AN EXAMINATION OF AGE AND ENVIRONMENTAL FACTORS THAT RELATE TO CHILDREN'S READINESS TO READ

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Abstract

The current national emphasis on early standardized testing places undue pressure on young children starting school since not all five year olds are ready for the rigors of an increasingly academic kindergarten curriculum. Typically a child must be chronologically five or close to five to begin kindergarten, and schools are designed to structure learning according to chronological age rather than taking into account the child's unique developmental needs. This emphasis on age leads to concerns about the efforts to teach children to learn to read before they may be developmentally ready.

This mixed method study examined age and environmental factors that relate to reading with 83 four to six-year-old children. The relationship between developmental age via the Gesell Developmental Observation-Revised and readiness to read via Marie's Clay observational tool, Concepts About Print (CAP), were explored. In addition, parents/guardian's responses to the Gesell Parent/Guardian Questionnaire were reviewed in order to analyze environmental factors. The purpose of the study was to highlight the need for better alignment of educational policies and practices as they relate to child development and to promote more effective synthesis between neuroscience discoveries about how children learn and what is known about child developmental ages and stages.

The findings revealed a statistically significant relationship between a child's developmental age and readiness to read as measured by the CAP. The descriptive statistics revealed that the developmental age of the children in this study was younger than their chronological age. Furthermore, a child's developmental age was found to be the strongest predictor of readiness to read.

Dedication

I dedicate this dissertation to the kindergarten students with whom I have worked over the past 18 years since it was my observations of their approaches to reading that inspired this study. Working with these students has provided me with a better understanding of how children learn to read, and has given me many insights about pedagogy, the art of teaching children. I am truly indebted to them.

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Table of Contents

List of Tables

List of Figures

Chapter One: Introduction

Overview

There are currently several national reform efforts underway all focused on how to best improve K-12 education in the 21st century: Race to the Top, Common Core State Standard Initiative, and the reauthorization of No Child Left Behind (Kauerz, 2010). Concurrently, the latest research on the brain and child development support how a child's early experiences and interactions contribute to the architecture of the brain and determine the foundation for all future learning, health, and behaviors (Center on the Developing Child at Harvard University, 2011; Heckman, 2008; Melhuish, Belsky, Leyland, & Barnes, 2008). As well, findings from the *Early Childhood Longitudinal Study – Kindergarten (ECLS-K) Class of 2011-12* (Mulligan, Hastedt, & McCarroll, 2012) showed children enter kindergarten with more knowledge and skills than previously thought, with some being farther ahead than others. Furthermore, the first reporting of the original study from 1998 found that achievement gaps between disadvantaged and more advantaged children identified at the beginning of school grew wider over the first four years of school attendance (West, Denton, & Reaney, 2000).

According to the National Center for Education Statistics (2004), kindergarten is considered to be the traditional beginning year of the American public school system. Kindergarten is an important year as kindergarteners are expected to integrate their cognitive, social, emotional, language, and physical competencies to meet the demands of a structured educational experience (Pianta, Cox, & Snow, 2007). Entrance into kindergarten is based on a child's chronological age, yet there are wide discrepancies in the chronological ages of children in the same class. Most current state policies in the

United States define school readiness as a predetermined date by which a child must reach the age of five (Education Commission of the States, 2005). However, since states vary in cut-off dates from August 1 through January 1, there is the possibility of having chronological ages ranging from four to six years old across kindergarten classes in the United States.

Typically a child must be chronologically five or close to five to begin kindergarten. However, not all five- year olds may be developmentally ready for the rigors of an increasingly academic and demanding kindergarten curriculum (Almon & Miller, 2009; Ilg, Ames & Baker, 1981). A child may have an above average knowledge base, but to be successful in school, especially in the early years, a child also needs to be ready physically, socially and emotionally, and must also exhibit adaptive behaviors that will support school success (Ames, 1978; Comer, 2004; Pianta, Cox & Snow, 2007; Wood, 2007). In addition to cognitive development, language, motor, and social development and the proficiency of self-help skills are essential to school readiness (Shonkoff & Phillips, 2000; Shore, 2003).

Readiness for kindergarten has been a parental concern often voiced to kindergarten teachers (Lincove & Painter, 2006; Ilg & Ames, 1972). Based on child developmental theories (Elkind, 1994; Erikson, 1963; Gesell et al., 1940; Montessori, 1964; Piaget & Inhelder, 1969), having reached a fifth or sixth birthday does not necessarily guarantee any given level of development. Children develop at their own rates yet go through the same predictable stages of growth. These theories of child development and learning have influenced discussions of school readiness, and have had a profound impact on kindergarten instructional practices.

The debate about school readiness has taken on a new meaning with the accountability movement as the shift has moved away from the individual child to test scores. The last twenty years in the United States have been referred to as the "Era of Accountability" (Pianta, Cox, & Snow, 2007) that started with the No Child Left Behind Act passed by Congress. A goal of the No Child Left Behind (NCLB) Act of 2001 is to have all children reach 100% proficiency in reading and math by the year 2014. Under NCLB legislation, each state is required to establish a timeline for Adequate Yearly Progress (AYP), and all of its students are expected to meet or exceed state standards on three measures: reading, mathematics, and attendance (at the elementary school level). Sanctions are applied to schools that fail to make AYP (NCLB, 2001).

The language included in NCLB focuses on accountability as determined by high-stakes testing, thereby setting expectations that undermine what research shows about child development (Meisels, 2006). Such high national expectations lead to the question of whether all children are starting school on an equal level and ready to receive the same instruction (Comer, 2004; Pianta, Cox, & Snow, 2007). Consequently, an environment has been created where children are expected to adapt to the curriculum, rather than the curriculum adapting to the developing needs of the child (Almon & Miller, 2009).

Need for Study

Early child development is multi-faceted and includes the domains of cognitive, motor and physical, language and literacy, social and emotional, and approach to learning (National Association for the Education of Children (NAEYC), 2009). NCLB, like most policies created for children, has the best of intent, but fails to take into consideration that children develop at their own rates yet go through the same predictable stages of growth.

The NCLB legislation was enacted for the purpose of holding schools accountable for their students' academic progress and eliminating achievement gaps. Successful student achievement is currently tied to reading and mathematical test scores. However, reaching a fifth or sixth birthday does not guarantee a particular level of development since some children may not reach proficiency based on their own developmental continuum. Furthermore, there is a lack of empirical research that has utilized a developmentally appropriate instrument as a way to monitor a child's developmental stage in conjunction with his readiness to read (Almon & Miller, 2009; Justice, Invernizzi, Geller, Sullivan, & Welsch, 2005; Meisels, 2006; Snow & Oh, 2011). Nevertheless, under NCLB high stakes testing, all students are required to reach proficient levels in math and reading, regardless of their developmental stages and ages.

School readiness questions cannot be answered easily despite policymakers' emphasis on accountability and information on how children are doing in school (Meisels, 2006). Readiness for school also implies readiness to learn to read (Fountas & Pinnell, 2011; Strickland & Morrow, 1989). Nonetheless, some children may or may not be ready to receive literacy instruction. Literacy is not an all or nothing, black or white phenomenon when children start school (Burns, Griffin, & Snow, 1999; Lonigan, 2006); rather, it is an ongoing process that develops early in the language acquisition of a child (Neuman & Dickinson, 2011).

In her early research with the week-by-week progress of children during their first year of school, Marie Clay (2001) believed that early reading must be looked at from a developmental perspective. Clay (2001) underlined the importance for educators to be alert to how active learners change over time within their given context. Clay (2001)

found that the acquisition of reading, a concept she coined as "emergent reading," is a journey, and that the responsibility of the educator is to meet each child at his level and take his learning from that point. The focus of emergent literacy is on learning, rather than on teaching, and on the child as an active learner. The role of the educator is to facilitate and extend child-initiated learning to meet the complex developmental level of that child (Vygotsky, 1978).

Such an emphasis on the developmental stages of children was the focus of Gesell's work at the Yale Child Study Center in the 1920s (Dalton, 2005). His findings, which were based on observations and documentation of child behavior and originally intended for the medical arena, led him to develop a standard of norms that described the sequential and predictable patterns of growth and development. One of Gesell's findings was that not only do children go through distinct stages with predictable patterns, but also that they do it in their own unique way. Each child has his own developmental age. So while a child might be at the chronological age of five, he may very well be functioning at a younger or older developmental age.

Gesell and his colleagues (Gesell, Ilg, & Ames, 1977) noted that not only were there cut-off dates for kindergarten entrance, but most schools had taken on the concept of readiness that implied a child's chronological age of five guaranteed five-year-old behavior. As a result, an instrument was designed for the purpose of identifying kindergarten readiness (Ames, 1989). The instrument, the Gesell School Readiness Screening Test, was based on Gesell's pioneering research on infant and child development at the Yale Child Institute (Gesell Institute of Human Development, 1999).

In 2011, the Gesell Institute updated and published this same instrument, now known as the Gesell Developmental Observation Revised (GDO-R). This assessment uses specific tasks to determine a child's current Developmental Age (DA), which may differ from the child's chronological age. Separate from I.Q. and academic skills, it measures the child's physical/neurological growth, social, and emotional maturity, cognitive maturity, language skills, and most importantly adaptive development – how a child uses knowledge in action (Gesell et al., 1940). Thus, the GDO-R is useful for understanding the whole child, particularly in relation to appropriate early education.

Interestingly, emergent literacy also looks to the continuum of literacy skills development unique to each child. Correspondingly, there is an entire field of child development that also recognizes a continuum in the individual development of children that includes physical, motor, social, emotional, adaptive, and cognitive as well as language domains. An understanding of the differences in children's developmental growth reinforces the importance of designing early instruction on a broad set of literacy experiences (Paris, 2011).

Statement of the Problem

There is a disparity between what is acknowledged as appropriate child developmental practices and the actual policies and programs that exist. Learning differs markedly from child to child, yet current educational practices often require the child to be ready for school based on his chronological age (High/Scope, 2004). There is not a one size fits all solution, and educators are faced with a common dilemma: a group of students with a variety of experiences, learning styles, and developmental levels.

In addition to a child's chronological age, which is a fact of nature, consideration must also be given to the child's environment, which is a product of nurture. Nearly all children learn to speak at home, but not all children learn to read at home. As aforementioned, readiness for kindergarten is already a concern. Not only is there a question about a child's readiness for school, there is another bigger question as to the child's readiness to read. Literacy has become so crucial in today's technological world that slow rates in progress in beginning to read will ultimately affect the child's achievement. Yet there is a lack of empirical research that has explored the relationship between a child's readiness to read and his developmental stage. The purpose of this study was to investigate if there was a connection between a child's developmental age and reading readiness. Another aspect of this study was to examine children's developmental ages vis-à-vis their early literacy skills using the Gesell Developmental Observation-Revised (GDO-R) and Concepts About Print (CAP) as defined by Marie Clay (2006) with the intent of identifying additional means to assist and guide parents and teachers in making curricular decisions for their children from prekindergarten to second grade. Knowledge about a child's developmental age and readiness for the formal instruction of reading can eradicate the assumption of the child as a deficit (NAEYC, 2009). Instead, if parents and teachers understand and meet the child where he is on his own unique continuum (e.g., developmental age and emergent literacy skills), student growth and success would be maximized and the mystery to the achievement gap might be unlocked.

Definitions of Terms

For the purpose of this study, the following operational definitions were used.

Chronological age- the physical birth date of a child at a given time. It is the time elapsed after birth and is measured in days, weeks, months, and/or years (American Academy of Pediatrics, 2004).

Concepts About Print (CAP)- the administration of the Concepts About Print (CAP), one of six literacy tasks of the Observation Survey of Early Literacy Achievement used to determine what a child knows about the way language is printed and shows implications for later reading achievement (Clay, 2006).

