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## **E is for Early Intervention: The Importance of Early Intervention Services in Providing Better Outcomes for Children Who Have or Are at Risk for Having a Developmental Delay**

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E is for Early Intervention: The Importance of Early Intervention Services in Providing Better  
Outcomes for Children Who Have or Are at Risk for Having a Developmental Delay

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Honors Thesis

# Abstract

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The purpose of this paper is to analyze the effects that early intervention services have on children who have or are at risk for a developmental delay due to medical or environmental circumstances. Throughout this paper, the following research questions were used as means to guide and provide focus to the paper: Why are early intervention services important in the first few years of life? Who benefits from early intervention services and how are these children affected? and Does early intervention affect the individual long-term? By using a combination of research articles, scientific journals, and data collected from federal research studies regarding early childhood early intervention and the outcomes of children, this paper provides a comprehensive overview of why early intervention services are needed early in life and the true impact of early childhood intervention programs on the lives of children both at the time of intervention and across the lifespan.

**Key Words: Early Intervention, Early Childhood Education, Head Start**

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# Introduction

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## Background Information

Early intervention services are federally and state funded programs such as Head Start or First Steps that is provided to children ages birth to age three who have or are at risk for having a developmental delay. The ultimate goals of early intervention are to enhance the development of toddlers with disabilities, minimize the negative effects the delay may have on development and learning, and to reduce the cost of education to society by reducing the need for special education services upon reaching grade school (National Information Center for Children). In terms of funding, early intervention programs are covered under part C of the Individuals with Disabilities Education Act (IDEA) that was most recently revised in 2004.

Initially, early intervention was a product of the 1986 reauthorization of Public Law 94-142 today known as IDEA, a monumental law expanding the educational rights of disabled children, most notably the right to receive a free and appropriate public education (Center for Parent Information and Resources). Before that point in time, children with developmental delays that presented clear areas of deficit were typically not assessed or allowed to receive services until they reached elementary school. While minimizing the effect of the developmental delay was mentioned at the time it was developed, the motivation for establishing early intervention programs was primarily economic in that the focus was on decreasing the cost to society through reducing the need for special education and related services upon entering school and the need for institutionalized housing once these individuals had reached adulthood (Center for Parent Information and Resources). Unfortunately, since 1986, little change has been made in regards to the public law. The most current reauthorization of IDEA in 2004 did mention the need to enhance the ability of families to meet the needs of their delayed or disadvantaged children in

addition to noting the significant changes in the development of the brain during the child's first three years of life, two positive changes that are a step in the right direction, yet still leaves much to be desired in terms of how early intervention will change in their method or implementation to meet these new areas of focus (Center for Parent Information and Resources).

In regards to what services are provided to these young children, the most common form of service delivery are the center-based programs known as Head Start or First steps that provide a preschool like setting geared towards providing a stimulating environment tailored to the individual needs of the children in the classroom. In addition, early intervention services can be home-based in which a teacher and/or the necessary therapists administer services to the child in his/her home environment. More often than naught, children who are developmentally delayed require what would be considered related services such as physical therapy, occupational therapy, and speech-language therapy to directly target the child's areas of deficit and improve the overall remediation of the child's skills. These therapists are included under Part C of IDEA and are present with center and home based therapy.

### **Identification of Unknown Aspects**

Although the federal government recognizes that early intervention services are an important part of aiding young children with a developmental delay in overcoming barriers to growth and learning, the discussion continues to be one of economic loss or gain rather than improving the educational practices of early interventionist to best meet the needs of the individual. Moreover, a substantial amount of research has been conducted into determining whether or not early intervention services are cost effective versus whether or not they are improving such skills as cognition or speech and language that are common deficits for children who are developmentally delayed.

Furthermore, the failure to make any serious revisions on the past reauthorization of IDEA is indicative of a potential misunderstanding of the rationale behind early intervention services and whether or not they are effective. Ideally, the lack of revisions would be due to an effective program that consistently improves the child's ability to learn and thrive in his/her environment consistent with that of his/her nondisabled peers. On the converse, the educational policies of public schools kindergarten through twelfth grade appears to be in a consistent state of flux, implementing more stringent policies to determine the effectiveness of teachers through the performance of their students each year. If policy makers held equal importance to both the educational practices associated with early intervention and the public schools, it would be assumed that the same stringent policies concerning the effectiveness of instruction would be applied to both, thus causing change in the educational practices and policies of both early intervention and public schools with the intent of providing better outcomes to students. Yet is evident that the only change that has occurred is in that of public schools, the policy of early intervention services remain largely the same. Much like public schools, early intervention practices should evolve as new research becomes available and in response to data collected on effectiveness. This absence of change suggests a certain level of ignorance on behalf of the policy makers in that they are not aware of the current research being conducted into early childhood development nor of the effectiveness of their programs. To underscore this point, IDEA 2004 stated in their continued rationale for services that there was significant change of the infant's brain from birth to three years of age, yet fails to further elaborate on specifically what new changes were made in comparison to past knowledge and how early intervention services will be modified to address those changes (Eile & Ka, 2011). In essence, the purpose of this paper is to conduct research in an attempt to fill in the gaps, to elaborate on what is known in

terms of development, to address how a developmental delay and early intervention services affects the individual not the budget, and to provide perspective into the effectiveness of services on the child over time.

