participants which may have played a role in the findings. A small sample size can contribute to less power in the results. Another limitation of this study was that it only included developmental therapy early intervention services, rather than all services provided to a child or family. Looking at total dosage of all of early intervention services a child is receiving (speech, developmental, physical, etc.) could assist in getting a general idea of early intervention services overall impact on child outcomes. Also, this study does not take into account eligibility category when looking at the relationship between dosage and outcomes. Previous research demonstrates that children with more severe needs, such as a developmental diagnosis, receive more services than those with less severe needs (Hebbeler et al., 2007). Some other intervening factors between services and outcome that were not considered included family characteristics, quality of service, and socioeconomic status. Additionally, participants in this study are residents of Middle Tennessee so this sample is not representative of the entire population in the United States and limits the generalizability of the results. Lastly, the amount and type of training provided to service coordinators collecting the Childhood Outcome Summary (COS) process data were not available. Therefore, the trustworthiness of the data cannot be determined or evaluated. These limitations should be taken into account when interpreting the results of this study.

Future Direction

While this study contributes to dosage research, future research should consider the limitations of this study. In the future, exploration of different intervening factors and

their relationships with child outcomes could be examined. For example, looking at the relationship between family characteristics and child outcomes could aid in the development of parent training programs to encourage parents in effectively engaging with their child. It would be of benefit to look into the differences between planned services received and actual services received as well. Learning more about these differences can contribute to learning more about the impact of missed visits and encourage research into the reasoning behind them. This could assist in IFSP development and dosage planning and decision making.

Conclusion

In summary, though there is plenty of research on the benefits of early intervention, there is a lack of research on service dosage and its impact on the child outcomes reported to the Office of Special Education Programs. This study found that there is a positive, but insignificant relationship between service dosage (hours of developmental therapy) and a child's growth in positive social-emotional skills and acquisition of knowledge and skills, but a positive and significant relationship between dosage and use of appropriate action to meet his/her needs. A possible explanation for this may be due to caregiver's high priorities for their children to independently take care of his/her basic needs. The inconsistent results across outcomes indicate that more is not always better. Additional findings from this study suggest an insignificant relationship between age of entry and growth in the three child outcome areas. The findings from this study can be beneficial when making dosage decisions and also tailoring service delivery to boost growth in a child's positive social-emotional skills, acquisition of knowledge and skills, and the use of appropriate actions to meet his/her needs.

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APPENDICES

APPENDIX A: IRB APPROVAL

IRB
INSTITUTIONAL REVIEW BOARD
Office of Research Compliance,
010A Sam Ingram Building,
2269 Middle Tennessee Blvd
Murfreesboro, TN 37129

MIDDLE TENNESSEE STATE UNIVERSITY

IRBN007 – EXEMPTION DETERMINATION NOTICE

Thursday, August 10, 2017

Investigator(s):	Yoshiko Jackson; Robyn Ridgley
Investigator(s') Email(s):	ys3f@mtmail.mtsu.edu; Robyn.Ridgley@mtsu.edu
Department:	Elementary Education

Study Title: The Relationship between Early Intervention Service Intensity and Child Outcome Ratings

Protocol ID: **17-1271**

Dear Investigator(s),

The above identified research proposal has been reviewed by the MTSU Institutional Review Board (IRB) through the **EXEMPT** review mechanism under 45 CFR 46.101(b)(2) within the research category *(4) Study involving existing data* A summary of the IRB action and other particulars in regard to this protocol application is tabulated as shown below:

IRB Action	EXEMPT from furhter IRB review***	
Date of expiration	**NOT APPLICABLE**	
Participant Size	60 (Sixty)	
Participant Pool	**Existing data provided by HCBEIP**	
Mandatory Restrictions	Analysis of existing de-identified data only; Data covered by letter of permission only	
Additional Restrictions	**None at this time**	
Comments	None at this time	
Amendments	**Date**	**Post-Approval Amendments**
		None at this time