Developmental age- an age at which a child is functioning as a whole: a summary of neurological, social emotional, and cognitive growth changes unique to each child; this may or may not be the same as his chronological age (Gesell Institute of Human Development, 2006).

Emergent literacy- refers to the knowledge, skills, and attitudes a child has in relation to reading and writing prior to the onset of conventional reading and writing (Teale & Sulzby, 1986; 1989) and describes the child's process of becoming literate (Clay, 2001).

Gesell Developmental Observation-Revised- the instrument utilized by a trained Gesell Examiner to determine developmental age of four to seven year olds. The GDO-R has developmental components, letter/numbers, language/comprehension, visual/spatial discrimination, and social behavior (Gesell Institute of Child Development, 2012).

Environmental factors- external factors that are important in promoting a child's early

literacy: 1) access to print and books; 2) adult demonstrations of literary behaviors; 3) supportive adults; and 4) storybook reading (Lonigan, Burgress, & Anthony, 2000).

Observation Survey of Early Literacy Skills Achievement/Assessment- a criterion-referenced test for use with children ages 3 years, 0 months through 5 years, 11 months (Clay, 2006).

No Child Left Behind (NCLB)- the federal reauthorization of the Elementary and Secondary Act of 1965, enacted for the purpose of holding schools accountable for their students' academic progress and eliminating achievement gaps among student subgroups (Harriman, 2005).

Reading readiness- the reading continuum of stages a child goes through before he can recognize unfamiliar words accurately and read sentences easily and fluently (Burns, Griffin, & Snow, 1999). Reading readiness implies that children become ready for formal reading based on maturity (Clay, 2001).

School readiness- a condition that involves more than just the child as it includes families, early environments, schools, and communities to ensure children have successful school experiences (Pianta, Cox, & Snow, 2007). School readiness also incorporates the multiple dimensions of child development (Comer, 2004; NAEYC, 2009).

Theoretical Perspective/Framework- child developmental theories support evidence that children develop at individual rates and go through various stages of development (Crain, 2011).

Limitations

This study was limited to students in four national preschool sites that already utilized the Gesell Developmental assessment (GDO-R). As well, this population included only children who were currently enrolled in preschool programs that may potentially have had a significant impact on their literacy development. The researcher administered the CAP assessment, which has a potential limitation. It is important to disclose that the researcher has affiliation with the Gesell Institute as she has been trained in the administration of the GDO-R. To prevent bias, a mixed method research design was utilized to present the data. Time constraints limited the subsequent school achievement and may not have reflected a complete picture of how these students might do in future school years. The study was also limited by the willingness of parents to participate. Due to the limited scope of this study and the features unique to the participating schools, the results of this study cannot be generalized across or between other schools and districts.

Research Questions and Hypotheses

Current curricular practice focuses on teaching the child to read at a proficient level; however, these practices fail to determine if the child is developmentally ready to read. Student success might be improved if the developmental factors in the home, teaching, and learning environments were better understood and aligned with educational policies. The following research questions guided this study and its corresponding hypotheses were tested:

1. How does the child's chronological age versus developmental age as measured by the Gesell Developmental Observation-Revised (GDO-R) relate to the child's readiness to read as measured by Concepts About Print (CAP)?

   $H_0$1: There is no statistically significant relationship between a child's chronological age versus developmental age and the child's readiness to read.

2. How does the overall score on the GDO-R Copy Forms predict the child's readiness to read via the total score on the CAP? Specifically, does the divided rectangle predict the child's readiness to read via the total score on the CAP?

   $H_0$2a: The overall score on the GDO-R Copy Forms does not predict the child's readiness to read via the total score on the CAP.

   $H_0$2b: The score on the divided rectangle GDO-R Copy Forms does not predict the child's readiness to read via the total score on the CAP.

3. How do environmental factors as reported by parents and/or guardians relate to the child's developmental age (via GDO-R) and his readiness to read (CAP)?

   $H_0$3: There is no statistically significant relationship between the environmental factors as reported by parents and/or guardians and the child's developmental age (via GDO-R) and his readiness to read (CAP).

4. What factors singly, or in combination, account for a child's readiness to read (CAP)?

   $H_0$4: There are no statistically significant factors that predict a child's readiness to read.

Summary

While children begin to walk and talk only when they are ready, they are expected to learn to read at a required grade. As previously stated, the mere fact of having reached a fifth or sixth birthday does not guarantee any given level of development. Policy makers need to pay greater attention to the theoretical body of knowledge regarding child development (NAEYC, 2009). Theory and research must inform and guide social and educational policy. Not only can this information be used to streamline and strengthen early childhood policies and practices, but it also can be utilized to establish national standards based on developmental theory and research. Early childhood programs must balance the focus on literacy and cognitive skills with attention to the physical, social, and emotional development of children (Shonkoff & Bales, 2011).

The study specifically focused on determining if there was a relationship between a child's chronological age, his developmental age, and his early reading ability. It also examined if there were factors, singly or in combination, which significantly impacted the child's emergent literacy.

Chapter Two: Literature Review

Introduction

This chapter explores the literature relevant to understanding the body of research on child development and emergent literacy. As noted earlier, government policies and practices impact the educational decisions about when children start school and influence their early educational experiences (Shonkoff & Bales, 2011; Center on the Developing Child at Harvard University, 2007; Education Commission of the States, 2005). The first part of this chapter reveals the importance of early reading to children's later academic achievement. This is followed by an overview of past and more current child developmental theories and brain development research that describe the continuum on which children learn and grow. Next, this chapter explores the literature on emergent literacy development that is relevant to understanding the aspects and continuum on how children learn to read. It will also identify the specific emergent skills that predict later reading achievement. Finally, an overview and description of two observational instruments will be provided: the Concepts About Print (CAP) and the Gesell Developmental Observation -Revised (GDO-R). The CAP is an instrument that reveals what children know about reading before they learn to read and is one group of reading behaviors which supports reading acquisition (Clay, 2001; Fountas & Pinnell, 1996). The GDO-R is a multi-dimensional assessment that involves direct observation about a child's growth in cognitive, motor, social, and emotional domains and indicates where a child is in his own stage of development. This literature review is intended to familiarize the reader with the basic assumptions underlying the design of this study and the interpretation of the results.

Early Reading and Later Academic Achievement

Evidence from the Early Childhood Longitudinal Study-Kindergarten (Claessens, Duncan, & Engel, 2008) clearly showed that children in the United States enter kindergarten with disparate entry-level mathematical and reading skills. This study suggested that the most powerful way to boost fifth-grade achievement was to improve the strongest predictors of later learning, which were numeracy and emergent literacy skills, and basic academic skills of low-achieving children prior to kindergarten entry. Duncan et al. (2007) analyzed school readiness among six longitudinal data sets of children from the United States, Great Britain, and Canada, and found the strongest predictors of later achievement in school were entry-level reading skills as well as math skills and attention skills. Based on these findings, Duncan et al. recommended examining students' early skills prior to school entrance as they have important implications for early education programs.

The problems children experience in learning to read during the elementary years and beyond are related to the preliteracy skills they bring with them from preschool and kindergarten (Claessens, Duncan & Engels, 2008; de Witt, 2009; Lonigan, Farver, Phillips, & Clancy-Menchetti, 2009). Lonigan et al. (2009) referred to these preliteracy skills as "emergent literacy skills," which include the areas of phonological awareness, alphabet knowledge, and print concepts. Research indicates that a child's reading success can be predicted from these early literacy skills (Lonigan, 2006; Plaza & Cohen, 2006).

Several studies (Cabell, Justice, Konold, & McGinty, 2011; Spira, Bracken, & Fischel, 2005; Welsh, et al., 2010) exploring the patterns of prekindergarten children who were identified as at-risk for later academic difficulties found emergent literacy skills to

be unique predictors of kindergarten math and reading achievement. Other studies focusing on the effectiveness of early intervention also supported the importance of these skills for helping struggling readers and English Language Learners as well as preventing reading disabilities (Betts et al., 2008; Farver, Lonigan, & Eppe, 2009; Justice, Kaderavek, Fan, Sofka, & Hunt, 2009; Young, 2009).

International studies (National Inquiry into the Teaching of Literacy, 2005; Lei et al., 2011; Niergard-Nilssen, 2006; Plaza & Cohen, 2006) also supported the importance of emergent literacy skills as predictors of later reading outcomes. A six-year longitudinal study in China (Lei et al., 2011) found that early literacy skills were essential in the early prediction of later reading difficulties in Chinese children. In a Norwegian longitudinal case study of children with developmental dyslexia, Niergard-Nilssen (2006) examined preschool cognitive and linguistic profiles with emergent literacy skills. The author found that delayed development in emergent literacy turned out to be the most prognostic indicator of later low reading achievement.

The development of early literacy, social, and emotional domains and brain growth are significant in young children before formal entry into school (Massetti, 2009; Neuman & Dickinson, 2011). There is a reported association between young children's language development and later success, social as well as academic, in school (Hay et al., 2007; Senechal, 2006). In addition, there is a growing recognition that appropriate early language and learning experiences have a positive influence upon preschoolers' cognitive and social development by helping to reduce low academic achievement (DeBaryshe & Gorecki, 2007; Elias et al., 2006; Elliot & Olliff, 2008; Paul, 2007). The relationship between early literacy skills in the primary grades and later reading achievement has

received much attention; however, measures and procedures to screen and monitor proficiency in the area of early literacy are less well researched (Justice et al., 2005; Marston et al., 2007).

Child Development

Early theories.

The formal study of children is a relatively recent field (Aries, 1973). During the late 19th century, human psychology emerged as its own field of study, breaking away from the philosophical perspective. This new field relied much more on a scientific framework that includes direct observation and experimentation. Many of these early human psychologists were trained in the natural sciences such as biology and medicine. This is especially true of the earliest theorists of child development such as Charles Darwin, G. Stanley Hall, and Sigmund Freud (Crain, 2011).

There are different, albeit overlapping, perspectives about how children grow and proceed in their stages of development. One line of theorists, the developmentalists, dates back to Rousseau (Crain, 2011). The developmentalists are less impressed at the efforts to teach or influence children; instead, they are more interested in how children learn and grow on their own. Their focus is to watch and make observations as children reach a certain stage of development. These stages of development are founded on the premise that children have an inner need to seek out certain kinds of experiences and pursuits at certain times in their life. Some of the more prominent developmentalists, namely Piaget, Montessori, and Gesell, have studied different aspects of child development and may not agree on every point. However, their overall concerns have been practical as well as theoretical.

Piaget's theory of intellectual development had its early roots in his child intelligence studies with the Binet Laboratory in Paris (Piaget & Inhelder, 1969). While developing a standardized intelligence test for children (which focused on the correct answers that a child can produce), Piaget became fascinated with the child's incorrect answers. Upon further investigation, Piaget discovered that these wrong answers were consistently occurring with children of the same age groups. Piaget concluded that these younger children were not less intelligent than their older peers, but rather that children of younger ages thought qualitatively differently than older children (Ginsberg & Opper, 1988). This framework viewed child development as a continuum going from concrete forms to abstract forms in a child's cognitive growth, and proved that children think differently than adults. Children are not blank slates, as information is not etched into their minds from the environment (Elkind, 1994). Children are always relearning and unlearning while acquiring new information (Piaget & Inhelder, 1969). Piaget observed how children actively constructed their own cognitive worlds, a theory now known as the constructivist view of perception (Crain, 2011).