### **Thesis/Problem of Statement**

While it is generally understood that early intervention services are beneficial to improving the educational outcomes of infants and toddlers who have or are at risk for a developmental delay, the underlying reasoning to why early intervention services are needed early in life and the efficacy of these services in improving outcomes for children with a developmental delay is largely unknown. Thus, I propose to conduct a comprehensive review determining the importance and efficacy of early intervention services through an evaluation of the developmental changes that occur within the first three years of life, how a developmental delay affects the individual, and finally the long term efficacy of services on the outcomes of children who received early intervention.

### **Research Questions/Statements**

In order to sufficiently provide focus to this paper a series of three research questions have been developed and are as follows: Why are early intervention services important in the first few years of life? Who benefits from early intervention services and how are these children affected? and Does early intervention affect the individual long-term?

I will first investigate the changes in development from birth to age three to determine why early intervention services are needed in the first few years of life. Within this section, I will seek to answer the following questions: What specific changes occur within the brain neurologically? What specific changes occur in terms of the child's linguistic skills? and What specific changes occur in terms of the child's fine and gross motor skills?

I will then establish the criteria for eligibility to determine who will receive early intervention services and further research how these services affect the individual by studying the effects of a developmental delay on the child and what services are provided to these individuals as a means of improving their future outcomes. I will seek to answer: Who specifically is eligible for services and under what criteria? How specifically does a developmental delay impair the learning and growth of a child? What services are provided to these children to combat the negative effects of the delay? and How are these children impacted by said services?

Finally, the last area of investigation concerns the efficacy of early intervention and how these services affect the individual over the lifespan. Within this section I will seek to answer: What studies have been conducted into the efficacy of early intervention? Does early intervention specifically improve the outcomes of children over time? And if so, What are the specific outcomes that are affected?

### **Means and Summary**

While investigating each of these questions, I drew my supporting information from a variety of sources including: scientific essays in the areas of early childhood development and early intervention, textbooks concerning the development of children, parental resources provided by the U.S. Office of Special Education regarding early intervention resources, and statistical data from such sources as the National Institute of Health.

In the production of this essay, I have synthesized the aforementioned information to provide a well-rounded essay that aims to clearly underscore the importance of early intervention in the lives of developmentally delayed infants and toddlers through the examination of the changes in development in the first three years of life and revealing the efficacy of early intervention through the examination of how the delay affects the child and the appropriate



services administered in addition to longitudinal studies discussing the outcomes of children who received early intervention services.

# Exploring the Importance of Early Intervention

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## Introductory Section

The purpose of this section is to provide an introspective look at the rationale behind and for early intervention services in today's society. Here, I synthesized information from scientific essays evaluating recent developments in early childhood development and early intervention, textbooks concerning the development of children, parental resources provided by the U.S. Office of Special Education regarding early intervention resources, and statistical data from such sources as the National Survey of Children's Health in order to craft a comprehensive review of why early intervention services are needed and how they affect the children receiving those services. By providing information from a variety of sources, this essay attempts to more clearly fill in the gaps of knowledge that policy makers have managed to ignore as a means to assess the need and efficacy of a program for children with or who are at risk for a developmental delay. While policy makers are concerned about the benefits of cost to society, this essay takes a more humanitarian approach in assessing how the delay affects the children and the impact of early intervention services on their current development and future outcomes.

## Why Are Early Intervention Services Important in the First Few Years of Life?

### A Critical Time for Development

To begin with, early intervention services are provided to children ages birth to three years of age, a critical time in development in which significant and holistic change occurs

neurologically, linguistically, and motorically. The mastery of these skills in each of the aforementioned developmental areas is imperative in that they provide the fundamental foundation for the skills used daily in adult life.

Dr. Kathleen Stassen Berger, author of *Invitation to the Lifespan 2<sup>nd</sup> Edition* and experienced educator, emphasizes the myriad of changes that occur during the earlier years of life in chapter three of her text book entitled, “The First Two Years: Body and Mind.” Considering that the brain is essential for the entirety of the lifespan, she begins with neurological development and the concept of transient exuberance or the process of rapid growth of the dendrites and synapses within the neurons of the brain followed by a period of pruning (Berger, 2014). In short, dendrites are the part of the nerve fiber that receives an electrochemical signal from other neurons and transmits that signal to the cell body. Synapses, on the other hand, are described as the intersection between the dendrites and the axon, the part of the nerve fiber that sends messages (Berger, 2014). Moreover, they are an imperative part of the communicative process between the various nerves in the brain. According to data obtained from neuropsychologists Allan Schore and Jennifer McIntosh, approximately 40,000 new synapses are formed in the infant’s brain every second (Schore & McIntosh, 2011). In addition to this rapid growth of synapses, the dendrites within the cortex of the brain increase fivefold by age 2 with nearly 100 trillion synapses present (Berger, 2014).