***This exemption determination only allows above defined protocol from further IRB review such as continuing review. However, the following post-approval requirements still apply:
- Addition/removal of subject population should not be implemented without IRB approval
- Change in investigators must be notified and approved
- Modifications to procedures must be clearly articulated in an addendum request and the proposed changes must not be incorporated without an approval
- Be advised that the proposed change must comply within the requirements for exemption
- Changes to the research location must be approved – appropriate permission letter(s) from external institutions must accompany the addendum request form
- Changes to funding source must be notified via email (irb_submissions@mtsu.edu)
- The exemption does not expire as long as the protocol is in good standing

APPENDIX B: COS RATING SCALE

CHILD OUTCOMES SUMMARY FORM

Date: _____/_____/_____
           Mon   Day   Yr

Child Information

Name: _____

Date of birth: _____/_____/_____
               Mon   Day   Yr

ID:_____

Persons involved in deciding the summary ratings:

Name	Role

Family information on child functioning (Check all that apply):

____ Received in team meeting

____ Collected separately

____ Incorporated into assessment(s)

____ Not included

The Early Childhood Outcomes Center   Draft 10-15-09

1. POSITIVE SOCIAL-EMOTIONAL SKILLS (INCLUDING SOCIAL RELATIONSHIPS)

To answer the questions below, think about the child's functioning in these and closely related areas (as indicated by assessments and based on observations from individuals in close contact with the child):

- *Relating with adults*
- *Relating with other children*
- *Following rules related to groups or interacting with others (if older than 18 months)*

1a. To what extent does this child show age-appropriate functioning, across a variety of settings and situations, on this outcome? *(Circle one number)*

Not Yet		Nearly		Somewhat		Completely
1	2	3	4	5	6	7

Supporting evidence for answer to Question 1a

Age-appropriate functioning   Concerns? No   Yes_____(describe)
Immediate foundational skills/ Functioning that is not age-appropriate
Functioning that is not yet age appropriate or immediate foundational

1b. *(If Question 1a has been answered previously):* **Has the child shown *any* new skills or behaviors related to positive social-emotional skills (including positive social relationships) since the last outcomes summary?** *(Circle one number)*

Yes	1➜	Describe progress:
No	2	

2. ACQUIRING AND USING KNOWLEDGE AND SKILLS

To answer the questions below, think about the child's functioning in these and closely related areas (as indicated by assessments and based on observations from individuals in close contact with the child):

- *Thinking, reasoning, remembering, and problem solving*
- *Understanding symbols*
- *Understanding the physical and social worlds*

2a. To what extent does this child show age-appropriate functioning, across a variety of settings and situations, on this outcome? *(Circle one number)*

Not Yet		Nearly		Somewhat		Completely
1	2	3	4	5	6	7

Supporting evidence for answer to Question 2a

Age-appropriate functioning
Concerns? No Yes_____(describe)
Immediate foundational skills/ Functioning that is not age-appropriate
Functioning that is not yet age appropriate or immediate foundational

2b. *(If Question 2a has been answered previously):* **Has the child shown *any* new skills or behaviors related to acquiring and using knowledge and skills since the last outcomes summary?** *(Circle one number)*

Yes	1 →	Describe progress:
No	2	

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3. TAKING APPROPRIATE ACTION TO MEET NEEDS

To answer the questions below, think about the child's functioning in these and closely related areas (as indicated by assessments and based on observations from individuals in close contact with the child):
- *Taking care of basic needs (e.g., showing hunger, dressing, feeding, toileting, etc.)*
- *Contributing to own health and safety (e.g., follows rules, assists with hand washing, avoids inedible objects) (if older than 24 months)*
- *Getting from place to place (mobility) and using tools (e.g., forks, strings attached to objects)*

3a. To what extent does this child show age-appropriate functioning, across a variety of settings and situations, on this outcome? *(Circle one number)*

Not Yet		Nearly		Somewhat		Completely
1	2	3	4	5	6	7

Supporting evidence for answer to Question 3a

Age-appropriate functioning
Concerns? No   Yes_____(describe)
Immediate foundational skills/ Functioning that is not age-appropriate
Functioning that is not yet age appropriate or immediate foundational

3b. *(If Question 3a has been answered previously):* **Has the child shown *any* new skills or behaviors related to taking appropriate action to meet needs since the last outcomes summary?** *(Circle one number)*

Yes	1➜	Describe progress:
No	2	