While Piaget focused on intellectual development, Montessori (1964) dedicated herself to the actual teaching of children. She was a physician in Italy who became interested in using alternate approaches to teaching mentally retarded children. Based on her success with this population, she was given an opportunity to teach at-risk children in the slums of Rome, and these methods proved to be effective. This successful approach was recorded and published in a book by Montessori in 1909, *Scientific Pedagogy as Applied to Child Education.*

Scientific pedagogy focused first on the observations of children using hands-on, didactic materials that allowed the children to use their senses in a learning environment. In her work with the mentally retarded, Montessori (1964) found that these children were teachable if the right hands-on materials were used: "First the education of the senses, then the education of the intellect; Looking becomes reading, touching becomes writing" (p.266). She utilized an approach that allowed physical movement and objects that stimulated children's senses. As this new approach worked, she explored more difficult areas of reading and writing in the same way. She found that normal children at earlier ages also were more successful in learning with this approach. This pedagogical method took into consideration the whole arena of child growth: physical, mental, social, emotional, and spiritual. Sensory and motor training in her didactic materials guided children in learning basic symbolic skills, counting, reading, and writing before five years of age. Today this hands-on approach and use of manipulative materials is the foundation for developmentally appropriate practices in early childhood learning (National Association of the Education for Young Children (NAEYC), 2009).

Another observer of children was Arnold Gesell. Gesell had spent the earlier part of his career on observational research on infant development, which he later expanded it to older children. With his photographic dome at Yale University, Gesell (1925) used the method of focused observation to systematically observe children's behavior without disturbing them. This direct study of children led Gesell to chart and develop norms that describe characteristics of children at certain ages (Gesell et al., 1940), which gave developmental psychology of the 1920s and 1930s its normative character (Ames, 1989).

Gesell's observations also revealed that two major forces influenced child growth and development: (a) a child was a product of his environment and (b) a child's development was directed from within, a genetic blueprint called maturation (Gesell, Ilg, & Ames, 1977). The significant finding about maturational development was that it always unfolded in fixed sequences. This sequential development begins embryonically and continues after birth. As babies grow (sit up, walk, run), these capacities develop in a specific order with growth of the nervous system –all directed by genes (Gesell et al., 1940). Children, inevitably, vary in their rates of development as they all do not stand, walk, and talk at the same time. However, all children go through the same sequences in growth, but at their own individual pace, which is based on the maturation of their nervous systems. Although the other developmentalists may differ with Gesell's theory, they all purported that the process of child development is continuous and ongoing as well as unique to that child.

Brain development.

Recent breakthroughs in the field of neuroscience about brain development in infants have further increased understanding of child development (Howard-Jones, 2009; Medina, 2008). The ability of the brain to change with new learning is known as plasticity. Brain plasticity is the lifelong ability of the brain to recognize neural pathways based on new experiences. The environment plays a key role in influencing plasticity. As a result, this new knowledge has put an end to the nature or nurture debate as it has made it simplistic and obsolete (Shonkoff & Phillips, 2000). Neuroscientists had previously assumed that by the time babies are born, their brain structure was genetically

determined; what they did not acknowledge was how early experiences help to shape the architecture of the brain (Shore, 2003).

Although every baby is born with approximately 100 billion brain cells called neurons, the human brain is still in an unfinished state, as most of these 100 billion neurons are not connected into networks (Shore, 2003). Every neuron has an axon, which is an output fiber that sends impulses to other neurons (Howard-Jones, 2009). The network of the brain is described as wiring in circuitry as it depends on rapid, efficient passages of signals from one part of the brain to another (Medina, 2008). Each neuron also has many dendrites, short, hair-like input fibers that receive impulses from other neurons. Dendrites branch out forming dendrite trees that can receive signals from many other neurons. As a child grows, the number of neurons remains relatively the same, yet neurons are designed to form connections in the brain in response to experiences (Shonkoff & Phillips, 2000). When the axon and dendrites meet, they form synapses.

Synapse formations become the building blocks of the brain's architecture (Fox, Nelson, & Levitt, 2010). As the neurons mature, more and more synapses are made. At birth, the number of synapses per neuron is 2,500, but by age two or three, it is about 15,000 per neuron. Fox et al. (2010) described this as getting "under the skin" and purported that early life experiences powerfully impact both the brain architecture and behavioral development. Early stimulation sets the stage for how children will learn and interact with others throughout life. There is a complex interplay between nature and nurture as how the child develops is based not only on the genes he is born with but the experiences he has (Bruer, 2001).

Furthermore, in early cognitive development, there are sensitive and critical periods in children's lives when specific types of learning take place (Fox et al., 2010). Sensitive periods are defined as the time in development when the brain is especially responsive to experiences; critical periods are the absence of an experience. The efficient brain, in synaptic pruning, eliminates connections (synapses) that are seldom or never used. Thus, there is a "use it or lose it" phenomenon in the brain (Bruer, 2001; Fox et al., 2010).

Early brain development is centered around the formation and reinforcement of neural connections that are made through a child's environmental interactions with parents, relatives, and caretakers. Consequently, scientists (Bruer, 2001; Werker & Tees, 2005) purport that language is acquired most easily during the first ten years of life. During these years, children's brains become wired to recognize the sounds in their language. An infant's repeated exposure to words clearly helps his brain build the neural connections that will enable him to learn more words later on. If a child receives little stimulation early on, the synapses will not develop, and the brain will make fewer connections. While brain development continues through life, that which occurs in early childhood lays the foundation for future learning.

Literacy Development

The brain and learning to read.

Current neuroimaging research (Dehaene, 2009; Schlaggar & Church, 2009; Wolf, 2007) has been shedding light on the demands made on the brain by learning to read as well as the reading brain's dynamic nature. Wolf (2007) described the reading brain as "a neuronally and intellectual circuitous act, enriched as much by the

unpredictable indirections of a reader's inferences and thoughts, as by the direct message to the eye from the text" (p.16). The most recent methods of neural imaging that have identified brain areas associated with proficient reading have included behavioral methods (reaction times, eye movements, accuracy), electrophysiological methods, magnetoencephalography methods, and functional neuroimaging methods such as positron emission tomography (PET) and functional magnetic resonance imaging (fMRI). Functional brain-imaging studies have mapped the neural circuitry for reading, converging on three left-hemisphere neural systems (Price & Mechelli, 2005; Shaywitz & Shaywitz, 2005) and have shown that in the early stages of reading, the neural structures for spoken language are notably active (Goswani, 2008).

Neuroimages of child and adult skilled readers performing the same reading related task revealed similar but nonidentical patterns of regional reading brain activity (Cohen & Dehaene, 2004; Froyen, Bonte, Van Atteveldt, & Blomert (2008); Schlaggar & McCandliss, 2007). When comparing both adults and school-age children performing reading tasks, many brain regions are called upon uniformly across development; however, some regions show an increase in activity while other regions show a decrease in activity. The child's brain functioned significantly different than the adult brain. Children activated some neural regions that adults did not or activated regions less than adults. Conversely, adults activated some neural regions that children did not. Thus, the reading brain of a child differs from that of an adult.

Brain research is also revealing some compelling information about when a young child is ready to read (Dehaene, 2009). Reading is the result of the brain's ability to connect and integrate sources of information in the environment as the child begins to

name letters and recognize environmental text and other sources of writing (Wolf, 2007). This integration depends on the maturation and the speed with which these neural regions connect (Wolf, 2007). That speed depends on myelination of the neuron's axon.

Myelin is a conductive material, a fatty sheathing, which wraps around the axons. The speed of a neuron's charge is directly related to the amount of myelin that sheathes an axon. Myelin growth follows a developmental schedule, and for most children myelination is not fully developed until five to seven years (Geschwind, 1965). Cross-linguistic studies found that children across three different European languages who were asked to read by age five did less well than children who began at seven (Goswani, 2005). The conclusion from this research is that efforts to teach a child to read before five years of age may not only be too soon, but also potentially counterproductive for many children.

Research shows that the brain's flexible and dynamic nature plays a major role in learning to read (Schlaggar & McCandliss, 2007). Reading can be learned only because the brain's architecture is versatile enough to change when accommodating new demands on it (Cohen & Dehaene, 2004; Wolf, 2007). In neural imaging of readers, it was discovered that skilled reading is achieved through many fundamental and interrelated types of cognitive skills (Schlaggar & Church, 2009). These cognitive skills manifest as phonological awareness, orthographic awareness, and graphotactic awareness. Functional neuroimaging is providing insights into the achievement gaps in reading skills and indicating how cognitive, social, and neurological influences on reading development are interconnected. Brain imaging has provided insights into these neurobiological bases of learning to read, and is being used to understand the neural bases of individual

differences in children's early literacy acquisition (Shaywitz, Mody, & Shaywitz, 2006) and better assess when children are ready to read (Goswani, 2005; Wolf, 2007).

Emergent Literacy Development

There is growing recognition of early reading development as a predictor of later school success and a factor in the widening achievement gap (National Inquiry into the Teaching of Literacy, 2005; Lonigan, Allan, & Learner, 2011; Jacobsen-Chernoff, Flanagan, McPhee, & Park, 2007). There are age appropriate developmental antecedents underlying the continuum of reading that are found early and prior to the onset of school (Lonigan et al., 2009). Many children enter kindergarten with well-developed print knowledge, phonological knowledge, and oral language; whereas, a significant number of children arrive in kindergarten with a low level of these early skills. These skills are often referred to as "emergent literacy skills," which Whitehurst and Lonigan (1998) defined as "the developmental precursors to conventional forms of reading and writing" (p.849).

The term "emergent literacy" was coined by Clay (1966) to describe the developmental reading behaviors she observed in young children in New Zealand. The concept of emergent literacy evolved during the 1960s through the 1980s as the result of new information on how young children develop an understanding of reading and writing (Morrow, 2011). Emergent literacy may be described as the process of learning about the environment that leads to the development of meaning and concepts, including concepts about the functions of reading and writing. Koenig (1992) stated that emergent literacy "is characterized by the early development of understanding that abstract symbols have meaning and that people use these symbols for the communication of ideas" (p. 279).

Teale and Sulzby (1986) in their classic review of the research on emergent literacy found five characteristics of young children as literacy learners. The first characteristic recognizes that almost all children in a literate society are learning to read and write early in their lives. It is difficult to pinpoint the exact time when this literacy learning begins. As children come into contact with print, a lifelong process of learning to read and write commences. Earlier studies (Goodman, 1986; Whitehurst & Lonigan, 1998) have revealed that by age two or three, many children can identify environmental print such as logos, signs, and labels.

A second feature is that literacy is functional and an integral part of a child's learning process. Observational studies (Taylor & Dorsey-Gaines, 1988) supported that a large portion of literacy experienced by children shows language as functional rather than isolated abstract skills to be learned. For example, a child might see adults reading newspapers, using the computer, or writing checks or a greeting card. Thus, literacy develops in real life settings where reading and writing are used to accomplish tasks (Cunningham, 2010).

The third characteristic is a very important one as it demonstrates how oral language, reading, and writing develop concurrently and interrelatedly (Teale & Sulzby, 1989). Just as a child's oral language proficiency facilitates literacy learning, his reading ability influences his writing and vice versa. In other words, what a child thinks, a child can say; what a child says, a child can write; what a child writes, a child can read.

A fourth dimension of children in emergent literacy indicates strongly how children learn through active engagement. In reading of favorite stories, children construct their understanding of how written language works by "memorizing" the story

using their own words as they "read" the book. Developmental spellings are another window into how children attempt to construct knowledge of print (Chan, Juan, & Foon, 2008). "I H a B D" (I have a big dog) is evidence of this as the child is hearing the sounds in the words and reproducing the beginning letters (Clay, 2006). The emergent literacy learner is changing over time in his understandings and use of strategies; this is a developmental process.

The last feature is now known as the family literacy theory (Taylor, 1983; Wasik, 2004) and it refers to the times that parents and children interact together around print. Bruner (1983) used the term "scaffolding" as adults paved the way to a child's independence in reading and writing. Teale and Sulzby (1989) asserted that this one was the most significant of the five characteristics. According to Wolf (2007), learning to read begins the first time an infant is held and a story is read aloud to him.