While there is undeniable growth of the human brain and its ability to form the necessary connections for future cognition, this period of development is also marked by a period of pruning. At this stage in development, any unused connections will atrophy and die (Berger, 2014). The determining factor in whether a dendrite will be used is not random, but is rather heavily dependent upon experience. When an infant experiences something for the first time-

like the touch of their mother's hand or a cool breeze- neurons will send messages to one another and the corresponding dendrites and synapses will be used (Berger, 2014). Neuroscientist Sandra Twardosz in her article *Effects of Experience on the Brain: The Role of Neuroscience in Early Development and Education* further categorizes these experiences as ones that are, "expected or common to the human species, such as patterned light, sound, language, opportunities to move and manipulate objects, and responsive caregivers" (Twardosz, 2012). These are the experiences that begin to build the foundation for more complex actions including cognition, visual perception, and motor skills such as sitting up and eye-hand coordination (Twardosz, 2012). Without these necessary experiences, the process of over-pruning will occur resulting in decreased brain activity in the child (Berger, 2014). Stimulation is a key component in combating over pruning and fostering neurological development in young children (Berger, 2014). By allowing them to experience a variety of sensations, through talking and reading, or just encouraging them to reach and grasp for a desired toy, the synapses and dendrites are being formed, used, and developed, setting the stage for further development.

Another area of significant growth is in the areas of speech and language development. According to Berger, while the timing of specific milestones of spoken language varies by nation and culture, the sequence in which children acquire language is universal (Berger, 2014). The American Speech-Language Hearing Association (ASHA) has used both universal normative data in addition to research on language acquisition specifically within the United States as a means to create a set of developmental milestones specifically for General American English (GAE). From birth to three months of age an infant progresses from strictly reflexive communication (cries, movements, facial expressions) to vocalizing sounds of pleasure such as cooing, smiling when seeing caregivers, and crying for different needs (American Speech-

Language Hearing Association: Birth). While this may seem trivial to the developed adult, this progression signifies the move from non-meaningful to a meaningful form of communication.

Around six months of age, infants begin babbling and favor early developing sounds such as p, b, and m. At this point the child should vocalize sounds of pleasure and displeasure, laugh, and has developed the ability to make gurgling sounds (American Speech-Language Hearing Association: Birth). By one year of age, the child's babbling now features short sound combinations (bababa, tititi), seeks attention through using crying and non-crying sounds, and has developed one or two words (hi, dog) (American Speech-Language Hearing Association: Birth). Each newly learned skill builds upon the last, refining it, and laying a portion of the foundation for the next level of complexity. From saying one word at one year old, the now toddler begins learning vocabulary with voracious intensity. At eighteen months of age, the child experiences what is known as the "naming explosion" in which the toddler's vocabulary expands rapidly primarily in the category of nouns (Berger, 2014). By age two, the child will begin to combine words into one to two word questions and requests and will use a variety of consonants at the beginning of sounds (American Speech-Language Hearing Association: One to Two). From two to three, the toddler will develop the ability to have a word for most things, name and direct attention to objects, ask why, and use more complex sounds such as k, g, f, t, d, and n (American Speech-Language Hearing Association: Three to Four). To underscore the progression of development from birth to age 3, the child begins with completely reflexive communication with extremely limited control over his interaction with his environment to actively naming and requesting items of interest in a manner that most everyone can understand. In this short period of time, the child has acquired a functional vocabulary and has beginning

utterances that illustrate a preliminary understanding of the deeper concepts of semantics and syntax. It's really quite astounding.

The final area of dramatic change and progression from birth to three exists in the development of the child's gross motor skills. Motor skill development is broken down into two basic categories: gross motor skills- or large movements such as walking- and fine motor skills- or small movements such as the finger movements used to grasp or pick something up (Berger, 2014). As with speech and language, gross and fine motor skills develop in a predictable, progressive sequence. According to Berger, gross motor skills develop in a cephalocaudal and proximodistal direction (Berger, 2014). In other words, gross motor skills develop in a head-down or center-out sequence, in which children first gains control of their heads, then upper bodies, and lastly their legs and feet (Berger, 2014). Much like ASHA, the World Health Organization (WHO) has developed a chart of developmental milestones to be used by medical professionals when assessing appropriate development. According to the WHO, there are six main gross motor milestones: sitting without support, standing with assistance, hands and knees crawling, walking with assistance, standing alone, and walking alone (WHO Multicentre Growth Reference Study Group). Between the ages of four and nine months of age, the infant should reach the first milestone of sitting without support. From there, the child will progress to standing with assistance from approximately five to eleven months of age. At 5 to 13 months of the age, the child is expected to exhibit some form of hand and knees crawling. As muscle strength and brain maturation increase in development, the child will progress to walking with assistance from approximately 5 ½ to 13 months of age (WHO Multicentre Growth Reference Study Group). The range continues to broaden with standing alone, which develops and can persist from 6 ½ to nearly 17 ½ months. Finally, from tenderly holding on to their mother's

hands to standing alone, the toddler is now expected to take those first cautious steps from 8 ½ to 18 months of age. (WHO Multicentre Growth Reference Study Group). Again with motor development, the child begins with little to no control over his/her bodily movements and ends with independently standing and walking. As many parents fondly remember, their child had become mobile. With more control and interest in their environment, mobility allows children to explore and learn in new and exciting ways.

