

5-2007

ASSOCIATIONS BETWEEN AGE AT SCHOOL ENTRY AND ACADEMIC PERFORMANCE: USING DATA FROM A NATIONALLY REPRESENTATIVE, LONGITUDINAL SAMPLE

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ASSOCIATIONS BETWEEN AGE AT SCHOOL ENTRY AND ACADEMIC
PERFORMANCE: USING DATA FROM A NATIONALLY
REPRESENTATIVE, LONGITUDINAL SAMPLE

A Dissertation
Presented to
the Graduate School of
Clemson University

In Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy
Curriculum and Instruction

by
Dawn Fleischman
May 2007

Accepted by:
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ABSTRACT

The purpose of this study was to examine the associations between age at school entry and academic performance in kindergarten through the fifth grade. The study utilized the Early Childhood Longitudinal Study, Kindergarten Class of 1998-1999 (ECLS-K) dataset that includes a nationally representative sample that was collected over a six-year period and compiled by the National Center for Educational Statistics (NCES).

Even when controlling for the variables of gender, race, socioeconomic status, and disability, the analyses revealed that the youngest students did not perform as well in reading and math as their school entry peers through the fifth grade. A separate analysis indicated that the youngest students were also less likely than their school entry peers to be in the expected grade (fifth) during the fifth grade collection.

The findings are strengthened because the youngest students in the study were found to not be “at-risk” in other identified areas (gender, socioeconomic status, parents’ education level). Although the youngest group did not have the identified “at-risk” characteristics, they still performed less well than their school entry peers in both reading and math.

Based on the research findings of this study, implications for policy, curriculum, and assessment are discussed.

DEDICATION

My interest in the topic of school entry age originally began while teaching in the elementary classroom. For that reason, this work is dedicated to my past and future youngest students and to all the “youngest” people who have been part of my life. This work is also dedicated to my own children in anticipation that what has been learned will benefit them as well.

ACKNOWLEDGMENTS

It is not often that an academic advisor uses prayer or Scripture during advising, but I have been blessed to have Dr. Fisk as a source of continual counsel during my program. I am grateful for the proofreading he has engaged in over the years and through all stages of the dissertation. He has maintained high expectations throughout the program and has been patient in waiting for the expectations to be met. I am also appreciative to Dr. Thompson for the tremendous amount of time she has generously provided while working with me on the statistical analyses. I could not have completed this study without her expertise, and I am indebted to her. Thank you to Dr. Stegelin for making the connection with Dr. Thompson and for becoming an ally in my efforts. You have been a great source of positive feedback and encouragement. Dr. Dickey has offered many enriching opportunities in the area of science that I have thoroughly enjoyed, and her personal perspective and faithful contribution to the committee is valued. Thank you for allowing me to participate in a field I wish I had pursued as an undergraduate. Thank you to Dr. Gillis for her constructive feedback and insight supplied during the comprehensive exam, proposal, and final draft. Thank you all, especially, for your patience!

Second, there are two important people in my life who wanted me to complete this program more than I desired to complete it: my husband and my grandmother. Their continual status checks and encouragement helped push me forward when I might not have otherwise. It means a great deal to know they both

can be proud of me, and I am thankful my grandmother was able to see me through to the defense before passing away. Thank you also to my husband and children for their understanding in recent days when household items were neglected and personal attention was sacrificed.

Finally, thank you to my parents who have always been involved in my academic pursuits, but more importantly, in my spiritual well-being and in leading me to Christ. The only successes that truly matter are the ones that have eternal significance, and my prayer is that I can employ this degree in a way that brings honor to Christ.

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CHAPTER ONE

INTRODUCTION

The beginning school experience marks an important milestone in a child's life. However, for many children, the first year of school may not be the positive experience that the parents and child had anticipated. This may be due, in part, to the fact that many school systems fail to consider the needs and maturity of individual children. Most children enter the school system by following the state's mandatory school requirements, which are typically based on a specific chronological age. Such requirements, to be discussed in more detail later, seem to be created more for convenience and perceived equity than based on what research studies have shown about child development. In order to begin examining the topic of school entry, it is necessary to consider some of the key theories of child development and learning.