Unlike the maturational theory of Gesell or stage model theory of Piaget, emergent literacy posits that literacy development begins at birth and that the home environment plays a major role in the child's literary abilities (Clay, 2001). It seeks to explain how literacy develops and what interaction is needed during the developmental continuum of the reading process. Emergent literacy is a developmental continuum revealing where a child is in his attempts to learn to read and write (Lonigan, Burgess, & Anthony, 2000; Strickland & Morrow, 1989). This literacy, like child development, is ongoing and not fixed, that occurs when a child starts school (Burns, Griffin, & Snow, 1999; Lonigan, 2006). Rather, it begins in infancy as children have had experiences with the oral and written language before they start school (NAEYC, 2009). Therefore,

literacy learning is an ongoing process that children develop early in their language acquisition, which contributes to their future academic success.

The National Early Literacy Panel.

The *Developing Early Literacy: Report of the National Early Literacy Panel* (2008) provided a meta-analysis of nearly 300 studies showing which early literacy measures correlated with later literary achievement. Its mission was to summarize the scientific evidence on early literacy development and to influence educational policy and practices on young children's early language and literacy development. Its one key finding was that reading and writing skills that were developed in the first five years of life had a consistently strong relationship with later conventional reading and writing skills.

The National Early Literacy Panel (NELP) (2008) identified emergent skills and abilities that predict later reading achievement, even after the influence of intelligence or socioeconomic status were taken into account. These emergent skills pertain to three broad areas: (a) phonological awareness, or children's developing awareness of sound units with oral language independent of meaning; (b) alphabet knowledge, or a child's knowledge of names and sounds associated with printed letters; and (c) print awareness, letter and word concepts as well as directionality. Children who had more of these skills learned to read sooner and more competently than those children who did not have these skills.

Children arrive in preschool with varying levels of early literacy skills. The importance of these early years in becoming a skilled reader is highlighted by a significant body of evidence that preschool children's development in the areas of oral

language, phonological awareness, and print awareness is predictive of how well they will learn to read once they are exposed to formal reading in elementary school (NELP, 2008).

Print Awareness and the Development of Visual Perception

Print awareness is a prerequisite for children's success in beginning to learn to read (Fountas & Pinnell, 2012). Children acquire print awareness on a gradient with the assistance of their interactions with text (Evans & Saint-Aubin, 2011). There are seven basic elements of print awareness that children come to know and understand: (a) words exist in written as well as spoken form; (b) the difference between a graphic design that is a word and one that is not; (c) the difference between a letter and a word; (d) the empty spaces mark the end of a word and beginning of the next; (e) in English, words are read in a left-to-right direction; (f) lines of text are read from the top to the bottom; and (g) written words, like the spoken, make sense.

Print awareness shows the understandings about written language that are developed slowly, steadily and often early in children brought up in highly literate environments as found in Durkin's (1966) groundbreaking study on children who learned to read before starting school. However, print awareness is also based on the child's vision development. In 1949, Gesell and Bullis published *Vision: Its Development in Infants and Children.* Earlier, they discovered the importance of seeing in the developing infant: "In the early months, looking is half of living" (p. 253) and wrote a description of visual behavior expected the first five years of life. This information translates to how a child responds to the items on the GDO-R, especially the Copy Forms, as it requires

visual discrimination. Children respond to the Copy Forms at their developmental stage of visual perceptions, and demonstrate their developmental age norm.

Clay (2001) found visual perception of text to be a part of the inner processing system from which the reader generates reading behaviors. She saw visual perception of text as a hidden curriculum of perceptual learning. Clay described visual perception strategies as one of the strategies (inner controls) used by children in learning to read. It is this increased visual awareness that allows the child to progress in his emergent literacy journey.

Concepts About Print (CAP)

Clay (1966) first used the concept of emergent literacy in her dissertation, *Emergent Reading Behaviors*, to describe how young preschool children interact with reading and writing activities before they formally can read and write. Clay (2001) defined reading as:

> A message-getting, problem-solving activity which increases in power and flexibility the more it is practiced. My definition states that within the directional constraints of the printer's code, language and visual perception responses are purposefully directed by the reader in some integrated way to the problem of extracting meaning from cues in a text, in sequence, so that the reader brings a maximum of understanding the author's meaning. (p.6)

Based on her theory on how children come to master the complex tasks of reading and writing, Clay (2001) created an assessment tool to observe and measure emergent literacy. *An Observation Survey of Early Literacy Achievement* (Clay, 2006) provided a systematic way to determine early reading behaviors. It includes six sub-tasks: Letter

Identification, Word Test, Vocabulary, Hearing and Recording Sounds in Words, Text Reading, and Concepts About Print.

Concepts About Print (CAP) measures what concepts children know about reading before they might be reading (Clay, 2006). CAP is an observational task that provides specific information about a child's level of literacy acquisition. CAP is a teacher-administered standardized assessment that determines what the child knows about the way spoken language is represented in print. It is another observational instrument based on a continuum of concepts that preschool children grasp prior to learning how to read. In this task, the teacher enlists the help of the child (e.g., "I'll read this book. You help me.") and proceeds to ask the child questions that require critical awareness about print.

The 24 items of the CAP address several critical points of print awareness, including where to start reading, reading directionality, word-by-word matching, and distinguishing between the idea of a letter and a word. CAP assesses the literary knowledge of young children by providing information about what children know about reading before they begin to read. CAP is important because it is based on the recognition that children master concepts about print before they are ready for the early stages of reading instruction (Clay, 2001; Fountas & Pinnell, 1996). Nonetheless, the CAP is only a measurement of literacy and does not take into consideration the other developmental domains that impact an overall child's growth.

The Gesell Developmental Observation-Revised (GDO-R)

The Gesell Developmental Observation-Revised (GDO-R) is an instrument that involves direct observation about a child's growth in cognitive, motor, social, and

emotional domains and determines the overall developmental age at which a child is functioning. In *Mental Growth of the Preschool Child: A Psychological Outline of Normal Development from Birth to the Sixth Year Including a System of Developmental Diagnosis,* Gesell (1925) provided detailed norms and specific instructions for giving the Gesell Behavior Tests at ages of 4, 16, 28, 40, and 52 weeks and at 18, 24, 36, 48, and 60 months. There were four fields of behavior observed: motor, adaptive, language, and personal-social (Gesell et al., 1940).

Ilg & Ames (1972) brought the Gesell testing to the public school arena in Connecticut and published their findings in *School Readiness*. They provided normative data and instructions for giving the tests to children three years through ten years of age and continued to revise the norms of development about children's behavior from four weeks to six years of age (Knobloch & Pasamanick, 1960; 1974). This developmental examination became known as the Gesell Readiness Screening Test, and later in the 70s to the 80s it come to be known as the Gesell Developmental Observation (GDO).

The GDO includes preschool, kindergarten, and school age tasks. Subtests of these tasks are administered according to the child's age. The tasks include: Cubes, Interview, Name, Numbers, Copy Forms, Incomplete Man, Visual I and II, Right and Left Picture Cards, Naming Animals, Interests, Discriminating Prepositions, Digit Repetition, Comprehension Questions, Color Forms, Three Hole Form Board, and Action Agents. The GDO is not concerned with right or wrong answers; rather, it is concerned with the child's response in terms of developmental status. The factors considered in determining a child's overall developmental age are processes, organization, the method, verbalizations, overt behaviors, as well as the end product. The developmental age (DA)

is the age at which a child is functioning as a total organism. A child's DA may or may not correspond to his chronological age.

The GDO was in need of updated norms to improve its validity and reliability as well as revision to reflect current thinking in the field of early childhood assessment. In response to the concerns over the reliability and validity of the GDO, the Gesell Institute in November 2008 started research on developing new statistics to improve the GDO screening tool. An outside agency, the Mid-Continent Research for Education and Learning (McREL) laboratory, was chosen to oversee the study. Data collection for the study was conducted in a large number of public and private schools in all regions of the country (Gesell Institute of Child Development, 2012). A total of 1287 children from ages three to six participated. Trained examiners administered the items on the GDO to children within the study age band (two years and nine months to six years and three months) in individual sessions.

The result of the 2008-2010 GDO study was the Gesell Developmental Observation Revised (GDO-R). The *GDO-R Technical Report Ages 3-6 Data Analysis and Results* (Gesell Institute of Child Development, 2012) listed the number of items, sample size, maximum possible points, mean raw score, standard deviation, and internal consistency coefficient for each task. Master level was reported for each age group and each task and P-values by age group were reported for each item within the tasks. The new GDO-R also incorporates parent/guardian and teacher input and includes performance level evaluations and strand scoring. Strand A includes the original developmental tasks developed by Gesell: Cubes, Incomplete Man, Fine Motor, Gross Motor, and Copy Forms.

Gesell's original Copy Forms test seriated six forms of increasing difficulty: circle, cross, square, triangle, divided rectangle, and finally diamond. The test reveals behavior-age level from two-and-a-half to nine years of age. The significance of the test is not just in the success of copying, but the way the child copies, the size form made, the placement of the form drawn on the paper, and the organization of the six forms on the paper. It also assesses a child's competence in integrating visual information with fine motor skills.

The divided rectangle is a challenging form that tells a great deal about a child (Ilg & Ames, 1972).

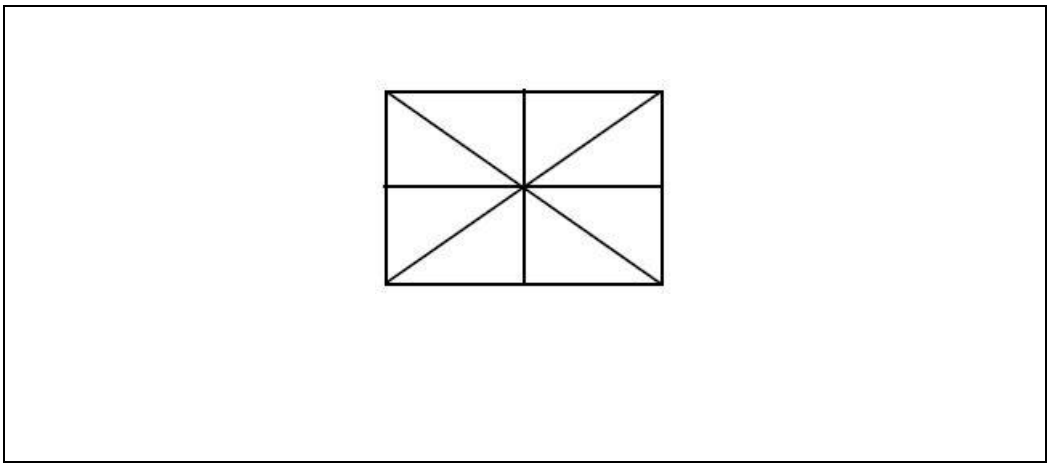

Figure 2.1 The Divided Rectangle Copy Form from the GDO-R Copy Form Task Card. Copyright 2012 by the Gesell Institute of Child Development

The four and four and-a-half year olds see it as "too hard" and when willing to tackle it, there is little success in making the divided rectangle (Ilg & Ames, 1972). Children who are developmentally younger than six do not have mature enough visual perceptions to handle this Copy Form.

The six year old shows an interest in oblique directionality:

> His eyes differentiate between a vertical and an oblique stroke, but in his effort to execute an oblique stroke with his crayon, he twists his body and shifts his paper at various angles. This growth trend expresses itself in his efforts to gain mastery of the oblique line in his eye-hand coordination (Gesell & Bullis, 1949, p. 137)

It is not until six years old that the child usually has success, meaning that he makes the horizontal and angled lines cross the central vertical lines. These directionality behaviors are necessary in mastering concepts about print and in early reading; it is an internal focus on the inner control within the child which emerges as the child uses text as the external resource in learning to read (Clay, 2001).