Within the first few years of life, the small child undeniably undergoes a series of changes in terms of brain development, their language abilities, and motor skills. Without prompt and appropriate intervention at this early stage of life, a deficit in any of these developmental areas can lead to negative consequences for the child as he/she continues to grow and develop. For children who have or are at risk for a developmental delay, it is imperative that parents, medical, and early educational professionals alike are aware of these developmental milestones to better assess if a child is progressing normally or if a deficit is present so that appropriate intervention can be administered as soon as possible.

## **Who Benefits from Early Intervention Services and How are these Children Affected?**

### **The General Population: Who Qualifies for Early Intervention Services**

While most people consider early intervention services to apply to any young child with an area of deficit below the age of five, the federal definition is a bit more stringent in regards to who is eligible to receive services and who is not. The National Early Childhood Technical Assistance Center (NECTAC), a government sponsored program from the Office of Special Education and U.S. Department of Education, states that under federal law individuals who are eligible for services include, “infants and toddlers aged birth to three with developmental delays

or a medical condition likely to lead to developmental delays” (Goode, Diefendorf, & Colgan, 2011). Genetic or chromosomal disorders such as Down Syndrome and Fragile X syndrome or sensory disorders such as vision impairment and deafness are common medical conditions that would place a child at risk for a developmental delay in early childhood (What Puts a Child at Risk). In addition, some states provide early intervention services to children who are considered to be at an increased risk for a developmental delay due to medical factors, and poor environmental or caregiver circumstances (Eile & Ka, 2011). Environmental risk factors that could place a child at an increased likelihood for a developmental delay include exposure to lead, infections, prematurity, severe poverty, poor nutrition and lack of care (What Puts a Child at Risk).

While there is a federal definition that defines the term “developmental delay”, states maintain the right to modify that definition if they so choose. The Indiana Department of Education (IDOE) uses the federal definition consistent with the Individuals with Disabilities Education Act (IDEA) by determining the presence of a developmental delay when, “there is a discrepancy of 25% or 2-standard deviations from the mean in one or more developmental domains or a discrepancy of 20% or 1.5-standard deviations from the mean in two or more developmental domains” (U.S. Office of Special Education Programs). According to the Center for Parent Information and Resources, the aforementioned developmental domains would include: physical, cognitive, communication, social or emotional, and adaptive development (Center for Parent Information and Resources). In essence, a developmental delay occurs when a child fails to meet developmental milestones that are expected for that child’s chronological age. Typically, the parent is the first person to notice this disparity between the skills of his/her child and age related peers. At this point, it is suggested that the parent talk to child’s pediatrician who

will conduct a developmental checklist that will determine whether further assessment is needed (Center for Parent Information and Resources). Should the checklist reveal areas of concern, the pediatrician will refer the child for a more in-depth developmental evaluation used to formulate a detailed profile of the child's strengths and weaknesses. During the evaluation, the child will be compared to normative data derived from his/her age related peers. If the child meets the aforementioned criteria, he/she will then receive a diagnosis of developmentally delayed and will become eligible for early intervention services (Center for Parent Information and Resources).

### **The Impact of a Developmental Delay on Learning and the Provision of Early Intervention Services**

Based on the information presented thus far, it is evident that early intervention services are provided to children who have or are at risk for being developmentally delayed. Yet both definitions fail to elaborate on how the delay may affect the further development and learning of the individual or what services will be provided to him/her to prevent or remediate those negative effects. In response, the areas of Down syndrome, hearing impairment, and poverty will each be discussed in an attempt to provide a more in-depth assessment of the affect a developmental delay has on a child and how early intervention services would impact him/her. In each of these of these instances, the individual would qualify for services in that the child would have an increased likelihood for a developmental delay due to his/her medical or environmental situation.

To begin with, Down syndrome is a chromosomal disorder that tends to affect multiple areas of development. This disorder is also commonly known in the medical community as trisomy 21 due to the presence of three copies of chromosome 21, compared to the usual two (Vinson, 2012). In addition, children with Down syndrome are often easily recognized by their common physical features including almond shaped eyes that slant up, a round, flattened face, a



short neck, and small ears (Center for Disease Control). Betsy Vinson, author of *Preschool and School-Age Language Disorders*, also notes the presence of prognathism, or a prominent jaw, in addition to a small oral cavity, which can often cause the tongue to protrude out of the mouth (Vinson, 2012). According to the National Institute of Health (NIH), Down syndrome continues to be the most common chromosomal disorder with a prevalence of approximately 1 in every 700 births (U.S. National Library of Medicine).