Theoretical Perspectives

For many years, scholars have proposed theories about how they believe children grow, develop, and learn. Because every human is expected to grow, develop, and learn, there is no doubt that trying to understand how the process takes place is a worthwhile pursuit. Theories involving when, how, and under what conditions learning takes place are instrumental in helping to gain a perspective on a child's optimal entry time into school. Unfortunately, there is not a definitive theory on which all educators agree that explains the process of growth and development or its contributing factors; however, there are many

varied and respected theories of child development and learning. These theories may overlap with each other, or they may be in direct conflict with each other. In order to thoroughly examine the topic of school entry, it is important to consider the theories that may be most relevant. For this discussion, the theories of John Watson, B.F. Skinner, Lev Vygotsky, Maria Montessori, Jean Piaget, Arnold Gesell, Erik Erikson, and Albert Bandura will be examined. The theorists will be grouped by the following topics related to school entry: manipulation of the environment, conditional terms, developmental readiness, and necessity of early successes.

Manipulation of the Environment and School Entry

Watson. The theory of John B. Watson is considered an approach in introspective psychology that focuses on consciousness (Watson, 1930/1970). Watson believed behavior must be observable, rather than speculative, and can be described in terms of stimuli and response. Because of this, he believed it is possible to predict and control behavior. Furthermore, the environment or stimuli can be manipulated to affect behavior. In contrast to developmental theories, Watson's behaviorism implied that training has more influence than developmental theories give credit. The implications of these theories on school entry will be discussed when behaviorism is examined further through Skinner's theories.

Skinner. Like Watson, B.F. Skinner was most known for his theories of behaviorism. He believed behavior is affected by conditioning and reinforcements (Skinner, 1953). Reinforcements may be positive or negative. Reinforcements that

are positive strengthen the behavior that produces it, but reinforcements that are negative strengthen behavior that reduces or eliminates it (Skinner, 1976).

Punishment suppresses the behavior. Positive reinforcement that families use may be food, warmth, affection, approval, and attention (Skinner, 1953). An educational system uses positive reinforcements such as good grades, promotion, diplomas, degrees, medals, and even economic reinforcement such as scholarships. However, behavior may be reinforced by social factors as well. Examples of such social reinforcement may be smiles, friendliness, cheering from a crowd, or negative reinforcement such as teasing or aggressiveness. It is the teacher's task to arrange contingencies under which the student acquires desired behavior (Skinner, 1976). The instructional contingencies must be contrived.

Behaviorists such as Watson and Skinner fully assert that the educational environment should be manipulated. Perhaps it could be argued from a behaviorist's perspective that creating a chronological age of entrance may be the first of such educational manipulations. However, if a behaviorist does not value or regard developmental stages, he may contend that entry age does not have to be considered or manipulated since the environment can be manipulated in order to obtain the desired results. Since behavior is the key, one can simply teach the desired behaviors even to younger students.

Regardless of the age a child enters school, a behaviorist would continue to manipulate the environment and stimuli throughout the education of the child. Incentives would be given for success. Positive reinforcement through good grades and emotional accolades would be critical to success. Similarly, from the

behaviorists' view, negative reinforcements such as threats of failure or punishment of low grades and failure may be necessary. However, it is important to note that what is a positive reinforcement for one child may not be so for the next. As stated previously, practicing the behavioral theory means that the instructional contingencies must be carefully contrived.

Conditional Terms and School Entry

Vygotsky. One popular theorist in early childhood was Lev Vygotsky. Although he died at a relatively young age from tuberculosis, he was well regarded in intellectual circles even as a young adult. He was a lawyer and psychologist whose career also involved working with mentally retarded children (Vygotsky, n.d./1978). Vygotsky developed a theory of human intellectual functioning and viewed the consciousness in its relationship to behavior. In Vygotsky's theory, the function of the brain, developmental history, and societal context are all to be considered when evaluating an individual. Maturation alone is not a sufficient explanation for intellectual functioning. Vygotsky was more interested in the process that leads to performance than he was in the actual performance.