Summary

Knowledge about children's reading readiness has increased substantially in the past several decades (Classens, Duncan, & Engel, 2008; NELP, 2008); however, only in the past ten years have sizeable efforts been directed to the understanding and development of reading related skills prior to school entry and an understanding of these skills' contribution to later academic success (Lonigan et al., 2009; Marston et al., 2007). Child developmental theories support evidence that children develop at individual rates and go through various stages of development. Current findings in the field of neuroscience reveal that the early childhood brain development differs dramatically from that of adults.

Today most researchers have come to understand child development, the learning process, and the early childhood underpinnings of reading ability (Hay & Fielding-Barnsley, 2009; Lonigan, 2006; Neuman & Dickinson, 2011). These findings lend

support to the concept of emergent literacy as a skill set and knowledge base that begins developmentally in infancy and is further enriched in early childhood stages by exposure to language, print, and instruction. Yet, there varying levels of early literacy skills among children entering school, and these early years are important. The process of becoming a skilled reader is highlighted by a significant body of evidence that preschool children's development in the areas of oral language, phonological awareness, and print awareness is predictive of how well they will learn to read once they are exposed to formal reading in elementary school (NELP, 2008).

There are ongoing concerns about the policy and practice implications as well as literacy assessments used with preschoolers (Invernizzi et al., 2010). Many efforts to teach children to learn how to read before four or five years of age may be rushing children to perform tasks for which they are not biologically ready. There are also concerns about the appropriate literacy assessment used in high-stakes testing that implement rigid benchmarks, as opposed to flexible child developmental ranges (Meisels, 2006).

Gesell suggested that student school success would increase if children started school based on their developmental level (or behavior readiness) rather than their age in years (Ames, 1989). Clay (2001), on the other hand, advocated that teachers meet children at the level at which they enter school. It has been proven that learning to read and write are fundamental developmental milestones in a literate society and that early literacy development is a key to future success in acquiring content learning in other areas and throughout life. However, there is a disconnect between this knowledge and the current practices in which high-stakes testing has created an environment in which

children are expected to adapt to the curriculum, rather than the curriculum adapting to the unique developing needs of the child. Research is needed to understand how to better prepare schools to be ready for the children, and not expecting children be ready for school.

Chapter Three: Method & Procedures

Introduction

The purpose of this study was to examine children's developmental ages vis-à-vis their early literacy skills using the Gesell Developmental Observation-Revised (GDO-R) and Concepts About Print (CAP) as defined by Marie Clay (2006) with the intent of identifying additional means to assist and guide parents and teachers in making curricular decisions for their children, prekindergarten to second grade. This study utilized data from 83 four to six-year old GDO-R scores and cross-referenced them to the CAP. The following research questions guided this study:

1. How does the child's chronological age versus developmental age as measured by the Gesell Developmental Observation-Revised (GDO-R) relate to a child's readiness to read as measured by the Clay's Observational Survey Concepts About Print (CAP)?
2. How does the overall score on the GDO-R Copy Forms predict the child's readiness to read via the total score on the CAP? Specifically, does the divided rectangle predict the child's readiness to read via the total score on the CAP?
3. How do environmental factors as reported by parents and/or guardians relate to the child's developmental age (via GDO-R) and his readiness to read (CAP)?
4. What factors singly, or in combination, account for a child's readiness to read?

This exploratory study incorporated a mix-methodology model of qualitative and quantitative analysis of data that addressed the specific research questions. A mixed methods design, the third methodology, (Tashakkori & Teddlie, 2009) is a procedure for collecting, analyzing and mixing both quantitative and qualitative data at some stage of

the research process within a single study to understand a research problem more completely (Creswell, 2008). In a mixed methods approach, the philosophical orientation is pragmaticism, which asserts that the truth is what works (Tashakkori & Teddlie, 2009, p. 7). When used in combination, quantitative and qualitative methods complement each other and allow for more complete analyses (Green, Caracelli, & Graham, 1989; Tashakkori & Teddlie, 2009).

Setting

This study included four sites from three states, Texas, Pennsylvania, and Michigan. The Texas site's preschool is private and has had National Association of the Education for Young Children (NAEYC) accreditation for the past five years. It currently enrolls 150 children and has a staff of 25. There are four programs available: the two-year-old, three-year-old, four-year-old, and Pre-Kindergarten. Degreed or certified teachers team-teach with two teachers in each classroom.

The two Pennsylvania sites are located in Southeastern Pennsylvania. Both are non-profit 501 (c) organizations. One is a childcare center for infants to six-year-old children. The staff consists of eight degreed teachers and four assistant teachers. It currently has 100 children attending. The second site holds preschool classes for three, four, and five year olds as well as functions as an after school program. The entire student population is 80 and the staff consists of five degreed teachers.

The Michigan site is a non-profit, state licensed preschool serving three to five-year-old children. It operates under the guidelines of NAEYC. It has a staff of seven degreed teachers and two assistant teachers. Its current student population is 49.

Participants

Study participants included 83 four to six and a half-year-old children attending early childhood learning centers in Texas, Pennsylvania, and Michigan. A total of 11 four year olds, 31 four and a half-year olds, 27 five year olds, 6 five and a half-year olds, 6 six year olds, and 2 six and a half-year olds participated in the study. There were 48 males and 35 females. Chronological ages were determined by calculating the child's age in years and months, then rounding it off into six month intervals. For example, a child that was four years and five months was placed in the (4) year old group; the child who was four years, seven months was placed into the (4 ½) group. Table 3.1 provides a breakdown of the sex and ages at each site.

Table 3.1

Summary of Total Number of Students in Study (N=83)

	Texas		Pa. 1		Pa. 2		Michigan	
Age in Years	Male	Female	Male	Female	Male	Female	Male	Female
4	0	0	3	1	0	2	3	2
4 ½	4	3	2	3	4	2	8	5
5	5	3	2	2	1	4	7	3
5 ½	0	1	1	0	1	0	3	0
6	2	1	0	0	0	1	1	1
6 ½	0	1	0	0	1	0	0	0
Total	11	9	8	6	7	9	22	11

The parents completed a questionnaire as part of the GDO-R assessment. The questionnaire, Gesell Parent/Guardian Questionnaire (GPQ), was filled out by parents while their child was being administered the GDO-R or at a later time. The GPQ contains 78 items that collected data regarding the child's health history, home environment, habits from birth, social, emotional, and adaptive behaviors observed by the parents/guardian.

Instruments

Concepts About Print.

This study utilized the Concepts About Print (CAP) task, Sand Form, a sub-task of the Clay's Literacy Observation Survey (Clay, 2006). The CAP is one of six literacy tasks of the Observation Survey of Early Literacy Achievement. The CAP, an authentic assessment, is used to determine what a child knows about the way language is printed and shows implications for later reading achievement. The CAP tasks are proven to be sensitive indicators of behaviors that can support reading and writing acquisition (Clay, 2001; 2006).

During the CAP observation task, the teacher reads the story in the task booklet and enlists the child's assistance. Instructions for administering the CAP and its scripted questions are in the manual. While reading the book, Sand Form, with the child, task items are individually administered. The child is asked to respond verbatim or to perform a task (e.g., "Show me the bottom of the picture."). The child is then scored one point for each of the 24 task items he responds to correctly on the Concepts About Print Score Sheet. The points are totaled and recorded on the upper right hand corner of the Score

Sheet. If the child correctly responded to 12 task items, it would be recorded as 12/24. The task takes approximately 15 minutes to administer to each child.

Validity and Reliability of CAP.

Concurrent validity correlation of scores at 6.00 years was .79 for the CAP (Clay, 2006; Denton, Cianco, & Fletcher, 2006). The predictive validity for the CAP had correlations at .79. Reliability coefficients for the CAP have been recorded for internal consistency: Kuder Richardson formula 20 = .95 reliability coefficient, split half = .95 reliability coefficient, test-retest = .73-.89 (Clay, 2006; Denton, Cianco, & Fletcher, 2006).

Gesell Developmental Observation-Revised (GDO-R).

Archival data were gathered from previous responses to the Gesell Developmental Observation-R (GDO-R), specifically, the Gesell Copy Forms scores. The GDO-R was revised and updated during 2008-2010 based on a national effort that collected baseline and exploratory data. The non-profit Mid-continent Research (McREL) compiled the Gesell study results for Education and Learning (Gesell Institute of Child Development, 2012).

The GDO-R functions in agreement with the current regulations of Head Start mandates and the Individuals with Disabilities Education Act (IDEA). The newly revised GDO-R is a clinical interview technique with standard procedure through which a trained examiner observes and interprets a child's behavior. The GDO-R is unlike academic performance tests or intelligence tests. It examines children's measure of readiness and is scored to determine a child's developmental age in neurological, physical, language, cognitive, social, and adaptive (i.e., how a child uses knowledge in action) areas (Gesell

Institute of Child Development, 2012). Five developmental tasks were administered: Cubes, Copy Forms (see Figure 3.1), Incomplete Man, Fine Motor, and Gross Motor.

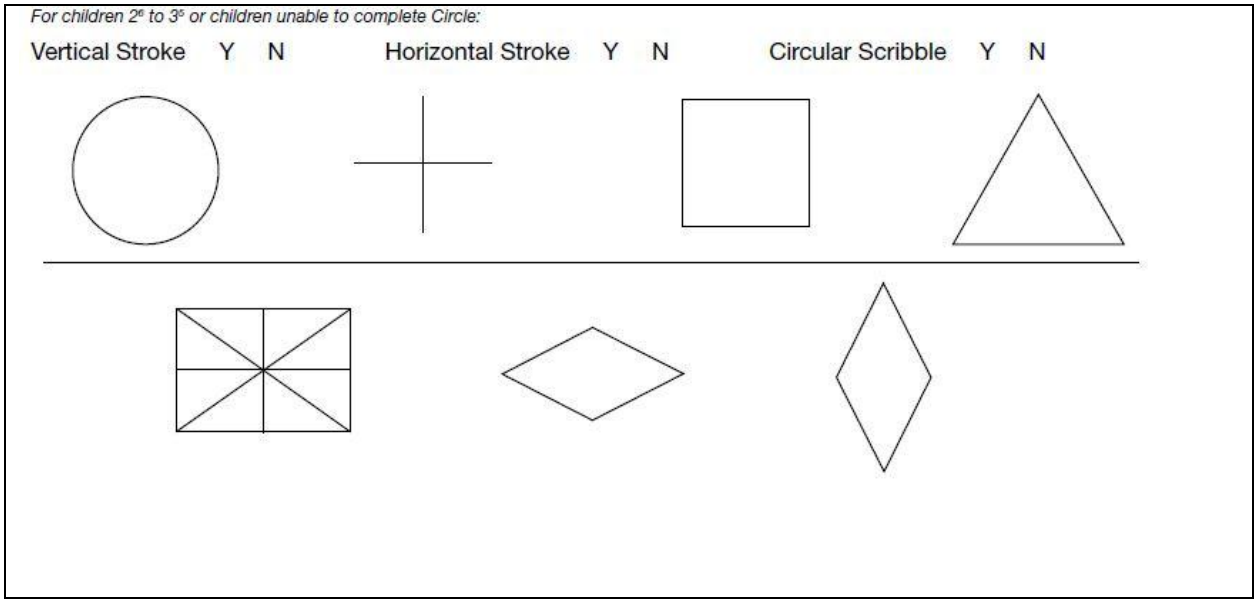

Figure 3.1 Copy Forms from the GDO-R Child Recording Form. Copyright 2012 by the Gesell Institute of Child Development

The administration is conducted one-on-one with the child and takes approximately 20 minutes to complete, and the observed child behaviors are recorded and scored to determine his developmental age.