Because it is so common, medical professionals and early interventionist alike have a certain familiarity with the disorder and are aware of what to anticipate in terms of development. In general, it is expected that children with Down syndrome will experience a developmental delay in the areas of motor, speech, and language development (Vinson, 2012). In essence, these children are impaired not in just one or even two domains of development, as would be needed to qualify for services, but in multiple. In regards to motor development, children with Down syndrome are characterized as both hypotonic and hyporeflexic, meaning that they have both poor muscle tone and a lowered response when the reflexes are stimulated (Vinson, 2012). This deficit in motor skills actively reduces the child's ability and desire to explore his/her surrounding environment, reducing the child's potential for new experiences that are critical for neural development (Vinson, 2012).

In regards to speech and language, the range of deficits broaden. Due to the reduced size of the oral cavity and hypertonic muscles, children with Down syndrome produce a voice characterized as breathy or husky with inconsistent articulation errors (Vinson, 2012). The National Down Syndrome Society (NDSS) further states that most children with this disorder do not produce their first words until 2 or 3 years of age and exhibit a reduced vocabulary (National Down Syndrome Society). While the child's ability to understand language does exceed his/her

ability to produce it, the child is once again not receiving the practice to use and build upon the language skills necessary for not only functional communication, but for later reading as well.

While the deficits for a child with Down syndrome may seem daunting, early intervention services can be administered to this child as a means to combat the negative affects the disorder may have on development. For a child with Down syndrome, a battery of physical, occupational, and speech-language therapy is suggested (National Down Syndrome Society). Physical therapy (PT) would specifically target the deficit in gross motor skills and the characteristic hypertonic muscles. By actively using exercises and activities to strengthen the infant or toddler's muscles, the child will gain mobility sooner, allowing him/her to more actively explore and engage with the environment (National Down Syndrome Society). Occupational therapy (OT), on the other hand, focuses on deficits in fine motor skills and teaches self-independent behaviors. The skills learned would include picking up and grasping toys, stacking blocks, manipulating buttons and knobs, while also teaching how to feed and dress themselves (National Down Syndrome Society). Finally, speech-language therapy would be administered. When beginning therapy, the speech-language pathologist (SLP) most often targets prelinguistic skills such as the ability to imitate sounds, auditory skills such as listening to music or speech sounds, and oral-motor activities that involve using the tongue or lips to stimulate the child's receptive language abilities even before he/she may say his/her first words (National Down Syndrome Society). With the provision of early intervention services, each area of deficit for this child can be assessed, targeted, and monitored throughout early childhood. Despite the negative effects that the delay may produce, early intervention services can actively work to remediate and reduce their effects on later development and growth.

Another individual who would be considered at risk for a developmental delay would be a child who has a hearing impairment. In terms of definitions, ASHA describes a hearing disorder as, “the result of impaired auditory sensitivity of the physiological auditory system” (American Speech-Language Hearing Association: Hearing Loss). Note that this definition specifies that it is a physiological impairment, meaning that it has to do with the specific structures of the ear – inner, middle, or outer- and how they transmit auditory information to the brain. This is what qualifies the impairment as sensory. A disorder in which the child has difficulty perceiving the auditory information such as in Central Auditory Processing Disorder (CAPD), would not be considered a hearing impairment, but rather fall under the psychoacoustic category. Individuals are further categorized as deaf or hard of hearing depending upon the type, degree, and configuration of the loss (American Speech-Language Hearing Association: Hearing Loss).

In regards to the effect on development, the degree of hearing loss and the age at which the child becomes hearing impaired are extremely important (Vinson, 2012). In relation to the development of speech and language, children who are prelingually deaf, or acquire a hearing loss before developing language, are at an increased risk for severe language disorders depending on the degree of loss (Vinson, 2012). In essence, the greater the degree of loss, the less language the child hears and subsequently uses, and the greater the impact on development (Vinson, 2012). More specifically, ASHA outlines a set of three primary areas that impact children with a hearing loss. The first of which is concerning the development of adequate vocabulary. For children with a hearing loss, the development of vocabulary is slower and tends to consist primarily of concrete words whereas multiple meaning words and abstract concepts prove to be areas of deficit and struggle (American Speech-Language Hearing Association: Hearing Loss).

In addition to vocabulary, the child's sentence structure is also impaired. Often times children with a hearing loss struggle to hear the final consonants of words such as –ed and –s that often serve as grammatical markers in language, leading to miscommunication in speech and the misuse of plurals, verb tense, and possessives (American Speech-Language Hearing Association: Hearing Loss). In regards to verbal expression, children with hearing deficits may be difficult to understand due to poor stress, intonation, and rate of speaking. In addition, a child with a hearing disorder may not be able to hear the following sounds: "s," "sh," "f," "t," and "k" and further do not use them while speaking, again decreasing his/her level of intelligibility (American Speech-Language Hearing Association: Hearing Loss).