Similar to the behaviorist view, Vygotsky considered a model of stimuli and response. However, unlike behaviorism, Vygotsky believed there was a "mediating" role (Vygotsky, n.d./1978). With Vygotsky's stimuli-response model, the learner could modify the stimuli before making the response. The learner is able to inhibit what would have been a direct impulse to react. Therefore, attending to stimuli is essential to success. Because Vygotsky views the learner as

being capable of mediating the stimuli, the editors of his work contend that Vygotsky cannot be viewed as stimuli-response theorist. A stimuli-response theorist would hold that an outside force is what would manipulate the stimuli or environment.

It is important to point out that although Vygotsky believed a learner could mediate the stimuli before responding, there are exceptions and limits to the mediation ability. Vygotsky believed that children of preschool age are not able to organize stimuli in order to master behavior. Once children reach school age, they become more capable of manipulating external stimuli. It is in adulthood that behavior remains mediated (Vygotsky, n.d./1978).

Another critical element of Vygotsky's theory is what he called the "zone of proximal development" (Vygotsky, 1934/1986). The zone of proximal development explores the relation between learning and development. The first level of development is considered the "actual developmental level" (Vygotsky, n.d./1978). It is the level of a child's mental functioning that results from completed developmental cycles. The zone of proximal development (ZPD) is then the distance between actual (independent) development and potential development that is determined by what could be accomplished with assistance from adults or more capable peers. Simplistically stated, ZPD addresses what can be done with assistance. With ZPD, the functions have not yet matured but are in the process of maturation.

Therefore, actual development can be viewed as retrospective, and ZPD as prospective (Vygotsky, n.d./1978). Because ZPD is prospective, imitation also

becomes a large part of the process. ZPD theory espouses that proper learning actually occurs in advance of development. Similarly, instruction precedes development, and development and instruction have different rhythms (Vygotsky, 1934/1986). Interaction with adults and peers is necessary. Such properly organized learning will result in mental development.

Vygotsky explored the acquisition of writing (Vygotsky, n.d./1978), and the findings are quite interesting. Writing can lag behind speech by as much as 6-8 years (Vygotsky, 1934/1986). Vygotsky maintained that the lag occurs because written speech is a linguistic function separate from oral speech. Written language requires a high level of abstraction, and Vygotsky declared it was the high level of abstraction that caused problems for the learner rather than underdevelopment of muscles.

Because Vygotsky did not view fine motor skills as presenting a problem for writing, he advocated teaching writing in preschool (Vygotsky, n.d./1978). However, if writing instruction is to occur in preschool, it must be taught with purpose and not as a mere motor skill or act of writing letters. It should be a complex cultural activity that is relevant to life. Although writing will begin as drawing, the drawing and depictions will be replaced with words.

Vygotsky's theory, similar to Jean Piaget who will be discussed later, examined the role of play. Vygotsky viewed play as a leading factor in development. However, the theorists differed somewhat in their views of play. Vygotsky believed that play helps satisfy a need but also creates an imaginary situation (Vygotsky, n.d./1978). In his view, play actually forces a child to act

against an impulse. This is especially the case in later years when such imaginary situations will change to rules in the development of play.

Whereas Piaget stressed biology, Vygotsky stressed interaction with the social environment and biology of behavior. Vygotsky maintained that development is unique for each individual. Every function will occur two times. The first occurs on the social level (interpsychological) and the second occurs on the psychological level (intrapyschological) (Vygotsky, n.d./1978).

With regard to school entry age, Vygotsky's statements and theory provide at least three indicators of what might have been Vygotsky's view on school entry age. The first indicator is that Vygotsky stated that if a child could read or write, school could be entered (Vygotsky, n.d./1978). Additionally, Vygotsky's ZPD theory provides a second indicator of his position on school entry that is consistent with the first. It could be argued that if a child is within the zone of proximal development for academic learning, school could be entered since an adult or more capable peer could help the child reach the next level of development. Finally, Vygotsky's view that learning and instruction should be in advance of development would also indicate acceptance of young students' entrance into the school system. It is important to note the conditions of entrance would include that a child must be able to read or write, must be within the necessary ZPD for school, and there must be adults and capable peers to assist in the child's learning.