Developmental age indicates where a child's placement is on his growth continuum. While all children go through patterned and predictable stages of development, each child goes through these developmental stages at his own rate (Gesell of Child Development, 2012). Through the GDO-R, child behaviors and performances can be correlated to normative patterns established for each developmental age. Developmental ages (DA) are reported in six-month intervals: for example "4, 4 ½, 5."

As a result, a child with a chronological age of four years, eight months might have a "4" year developmental age.

Validity and Reliability of GDO-R.

The evidence of construct validity for the GDO-R and Gesell Screener was based on established theories of child development (Gesell Institute of Child Development, 2012). Inter-item correlations of the GDO-R and Gesell Screener provided evidence of construct validity. Reliability was established by calculating internal consistency coefficients and conducting an inter-rater reliability study: "the agreement between the two raters' overall developmental age rankings was high for both Copy Forms (.91) and Incomplete Man (.92), showing that raters ranked the children by developmental age very similarly" (Gesell Institute of Child Development, 2012, p. 62). In addition, the Pearson product moment correlations between developmental age and chronological age were calculated to examine the degree to which the developmental age assigned by raters corresponded to the children's actual age (i.e., chronological age). Correlations were calculated separately for Rater A and Rater B, and these correlations were in the expected range of .78-.82 which provided evidence that the assigned developmental ages corresponded closely (Gesell Institute of Child Development, 2012).

Gesell Parent/Guardian Questionnaire.

Archival data were also collected from the Gesell Parent/Guardian Questionnaire (GPQ) which was completed by parents or guardians while their child was being administered the GDO-R or at a later time. The GPQ contains 78 items that collected data from the parents or guardians about their child's background and demographics; medical and educational history (birth history, early educational experiences); home environment

(siblings, use of technology, media exposure, and literacy opportunities); social, emotional, and adaptive capabilities.

Design of Study

This mixed method study was used to examine children's developmental ages and their impact on a child's early reading abilities. The mixed method design gathered qualitative data through archived parent questionnaires and quantitative data through CAP scores and archived GDO-R developmental age scores. One benefit of using a mixed-method study according to Creswell (2008) is that combining the two approaches sharpens our understanding of the research findings. For example, rejecting a quantitative null hypothesis can be clarified by using some of the comments made by students in open-ended qualitative responses.

According to Hanson, Creswell, Plano-Clark, Petska, and Creswell (2005), "using both forms of data allows researchers to simultaneously generalize results from a sample to a population and to gain a deeper understanding of the phenomena of interest" (p. 224). This study yielded quantitative data through the CAP scores; the GDO-R developmental age scores while the parent questionnaire provided qualitative content data through open-ended questions.

Procedure

The researcher received permission from the Director of the Gesell National Lecture Staff to contact the site administrators at various educational settings. The researcher received permission from the site administrators to solicit parental consents to access archival data (Gesell Developmental Observation- Revised (GDO-R) scores and Gesell Parent /Guardian Questionnaire (GPQ) responses) as well as to administer the

Clay Observational Survey-Concepts About Print (CAP), to their children. All students at sites that utilized the GDO-R were invited to participate. All those who chose to participate were included in the study. The site administrator who explained the study gave a letter of recruitment to the parents/guardians of the potential participants. Those agreeing to allow their child to be a part of the study signed a consent form and returned it to the childhood center's administrator.

No restrictions for participation in this study were placed with regards to gender or ethnicity. Approval to conduct the research was granted by the Research Ethics Review Board (RERB) of Immaculata University (Appendix A) prior to parental contact.

After RERB approval, the researcher sent copies of the parental consent form to site administrators who distributed these to the students' parents/guardians. Parental consent forms were returned to the site administrator who then returned them to the researcher. The researcher communicated with the site administrator to determine convenient times during the school day to come and administer the Clay Observational Survey-Concepts About Print (CAP), to the students who had parental consent. The researcher was trained to administer CAP by district personnel using the procedures of the Clay Observational Survey. The students at these sites are often assessed in the normal scope and sequence of the educational day. It is important to note that the CAP timeframe was administered within 30 days of when the GDO-R was completed.

The Gesell National Lecture Staff sent the archival data (GDO-R Profile Summary and GPQ) to the research assistant. The researcher sent the individual score sheets of the CAP to the research assistant (who has been trained in Protecting Human Subjects by the National Institutes of Health) for coding. The research assistant matched

each child's GDO-R with that child's GPQ, and his CAP. A label was placed on all materials so the researcher did not know the identity of any of the subjects. Data were recorded in a format rendering subjects unidentifiable and preserving anonymity of students' and parents' names. Each category of students was processed sequentially, consecutively, and alphanumerically until each child with a full set of data received a code. Once all the data were coded, the research assistant sent the data to the researcher for analysis. The researcher then analyzed the "coded" data.

Data Analysis

The data collected from the CAP scores were analyzed to reveal children's emergent literacy skills. These scores were then compared to the children's chronological and developmental ages. The children's developmental ages were determined by the GDO-R, which provided a score for a strand of developmental tasks that actually results in ages that may be younger, older, or equal to their actual chronological ages. Each child received a numerical score on each GDO-R task based on his performance of the items that comprise the task. The score was reported in six month age intervals: 4, 4 ½, 5, etc.

To aid in the interpreting of the task scores, each task has a benchmark that reflects the performance that can be expected of a child in each age band. In addition to the task score and benchmark, the technical data supporting the GDO-R based on a large, diverse national sample of children provided the percent of children meeting the benchmark for each developmental task (cubes, copy forms, completing a drawing of a person, etc.) and the p-values for each item for each age band. These technical data provide information that aids in comparing an individual child's performance to a sample

of same-age peers. Archived data from the GDO-R developmental age scores and parents' responses from the GPQ provided additional data to answer the research questions.

All data were entered into a computer database and analyzed using the Statistical Package for Social Sciences (SPSS), version 20 (SPSS-IBM, 2012). For each student in the study, the following data were collected:

1. Chronological age
2. Developmental age at time of data collection
3. GDO-R Copy Forms Task (overall) developmental age
4. GDO-R Copy Form Divided Rectangle developmental age
5. CAP score
6. Environmental factors from the GPQ

The research hypotheses, $H_0$1-4, for the study were based upon information and conclusions drawn from the review of literature. The following null hypotheses were tested:

$H_0$1: There is no statistically significant relationship between a child's chronological age versus developmental age and the child's readiness to read.

$H_0$2a: The overall score on the GDO-R Copy Forms does not predict the child's readiness to read via the total score on the CAP.

$H_0$2b: The score on the divided rectangle GDO-R Copy Forms does not predict the child's readiness to read via the total score on the CAP.

$H_0$3: There is no statistically significant relationship between the environmental factors as reported by parents and/or guardians and the child's developmental age (via GDO-R) and his readiness to read (CAP).

$H_0$4: There are no statistically significant factors that predict a child's readiness to read.

Data were analyzed using descriptive statistics and correlation calculations using the Pearson product of movement of correlation. Mertler and Charles (2005) stated that the Pearson product of movement of correlation is most common and popular in use and is appropriate for use when the relationship between two variables is a linear one. The correlation coefficient is the index of the relationship between two variables. The coefficient shows the direction of the relationship, positive or negative, and the relative strength of the relationship (Graziano & Raulin, 2007). Pearson correlations were utilized to determine if there was a relationship between certain variables, such as child's chronological age, developmental age, and readiness to read. Two-tailed t-tests were also run to examine the relationship between items on the GDO-R and readiness to read.

Subsequent analyses were performed to further explore environmental factors and the possible relationships to the child's developmental age and readiness to read. Specifically, a principal components factor analysis was performed on environmental items from the parent questionnaire. Pearson correlations were utilized again to examine relationships between meaningful factors and children's developmental age as well as their readiness to read. Finally, a step-wise multiple regression was employed to see which, if any, factors predict children's readiness to read.

Summary

The purpose of this study was to determine if a correlation exists between developmental ages of children with the chronological ages of four to six-years-old and their emergent literacy skills, and how and what environmental factors may exist through factor analysis and multiple regression analysis. Participants in this study were administered the CAP and the researcher analyzed archival GDO-R and GPQ data. The design of the study secured reliability and validity (Merriam, 1998). Results are reported in Chapter Four.

Chapter Four: Results

Introduction

This mixed methods research study was conducted in order to examine if a child's chronological age versus developmental age relates to his readiness to read. It also explored how and what environmental factors relate to a child's developmental age and his readiness to read. Additionally, this study attempted to explore how visual perceptions of the Gesell Developmental Observation-Revised (GDO-R) assessment's Copy Forms relate to the child's Concepts About Print (CAP) score. This study took place in four preschool sites: one located in Texas, one in Michigan, and two in Pennsylvania.

This chapter presents the data resulting from the study's research hypotheses. Data from the Concepts About Print scores, the GDO-R developmental age and Copy Forms scores, and question items from the Gesell Parent/Guardian Questionnaire were categorized and analyzed in order to answer the research hypotheses presented in the study. The results of this study are presented in the next section, which addresses the findings for each hypothesis.

Analysis of Data Results

Hypothesis One.

This hypothesis stated there is no statistically significant relationship between a child's chronological age (CA) versus developmental age (DA) and his Concepts About Print (CAP) score. Correlations were computed among the child's CA, the child's DA, and the child's readiness to read as measured by CAP for 83 children. Descriptive statistics for the participants' CA, DA, and CAP are displayed in Table 4.1.

Table 4.1

Descriptive Statistics on CA, DA, and CAP Scores

Variables	Mean	Standard Deviation	N
Chronological Age	4.8253	.58661	83
Developmental Age	4.7470	.53176	83
CAP Score	10.24	4.520	83

Participants' chronological ages ranged from four years old (4.0) to six years and nine months (6.9). The average chronological age of the participants was four years old and eight months. Participants also had the potential to score via the GDO-R developmental ages of two and a half years old (2.5) to seven years old (7.0) with intervals of six months. Results showed the average developmental age of the same participants to be four years and 7 months, which would yield a developmental age of four and a half (4.5) as per the Gesell parameters. Furthermore, the total amount of items that the child can score on the Concepts About Print (CAP) is 24. Higher scores on the CAP correlate with a child's increased likeliness to be ready to read (Clay, 2006). Table 4.1 demonstrates that the mean score of the child's developmental age is lower than the child's chronological age. Moreover, the mean CAP score is at a 10.24 for the participants in the study.

Pearson correlations were run to determine whether a statistically significant relationship exists between a child's chronological age versus developmental age and the

child's readiness to read. The results of the Pearson correlations are presented in Table 4.2.

Table 4.2

Pearson Correlations between CA, DA, and CAP

Variables		CA	DA	CAP Score
Child's Chronological Age (CA)	Pearson Correlation (r)	1	.648	.596
	Sig. (2-tailed)		.000**	.000
	N	83	83	83
Developmental Age (DA)	Pearson Correlation (r)	.648	1	.683
	Sig. (2-tailed)	.000**		.000
	N	83	83	83
Concepts About Print (CAP) Score	Pearson Correlation (r)	.596	.683	1
	Sig. (2-tailed)	.000**	.000**	
	N	83	83	83

Note. * ** Correlation is significant **p<.01, two-tailed.

Results suggest that all correlations were found to be statistically significant. Results indicate a positive relationship between 1) the child's chronological age and the child's developmental age, r (83) = .648, p<.000, 2) the child's chronological age and child's readiness to read as measured by the CAP r (83) = .596, p<.000, and 3) the child's developmental age and readiness to read r (83) = .683, p<.000. In general, the results suggest that older children also have a higher developmental age and are more likely ready to read. It is important to note that the relationship between a child's developmental age and readiness to read (.683) as measured by the CAP is not only statistically significant, but proves to be stronger than between chronological age and the CAP (.596).

Hypothesis Two.