If severe deficits in speech and language are not enough to underscore the need for early intervention services for the deaf hard of hearing population, research has proven that on average, students with a hearing loss achieve one to four grade levels lower than their peers with normal hearing, unless early intervention services are received (American Speech-Language Hearing Association: Hearing Loss). Furthermore, the timing of these services is imperative. A research study conducted by Pat Moeller in 2000 specifically assessed the relationship between age of enrollment in early intervention programs and language outcomes in children who are deaf hard of hearing by age 5. The vocabulary skills of 112 hearing impaired children were evaluated using the Peabody Picture Vocabulary Test and Preschool Language Assessment Instrument. Moeller concluded that children who were enrolled the earliest achieved higher vocabulary and verbal reasoning scores than did their later enrolled peers (Moeller, 5-6). In addition, regardless of the degree of loss, "early-enrolled children achieved scores on these measures that approximated those of their hearing peers" (Moeller, 2000). The National Early Childhood Technical Assistance Center (Eile & Ka, 2011) supports her findings, stating that

children who received services within the first year of life are proven to develop language skills within normal limits by age 5 (Eile & Ka, 2011). Despite the degree of loss, the use of early intervention services early in life proved to remediate one of the largest areas of deficit for children who are deaf hard of hearing. Quite simply, the earlier the child is enrolled and begins receiving services, the less impact the disorder will have on development.

Much like with Down syndrome, children with a hearing loss also receive a multidisciplinary team that aims to meet the individual needs of the child and family when receiving early intervention services. According to Boys Town National Research Hospital, the multidisciplinary team for the deaf hard of hearing child is comprised of the audiologist, an infant/family specialist, speech-language therapist, and a primary care physician (Boys Town Research Hospital). The role of the audiologist in early intervention is to assess and monitor the amount of residual hearing the infant or toddler has, determine whether amplification devices are needed, fit the child for hearing aids, provide information and services regarding cochlear implants, and field parental concerns (Boys Town Research Hospital). The infant/family specialist, on the other hand, is a specially trained professional who has extensive knowledge about hearing loss including how to read an audiogram, how to fit and troubleshoot problems with hearing aids, information regarding speech-language development in children with a hearing impairment, and most importantly, how to relay and explain this information to the parents (Boys Town Research Hospital). Their primary purpose is to work with the parents to educate them on concepts related to hearing loss, their role in increasing the child's outcomes, in addition to helping facilitate the best environment for stimulating learning and growth in the young toddler (Boys Town Research Hospital). Next is the speech-language pathologist, who would more than likely have specific training in aural habilitation. The speech-language

pathologist would work one-on-one with the client on such aspects as the auditory discrimination of sounds (Ex. “p” versus “b”), lip reading, noticing when sounds start and end, and aspects of language such as building vocabulary, and the appropriate use of verb tense and possessives (Boys Town Research Hospital). The final member of the multidisciplinary team would be the child’s primary care physician. While the physician would not intervene directly with the child like the SLP or infant/family specialist, he/she would still provide key information concerning appropriate development and the in general health of the child. On a more important note, the primary physician is also the person who would sign-off any referrals (as to the audiologist) or for any early intervention services the child may need (Boys Town Research Hospital). With the help of each member of the team, the child with a hearing loss will be able to receive early and consistent intervention allowing him/her better overcome the delays and obstacles set before him, meeting the developmental milestones of age related peers, and reducing the potential for academic difficulties.

The final and last example of the affect a developmental delay may have on a child and the impact of early intervention services is concerned not with a medical disorder such as Down syndrome or hearing loss, but rather with the environmental factor of poverty. The U.S. census defines the threshold for poverty as, “the minimal income necessary to pay for food, shelter, and clothing that meet the basic needs for healthy living” (Nwokah, Hsu, & Gulker, 2013). To better illustrate what that means, according to the poverty guidelines set by the Department of Health and Human Services, a family of five that receives a yearly income at or below \$28,410 would considered to be in poverty (U.S. Department of Health and Human Services).

In regards to being eligible for services, children in poverty would fall under the “at risk” category for a developmental delay. As mentioned earlier, because these children do not have a

medical condition that would increase the likelihood of a delay, it is not covered under federal law and it is up to the state legislature to decide whether or not to provide early intervention services to these individuals. Should the states choose not to, despite consistent research identifying cognitive and behavioral deficits in children from impoverished households, children must first be diagnosed with having a developmental delay before services are administered. In other words, preventative measures to stimulate learning and growth are not allotted until the developmental delay is already present, despite the ever growing list of potential risk factors and deficits for children in poverty. To begin with, infants born to parents in poverty have a higher frequency of being premature or are of low birth weight (Brooks-Gunn & Duncan, 1997). The problem of low birth weight should not be trivialized considering that it increases the likelihood that a child will have physical, cognitive, and socio-emotional health problem in both childhood and adolescence ((Brooks-Gunn & Duncan, 1997). Moreover, a series of academic difficulties have a higher prevalence in children of low birth weight including, “serious physical disabilities, grade repetition, learning disabilities...lower levels of intelligence, and of lower math and reading achievement” in addition to being the primary risk factor in infant death (Brooks-Gunn & Duncan, 1997). Furthermore, infants and toddlers of impoverished backgrounds maintain an increased chance of being exposed to environmental toxins such as lead poisoning, a known factor in causing a myriad of health problems including developmental delays, stunted growth, hearing loss, and impaired blood production (Brooks-Gunn & Duncan, 1997). Due to limited child-parent interactions, children who live in impoverished homes are not as exposed to as many words in connected speech, books, or opportunities to explore and play with language leading to reduced vocabulary and syntax (Vinson, 2012). To further underscore the need for preventative early intervention services, data taken from the National Longitudinal Survey of