T-tests were run to determine if a child's overall score on GDO-R Copy Forms predicts his readiness to read as per his Concepts About Print (CAP) score. Results of the t-tests are displayed in Table 4.3.

Table 4.3

T-Test Results on Overall Score of GDO-R Copy Forms to CAP Score

					95% CI of the Difference	
Scores	T	Df	Sig. (2-tailed)	Mean Difference	LL	UL
Copy Forms	77.558	82	.000	4.68072	4.5607	4.8008
CAP	20.642	82	.000	10.241	9.25	11.23

Note. CI = confidence level; LL = lower limit, UL = upper limit.

Results indicated that there was a statistically significant difference in the child's overall scores of the GDO-R Copy forms and the child's readiness to read as measured by the total score on the CAP. A t-test revealed a statistically significant difference in the overall score on the GDO-R Copy Form (M=4.68, SD=0.55), $t(82) = 77.558$, $p < .05$, $\alpha = .000$, and the child's readiness to read via the total score on the CAP Form (M = 10.24, SD = 4.52), $t(82) = 20.642$, $p < .05$, $\alpha = .000$.

T-tests were also run to determine if a child's divided rectangle GDO-R Copy Forms score predicts his readiness to read as per his Concepts About Print (CAP) score. Results of the t-tests are displayed in Table 4.4.

Table 4.4

T-Test Results on GDO-R Divided Rectangle to CAP

					95% CI of the Difference	
Scores	T	Df	Sig. (2-tailed)	Mean Difference	LL	UL
Divided Rectangle	66.238	79	.000	4.75000	4.6073	4.8927
CAP	20.642	82	.000	10.241	9.25	11.23

Results indicated that there was a statistically significant difference in the child's divided rectangle score of the GDO-R and the child's readiness to read as measured by the total score on the CAP. A t-test revealed a statistically significant difference in the overall score on the child's divided rectangle score of the GDO-R (M = 4.75, SD = 0.64), $t(79) = 66.238$, $p < .05$, $\alpha = .000$, and the child's readiness to read via the total score on the CAP Form (M = 10.24, SD = 4.52), $t(82) = 20.642$, $p < .05$, $\alpha = .000$.

Hypothesis Three.

Since this study also focused on environmental factors and the possible impact on a child's developmental age and/or his readiness to read, questions 47-54 on the Gesell Parent/Guardian Questionnaire (GPQ) were specifically examined. First, a principal components factor analysis was computed on the nine items that pertained to environmental factors on the GPQ. The analysis yielded three factors with eigen values over 1; however, only two meaningful factors were identified. The results of the factor analysis and their loadings are presented in Table 4.5.

Table 4.5

Factor Loadings for Exploratory Factor Analysis of Gesell Parent Questionnaire

Factor	Items	Description	Loading
1	q47	Go to Library	.585
	q48	How Often Child Is Read To	.549
	q49	Reading Request Frequency	.764
	q50	Frequency of Play	.745
2	q51	Digital Media	.759
	q52	Exposure to Media (Hours)	.652
	q53	Educational Program	.549
	q54	Child and Food Choice	.685

It is evident from Table 4.5 that Factor 1 consisted of four components relating to "Parent/Child Interaction and Support for Literacy Opportunities." These statements centered on the child's involvement with literacy and play with an adult or caregiver. Factor 2 consisted of four components relating to "Child's Exposure to Digital Media and Food Choice." These statements highlighted the amount of time the child spent with digital media and the child's ability to choose his own snacks and meals.

Next, Pearson correlations were run to determine whether or not a statistically significant relationship existed between Factor 1 "Parent/Child Interaction and Support for Literacy Opportunities" and the child's developmental age. It is important to note that 58 of the 83 questionnaires were returned to the preschool site coordinators. The results of the Pearson correlations are presented in Table 4.6.

Table 4.6

Pearson Correlation between Factor 1 and DA

Variables		Factor 1	DA
Factor 1	Pearson Correlation (r)	1	-.067
	Sig.(2-tailed)		.618
	N	58	

Results did not suggest a statistically significant relationship exists between Factor 1 (Parent/Child Interaction and Support for Literacy Opportunities) and the child's developmental age, $r(58) = -.067$, $p > .05$.

Pearson correlations were also run to determine whether or not a statistically significant relationship existed between Factor 1 (Parent/Child Interaction and Support for Literacy Opportunities) and the child's readiness to read (CAP). The results of the Pearson correlations are presented in Table 4.7.

Table 4.7

Pearson Correlation between Factor 1 and CAP Score

Variables		Factor 1	CAP
Factor 1	Pearson Correlation (r)	1	.109
	Sig.(2-tailed)		.414
	N	58	

Results did not suggest a statistically significant relationship exists between Factor 1 (Parent/Child Interaction and Support for Literacy Opportunities) and the child's readiness to read (CAP), $r(58) = .109$, $p > .05$.

Next, Pearson correlations were run to determine whether or not a statistically significant relationship existed between Factor 2 (Child's Exposure to Digital Media and Food Choice) and the child's developmental age. The results of the Pearson correlations are presented in Table 4.8.

Table 4.8

Pearson Correlation between Factor 2 and DA

Variables		Factor 2	DA
Factor 2	Pearson Correlation (r)	1	-.174
	Sig.(2-tailed)		.192
	N	58	

Results did not suggest a statistically significant relationship exists between Factor 2 (Child's Exposure to Digital Media and Food Choice) and the child's developmental age, r (58) = -.174, p>.05.

Additional Pearson correlations were run to determine whether or not a statistically significant relationship existed between Factor 2 (Child's Exposure to Digital Media and Food Choice) and the child's readiness to read (CAP). The results of the Pearson correlations are presented in Table 4.9.

Table 4.9

Pearson Correlation between Factor 2 and CAP Score

Variables		Factor 2	CAP
Factor 2	Pearson Correlation (r)	1	-.254
	Sig.(2-tailed)		.054
	N	58	

Results did not suggest a statistically significant relationship exists between Factor 2 (Child's Exposure to Digital Media and Food Choice) and the child's readiness to read (CAP), r (58) = -.254, p>.05. However, the significance level was close to being statistically significant (p=.054).

Hypothesis Four.

Furthermore, this study explored what factors singly, or in combination, account for a child's readiness to read. A stepwise multiple regression was conducted using the child's chronological age (CA), developmental age (DA), environmental factors via the Gesell Parent /Guardian Questionnaire (GPQ), the overall Copy Forms score, and the divided rectangle to predict the child's readiness to read (CAP). Each predictor was entered into the regression equation in a stepwise fashion to see if it accounted for a significant proportion of the variance in the dependent variable (CAP) at the .05 significance level. Results of the stepwise multiple regression are displayed in Table 4.10.

Table 4.10

Stepwise Multiple Regression on Reading Readiness Factors

Step	Variable Entered	Beta at Final Step	R	Adjusted R Squared
1	Developmental Age	.461	.791	.510

It is evident in Table 4.10 that only one variable entered the regression equation, accounting in the final equation for 51% of the variance. Specifically, a child's developmental age predicts a child's readiness to read.

Summary

The null research hypotheses, H_o1, 2, and 4 for the study were all rejected based on the data analysis findings. Pearson correlations showed that developmental age rather than chronological had a stronger relationship to the CAP. T-Tests found statistically significant correlations between the GDO-R Copy Form to reading readiness. T-tests also found a stronger correlation between the divided rectangle (the more complex Copy Form) to reading readiness. The findings revealed:

H_a1: There is a statistically significant relationship between a child's chronological age versus developmental age and the child's readiness to read.

H_a2a: The overall score on the GDO-R Copy Forms does predict the child's readiness to read via the total score on the CAP.

H_a2b: The score on the divided rectangle GDO-R Copy Forms does predict the child's readiness to read via the total score on the CAP.

H_a4: There is statistically significant factor, specifically the child's developmental age that predicts his readiness to read.

The null hypothesis, $H_0$3, was accepted, as results did not suggest a statistically significant relationship between the environmental factors and a child's developmental age and his readiness to read. Results showed:

$H_0$3: There is no statistically significant relationship between the environmental factors as reported by parents and/or guardians and the child's developmental age (via GDO-R) and his readiness to read (CAP).

This study rejected three of the four hypotheses and accepted one null hypothesis at a statistically significantly level. The discussion of the results is presented in Chapter Five.

Chapter Five: Discussion

Summary of the Study

This chapter will provide a brief summary of the study, relate the findings to prior research, suggest possible directions for future research, as well as address the limitations of the study. The last twenty years in the United States have been referred to as the "Era of Accountability" (Pianta, Cox, & Snow, 2007) due to increased demands for evidence that students are making growth in their academic achievement. However, this emphasis on achievement has raised concerns about the creation of an environment that fails to address the unique, multi-faceted domains of child development, especially in the early years (Almon & Miller, 2009; Meisels, 2006). The purpose of this study was to examine children's developmental ages vis-à-vis their early literacy skills using the Gesell Developmental Observation-Revised (GDO-R) and Concepts About Print (CAP) as defined by Marie Clay (2006) with the intent of identifying additional means to assist and guide parents and teachers in making curricular decisions for their children, prekindergarten to second grade.

Four preschool sites, one located in Texas, one in Michigan, and two in Pennsylvania, were selected as the sites for this study. The participants were 83 children who had a chronological age range of four years to six years, nine months old. This mixed method study utilized archived data (i.e., the participants' GDO-R scores) and cross-referenced them to the CAP. It also explored environmental factors obtained from an archived parent questionnaire.

All data were entered into a computer database and analyzed using the Statistical Package for Social Sciences (SPSS), version 20 (SPSS-IBM, 2012). Four research

questions were generated, and four null hypotheses were written and tested. The collected data were analyzed to reveal if there are relationships between children's emergent literacy skills and developmental age. Further analyses were conducted to explore the impact of environmental issues on developmental age as well as emergent literacy skills.

Summary of the Results

Four hypotheses were formulated for this study. The following section of this chapter will review findings for each research question and its corresponding hypothesis followed by a discussion of its relationship to other research. Overall, the data derived from this study provide evidence of a significant relationship between developmental age and emergent literacy. Three of the four null hypotheses were rejected, and one was accepted.

Research question/hypothesis one.

The first research question examined how the child's chronological age versus developmental age as measured by the Gesell Developmental Observation-Revised (GDO-R) relates to the child's readiness to read as measured by Concepts About Print (CAP). The null hypothesis read that there is no statistically significant relationship between a child's chronological age versus developmental age and the child's readiness to read. Results confirmed that there is a positive relationship between a child's chronological age, his developmental age, and his CAP score. The correlation is significant at the 1% level of significance. Thus, the null hypothesis is rejected.

Therefore, there is a statistically significant relationship between a child's developmental age and his readiness to read. The correlation is high and positive ($r = .683$), suggesting that the child's readiness to read increases in connection with his

developmental age. This finding relates to the research that highlighted the significance of the developmental aspects of early literacy, social and emotional factors, and brain growth in young children prior to entering school (Massetti, 2009; Neuman & Dickinson, 2011). This study confirmed the importance of understanding child development in emergent literacy.

Descriptive statistics also revealed that the children's developmental ages were younger than their chronological ages. These findings show a connection with the theoretical roots of the early child developmentalists who did not adhere to a linear interpretation of child growth, but held rather that children develop at their own rates (Elkind, 1994; Erikson, 1963; Gesell et al., 1940; Montessori, 1964; Piaget & Inhelder, 1969). According to the constructivist view of perception (Crain, 2011), young children actively construct their own cognitive worlds on a continuum of concrete hands-on learning before moving to the abstract forms of symbols. Children of younger ages think qualitatively differently than older children (Gesell, Ilg, & Ames, 1977; Ginsberg & Opper, 1988; Inhelder & Piaget, 1969; Montessori, 1964; Vygotsky, 1978). This current study supported the seminal research concerning child development.