Youth (NLSY) and the Infant Health and Development Program (IHDP) reveal that children living below the poverty line are 1.3 times more likely than their non-impooverished peers to experience learning disabilities and delays (Brooks-Gunn & Duncan, 1997). In essence, these children are considered at risk for a reason. It is evident that the probability for serious delays in development and overall cognitive ability are high in infants and children who come from impooverished backgrounds. Instead of waiting for the child to experience a delay in development and stunts in learning in which he/she has already fallen behind, it would be better to recognize the risk associated with being a child born to an impooverished family by intervening early as a means to reduce the potential for cognitive deficits later in life.

In terms of administering services to at risk children, early interventionists use a variety of delivery models that are heavily dependent on both the family and the child's needs. The most common service delivery models are the center based early childhood development programs known as Head Start and Early Head Start. The goal of center based programs is to close the achievement gap between children from disadvantaged and non-disadvantaged backgrounds and to encourage school readiness upon entering formal education (Anderson et al., 2003). For the context of this paper, Early Head Start will be examined in that it serves pregnant women, infants, and toddlers and are available to the family until the age of 3, the upper limit for early intervention services (Office of Head Start). Services are provided for at least 6 hours a day and range from providing education to parents about proper pre- and postnatal care, developmental milestones and what to expect, how to provide a stimulating environment for the child, to a more structured preschool or daycare like setting in which early childhood development teachers use curriculum to guide learning and provide new experiences to the children in the classroom (Office of Head Start). Effective early childhood curriculum focuses on the development of



social/emotional, language, cognitive, fine and gross motor, and self-help skills and are taught by certified early education teachers and corresponding paraprofessional support (Katz, Ullery, Lederman, 2014). When delivering services, children may engage in small group activities such as doing art or through symbolic play as well as more specific activities designed to meet the needs of the individual toddlers (Katz, Ullery, Lederman, 2014). For example, if a child exhibited a difficulty with fine motor skills, perhaps drawing or an activity that uses buttons or snaps would be incorporated into the day's activities. Through Early Head Start, special services – PT, SLP, OT- are provided as needed (Office of Head Start). A meal and snack is also provided through the Department of Health's Free and Reduced Cost Childcare Meal Program (Katz, Ullery, Lederman, 2014). Early intervention programs like Early Head Start provide disadvantaged and at risk children with the opportunity to learn and experience new things in a safe environment. By intervening early, children in poverty are being stimulated sooner and are receiving direct instruction from professionals, providing them with the same opportunities for academic and social achievement as their non-disadvantaged peers.

### **Does Early Intervention Affect the Individual Long-Term?**

Recall that the ultimate purpose of early intervention services is to first minimize the effects of a potential developmental delay and secondly to reduce educational costs by reducing the need for special education services as children enter grade school (Goode, Diefendorf, & Colgan, 2011). That being noted, a very limited amount of research has been conducted in regards to taking that next step forward in assessing how early intervention services affect the outcomes of the individual not only as he/she progress through school, but into adulthood as well. Ideally, the services provided to infants and toddlers who have or were at risk for a developmental delay would positively affect the outcomes of these now adults in comparison to

their age-related peers who did not receive intervention services. When examining the long-term gains of early intervention programs there are two primary studies that best delineate the efficacy of early intervention services: the HighScope Perry Preschool Project, and the Carolina Abecedarian Project.

In short, the HighScope Perry Preschool Project is a longitudinal study beginning in 1962 and continuing today that assesses the effect that early intervention services have had on the outcomes of children considered to be at risk for a developmental delay and later school failure (HighScope Educational Research Foundation). From 1962-1967, 123 children ages 3 and 4 were randomly divided up into 2 groups: one that received a high quality preschool program and a control group that did not receive any preschool. Throughout their formal education, the participants were followed and data was taken periodically throughout different stages in their lives. The most recent phase of the study was conducted from 2002-2007 when the participants turned 40 years of age. 97% of the participants were still living and were interviewed at this time. Over time, additional information concerning the participant's school, social services, and arrest records were obtained. The results of the study were clear: participants who were enrolled in the preschool program, "had higher earnings, were more likely to hold a job, had committed fewer crimes, and were more likely to have graduated from high school than adults who did not have preschool" (HighScope Educational Research Foundation). Quite simply, being exposed to an educational environment earlier in life had a lasting effect on the individual who was once at risk for delays.

The Carolina Abecedarian Project yielded similar results. Initially developed by Craig T. Ramey, the Abecedarian Project aimed to assess whether or not early childhood education produced a lasting effect on both infants and toddlers who had developmental delays or who

were considered at risk for developmental delays due to poverty (Abecedarian). Much like the Perry Preschool Project, from 1972 to 1977, 111 children from Orange County, NC were randomly divided into 2 groups: one that received preschool and one that did not. Unlike the Perry Preschool Project, in this study early childhood education services were provided to children ages birth to five (The Carolina Abecedarian Project). From here, the “Abecedarian Approach” was implemented in which the areas of language development, conversational reading, enriched caregiving, and LearningGames were integrated into the curriculum and taught by qualified teachers. The LearningGames were used to create what Ramey described as a, “playful back-and-forth exchange between the adult and child” to facilitate a more relaxed yet involved style of teaching (The Carolina Abecedarian Project). Researchers monitored the child’s growth throughout the 5 years in the early education center and continued to conduct a series of follow-up studies at ages 8, 12, 15, 21, 30, and 35. At age 15, children who had received Abecedarian intervention scored higher on achievement tests in both math and reading, in addition to maintaining higher I.Q. scores than the control group (The Carolina Abecedarian Project). In addition, researchers found that the intervention group “had lower levels of grade retention and fewer placements in special education classes” than their nonintervention peers (The Carolina Abecedarian Project). Fifteen years later, both groups were interviewed again. At this point in time, the intervention group was more likely to hold a bachelor’s degree, delay parenthood, and hold a job in comparison to the control group (The Carolina Abecedarian Project).

In both studies, early intervention practices appeared to have played a definitive role in affecting the positive outcomes for youth academically and economically. Notice that both studies were longitudinal, studying participant’s behavior and the effect of early intervention

over an extended period of time in comparison to most studies who measure the efficacy of many programs at age five. By being a longitudinal study, this gives researchers a more holistic perspective on the effect on the individual's overall well-being, not just academic performance. In addition, both studies were divided randomly allowing for the direct comparison of participants in the control and intervention group. That being said, in both studies children who received the early education programs consistently received more positive outcomes than nonintervention peers. For example, in both studies participants in the intervention group were more likely to graduate from high school and to hold a job in comparison to their age-related nonintervention peers. While the goal of early intervention services may be to reduce the effects of a developmental delay on the child's academic performance, their impact reaches much farther, positively influencing aspects of the child's life educators never imagined.

## Conclusion

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### Introductory Section

It is clear that early intervention services have a positive impact on children who have or are at risk for a developmental delay. Throughout this essay, it has been proven not only that early intervention services are needed early in life at a time in which the infant and toddler is experiencing dynamic change, but also that through consistent, individualized instruction intended to address the child's areas of deficits, that he/she can essentially overcome the negative effects the delay initially posed. Based on the information presented, it is now apparent that early intervention services are not only needed but also have a powerful impact on the lives of the individual receiving those services.

## Summary of findings

It was initially discovered that ages birth to three is a critical time for development characterized by a series of developmental milestones that parents as well as medical and educational professionals use to assess the developmental growth of the child. Neurologically, the infant experiences a period of extensive synapse and dendrite growth followed by a period of pruning. This period of growth and pruning is heavily dependent upon the experiences of the child in which every new experience creates a new neural connection that will not be pruned. It is a general goal of early interventionist to provide a stimulating environment to children in which they are motivated to explore and experience new things to enhance neurological development. In regards to speech and language, children progress from extremely reflexive communication such as crying to relay wants and needs to formulating two word utterances and maintaining a rudimentary understanding of semantic and syntactic rules. In terms of fine and gross motor skills, children develop in head-down and center out progression, first maintaining control of the head and neck and working down and out to the extremities of the arms and legs. In regards to early intervention, each of these areas would be specifically assessed and targeted, depending on the child's deficits and needs. Intervention is imperative in this stage of development because the skills learned here provide the foundation for all other learning.

When determining one's eligibility for services, infants and toddlers birth to age three who have or are at risk for a developmental delay due to a medical disorder are qualified to receive services. A separate category exists for children who are considered to be at risk due to environmental or parent/caregiver circumstances. An analysis of three different situations in which a child would be eligible for services was then conducted. For each situation, the impact of the developmental delay and the specific services that would be administered to meet the individual needs of the child were assessed. In each situation, the services would impact the child

in a positive manner through directly targeting his/her areas of deficit and preventing the persistence of the delay through remediating early.

Finally, it was discovered that early intervention does have a long-term positive effect on the outcome of children who receive services. Two longitudinal studies – the HighScope Perry Preschool Project and the Carolina Abecedarian Project- were examined. Both studies followed the participants from the age that he/she was enrolled in the research study to currently. From the data obtained thus far, it is apparent that over time the intervention group consistently had better outcomes such as increased income and likelihood to graduate high school during adulthood in comparison to the delayed or at risk children who did not receive early intervention preschool services.

## **Closing**

When considering policy change in regards to these state and federally funded programs, this knowledge is imperative in order to make a well-rounded decision. Too often the concern is placed on the monetary value of the child, while the importance and efficacy of the services delivered are forgotten and fall by the wayside. While early intervention services have been proven to be effective, when evaluating early educational practices, politicians and educators alike should take this information into consideration and acknowledge the importance of these services to the individuals affected by a developmental delay. With this information in mind, the appropriate changes can be made to legislation and educational practices alike to better target needs of the children affected and to produce even better outcomes than ever before.

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