Concurrently, this study examined the relationship of developmental age to emergent literacy. In this study, information about the child's emergent literacy was determined through Concepts About Print (CAP). CAP is an instrument that measures what children know about reading before they learn to read and represents one group of reading behaviors necessary for reading acquisition (Clay, 2001; Fountas & Pinell, 1998). Further analysis showed that the mean score of the CAP was 10.24 (out of 24 items to be scored) for this population whose mean chronological age was 4.83 years. Typically,

children whose chronological age are five to five and half will score 12-15 on the CAP (Clay, 2001). Therefore, the mean CAP score of 10.24 for this population is realistic within those age expectations. This statistic indicates that the children in this study had not yet mastered concepts about print, and since they were learning about how books and print work, they were therefore not ready for formal reading instruction.

This study confirmed that the process of child development is continuous and ongoing, as well as unique to the child (Gesell et al., 1940; Ginsberg & Opper, 1988; Inhelder & Piaget, 1969; NAEYC, 2009). Duncan et al. (2007) found that the strongest indicators of later achievement were entry-level reading skills (in addition to math skills and attention skills), and these reading skills have been identified as emergent literacy skills (de Witt, 2011; Lonigan et al., 2019; NELP, 2008). It has been established that children come to kindergarten with a range of reading skills (Classens, Duncan, & Engel, 2008), and that it is crucial to examine students' early reading skills prior to school. It appears that developmental age via the GDO-R might be used in conjunction with early reading assessments in this examination. This study supports the assumption that children's issues in learning to read may often be directly related to the fact that they may be functioning at a younger developmental age.

Research question/hypothesis two.

The second research question and its two hypotheses tested how the overall score on the Copy Form tasks of the GDO-R predicts the child's readiness to read via the total score on the CAP. It also tested whether the divided rectangle predicts the child's readiness to read via the total score on the CAP. The first null hypothesis stated that the overall score on the Copy Form tasks of the GDO-R is not a predictor of the child's

readiness to read via the total score on the CAP. The second null hypothesis specifically was intended to investigate if the score on the divided rectangle form (GDO-R Copy Forms) is not a predictor of the child's readiness to read via the total score on the CAP.

The results of the two-tailed t-tests revealed that there was a statistically significant relationship between the overall Copy Form scores and the CAP, thus rejecting the null hypothesis. The Copy Forms consist of six forms that become increasingly more difficult on a developmental continuum. The child's responses on the Copy Form tasks are not scored as right or wrong answers, but rather in terms of his developmental behavior (The Gesell Institute of Child Development, 2012). However, the CAP is only an observation of a child's literacy and does not look into the developmental aspects (Clay, 2001). Yet, the analysis in this study strongly shows a positive relationship between the child's score on the Copy Form tasks and his CAP score.

The second null hypothesis was also rejected as a statistically significant relationship was found between the child's divided rectangle (the sixth form of the Copy Form tasks) score and the child's CAP. The divided rectangle is one form that, according to Ilg & Ames (1972), reveals a great deal about a child – especially his visual perceptions as a child developmentally younger than six is not mature enough to execute this Copy Form. The divided rectangle form requires directionality behaviors. These directionality behaviors are necessary in mastering concepts about print and in early reading (Clay, 2001). In fact, three of the children who were chronologically four years old did not complete this particular form for this study. Earlier research with four year olds (Ilg & Ames, 1974) pointed out that the four and four and a half year olds see the

divided rectangle as "too hard" and when willing to tackle it, experience little success. Overall, children who are developmentally younger than six do not have mature enough visual perceptions to handle this specific Copy Form. It is not until at the later age of six when the child shows an interest in oblique directionality.

The results of the Copy Form tasks corroborate with what the neurobiological research states about learning to read: the uniqueness of each child's cognitive and neural base (Medina, 2008). It appears that the responses to the Copy Forms tasks are a predictor of a child's readiness to read, and can inform an understanding of the unique developmental age of the child. This study further confirms the research that suggests that teaching formal reading instruction to children before the age of five may be too soon and potentially counterproductive (Goswami, 2005).

The research on visual perception (Clay, 2001; Evans & Saint-Aubin, 2011) supported the view of developmental readiness to teach children to read. If a child is struggling with drawing a Copy Form, for example the triangle, because of visual pursuits, it could be that the child may also not be ready for diagonal lines in reading and writing alphabet letters (e.g., "A"). When schools are searching for tools to support their differentiated instruction for children in kindergarten (ages four to six), the GDO-R Copy Forms could be a helpful tool, specifically the Copy Forms. With this information, schools can better make curricular decisions that meet the individual needs of students.

Research question/hypothesis three.

The third research question and its corresponding hypothesis explored the relationship of environmental factors as reported by parents and/or guardians to the child's developmental age (via GDO-R) and his readiness to read (CAP). The null

hypothesis read that there is no statistically significant relationship between the environmental factors as reported by parents and/or guardians and the child's developmental age (via GDO-R) and his readiness to read (via CAP). Two meaningful environmental factors were identified, Factor 1: "Parent/Child Interaction and Support for Literacy Opportunities" and Factor 2: "Child's Exposure to Digital Media and Food Choice." Results did not suggest statistically significant relationships existing between Factor 1 or Factor 2 and a child's developmental age (GDO-R); nor did results suggest significant relationships existing between Factor 1 or Factor 2 and the child's readiness to read (CAP). Thus, the null hypothesis was accepted.

These results do not support the body of research on emergent literacy or family literacy theory about the importance of the interactions children experience with books and print. A key point of emergent literacy describes the process of children learning about the environment in order to develop the meaning and concepts regarding the function of reading and writing (Morrow, 2011). Children's contact with print begins in their environment. Children as young as three can identify environmental print such as road signs, store logos, and fast food names (Whitehurst & Lonigan, 1998).

Coincidently, the items identified in the factor analysis deal with key features in family literacy theory (Taylor & Dorsey-Gaines, 1988; Wasik, 2004), which refers to the times that parents and children interact around print. Family literacy theory emphasizes how literacy develops in real life settings with adults modeling the literacy functions, such the child going to the library and the child being read to by an adult and caregiver. While these activities were included as specific items on the Gesell Parent/Guardian

Questionnaire, additional items may have been needed to more accurately capture the family literacy environment.

Research question/hypothesis four.

The fourth question and hypothesis explored which factors singly, or in combination, accounted for a child's readiness to read (CAP). The null hypothesis stated that there were no statistically significant factors that predicted a child's readiness to read. However, the null hypothesis was rejected as developmental age was found to be a statistically significant predictor of a child's readiness to read. In fact, developmental age was the only variable that entered the stepwise regression equation, accounting for 51% of the variance.

These findings support developmental theorists' (Elkind, 1994; Erickson, 1963; Gesell et al., 1940; Montessori, 1948; Piaget & Inhelder, 1969) assertions that having reached a specific chronological age does not guarantee any level of development. Rather, children develop at their own rates, thus highlighting the importance of developmental age. This study suggests that developmental age is a stronger predictor of the ability to perform reading readiness tasks via the Concepts About Print than chronological age or environmental factors.

Early childhood education is on the forefront of educational reform (Kauerz, 2010) as children's achievement and success in school is presented as a political as well as economic and social good (Heckman, 2008). This study strongly suggests that schools should consider developmental age in their educational decisions, rather than basing decisions on chronological age. These results confirm Dr. Gesell's original convictions that schools need to examine and attend to children's developmental ages as opposed to

their chronological ages (Ames, 1989). More importantly, this understanding of developmental age can help make parents and teacher better advocates for children. The implications and possibilities for this knowledge in guiding parents and educators in making educational decisions about children are numerous. The curriculum framework is one starting place; there teachers with parents can use their expertise to make adaptations as needed to optimize the fit with children. Together they can widen the curriculum scope to align across developmental ages and stages by emphasizing what is important for children to know and when they should be able to do it.

Limitations Found in the Study

Initial limitations found in this study were identified in Chapter One. As the research process progressed, additional limitations emerged. First, in obtaining the archived data, the parent questionnaire, only 58 of the 83 participants' parents/guardians had completed it. Second, the questionnaire, Gesell Parent/Guardian /Questionnaire (GPQ), used in this study was a self-reporting vehicle used for gathering data. Therefore, the accuracy of the respondents was limited by their self-knowledge, subjective interpretation, personal perspective, and individual honesty. Finally, the GPQ has not yet attained validity and reliability (Gesell Institute of Child Development, 2011). After review of the findings, and because the findings do not support environmental issues on learning to read, this section may require more examination. It may not be accurately capturing environmental factors that influence reading readiness.

Recommendations for Further Research

Further studies regarding the connection of visual perception, developmental age, and reading are strongly recommended. An unplanned aspect of the study was the strong

connection found between the early child developmentalists (e.g., Piaget, Montessori, and Gesell) and the current research of neuroscience about the wiring of the child's brain. Future research is needed to further investigate neuroeducation and its implications about how schools must become ready for children. Another area that would be beneficial for future research is a longitudinal study with this population, which follows their developmental age patterns and relationship to reading skills. An interesting aspect of the study was that there were not any statistically significant relationships between the environmental factors, developmental age, and emergent literacy. Future research is strongly recommended on the areas of environmental factors and developmental age and how they impact emergent literacy. There is body of research that supports the importance of environmental issues and emergent literacy; a possible focus of future research might incorporate child developmental factors.

Conclusion

In summary, this mixed method study found that a child's developmental age has a statistically significant relationship to his emergent literacy. In factor analysis, developmental age was a stronger predictor than the environmental factors of the child's readiness to read. The results of descriptive statistics revealed that the children in this study's developmental age were younger than their chronological age. This information is important for both parents and educators to know since a child who is chronologically five may not be behaving and functioning at a fully five-year-old developmental level, but may be younger, for example, between four and a half and five.

Based on these findings, not all five year olds are behaving in a manner that is fully five and may not be ready for the rigors of an increasingly academic and demanding

kindergarten curriculum. A child may have an above average knowledge base, but to be successful in school, a child also needs to be ready physically, socially, and emotionally, and exhibit adaptive behaviors that will support school success. In addition to a child's cognitive development, language, motor, and social development and the proficiency of self-help skills are essential to school success. Schools are currently designed to organize learning by chronological age, not developmental age; therefore, the findings of this study supports the idea that developmental age should be considered, specifically, in early literacy teaching and learning. Some suggestions may include to use the developmental profile of a child to inform the content and pace of curricular expectations, as well as to sequence learning experiences to the overall developmental level of a child, rather than by his chronological age.

Furthermore, the findings of this study revealed that there is a statistically significant relationship between a child's developmental age and readiness to read as measured by the CAP. Additionally, the child's developmental age was found to be the strongest predictor of the child's readiness to read. School readiness involves all the stakeholders: the parents, the teachers, the community as well as the child, and requires more than a "one size fits all" formula. Clay (2001) underlined the importance for educators to be alert to how active learners change over time within their given context. Clay emphasized that the acquisition of reading, a concept she coined as "emergent reading," is a journey, and that the responsibility of the educator is to meet each child at his level and take his learning from that point.

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Appendix A

IMMACULATA UNIVERSITY RESEARCH ETHICS REVIEW BOARD
REQUEST FOR PROTOCOL REVIEW–REVIEWER'S COMMENTS FORM
(R1297)

Name of Researcher: Karlen D. Senseny

Project Title: The Relationship Between Developmental Age and Emergent Literacy

Reviewer's Comments:

Your proposal is ***Approved***. You may begin to collect your data. This approval is good for one year from the date of issue.

Reviewer's Recommendations:

_____ Exempt	__X__ Approve
_____ Expedited	_____ Conditionally Approved
_____ Full Review	_____ Do Not Approve

Thomas F. O'Brien — July 28, 2011

Thomas F. O'Brien, Ph.D., Ed.D., RERB Chair — Date