Montessori. Maria Montessori can be viewed as an advocate for early childhood education. She believed that education must start from birth

(Montessori, 1967). Montessori also considered stages of development and school entrance. She maintained that children could learn without being aware of their own learning because education is a natural process developing spontaneously when a child acts on the environment.

The stages of development that Montessori describes are similar to the stages of other developmental theories. The age span is a bit broader in the first period as she includes birth to six years of age (Montessori, 1967). However, the first period is divided into sub phases similar to those of Piaget. The descriptions of the stages differ somewhat but do not appear to be contradictory.

With heavy emphasis on early learning, it seems that Montessori would be an advocate of entering school at a young age. Although Montessori did encourage parents to send their children to school at a young age, children were not directly taught. In the Montessori school, students who entered “school” at age 3 could often read and write before they were 5 years old without actually receiving instruction (Montessori, 1967). Montessori points out that it is not because of advantaged or affluent backgrounds that these children were able to accomplish the tasks. On the contrary, the students in the school were from lower socioeconomic homes in which many parents were uneducated themselves.

Although we know that Montessori allowed children to enter school at a young age, it is important to remember that Montessori’s school setting is not the traditional American school setting nor is the instruction typical of other schools. Children of various ages are in the same classroom and may work together or independently. Children advance at their own pace rather than receiving whole

group instruction. Because of the differences in school settings, it is likely not safe to conclude that Montessori would advocate sending very young children to a traditional school setting. It is known that Montessori believed a child who is six is often intelligent enough to go to school (Montessori, 1967), and the period of development at age six is one in which the child begins to understand and is patient to listen. However, Montessori realized that learning occurs from birth, and in the Montessori school setting, it is appropriate for very young children to attend school.

Developmental Readiness and School Entry

Piaget. Probably the most well known theorist on topics of early childhood is Jean Piaget. Piaget believed learning takes place through assimilation, accommodation, and adaptation or equilibration within a child's environment (Hergenhahn, 1982; Maier, 1969). Assimilation is the natural integration of an event, and accommodation requires modifying one's thinking (cognitive structures) based on the environment. Adaptation or equilibration entails a balance between self and the environment. All three processes involve the child and the environment. There is very little stated about the adult's role in the child's learning.

In addition to the influence of the environment, Piaget asserts that individuals go through natural stages of development. Piaget identified the phases of development as sensorimotor - occurring between birth to two; preoperational - from two to about eight years of age; concrete operations - from seven to about twelve; and formal operations - from age eleven or twelve to about age 15

(Hergenhahn, 1982; Piaget, 1935/1970). Although there is some overlap in ages of each stage, Piaget maintained that development occurs in a unitary direction through each distinct phase. Furthermore, the sequence is the same for all individuals.

Piaget's theory proposes that individuals' thinking develops from concrete to abstract or simple to complex (Maier, 1969). For example, in the preschool ages, children engage in continuous investigation. Their primary mode of learning is through interaction with their environment and playing. As they enter the next phase (ages 4-7), they have an increased social interest in their world. They think more in parts than the whole, and although they can count, the concept of numbers is often not real. They engage in self-conversation and usually demonstrate obedience to adults. In the stage that follows (7-11), they begin to understand relationships such as part-to-whole, can begin conceptualizing and classifying, shift from inductive to deductive thinking, and can begin applying knowledge. Although the thought processes of the seven to eleven year old are more advanced, they still depend on a tie to real objects or events rather than verbally or abstractly (Hergenhahn, 1982; Piaget, 1935/1970). In considering all the skills they are acquiring during this stage, it seems logical that this would also be the stage in which most students are beginning school. Similarly, it is the following stage when they are eleven or twelve years old that they are more likely to begin thinking hypothetically or in the abstract.

In terms of entrance to school, the theory of Piaget suggests that sending a child to school before developmentally ready would not be of benefit. A child

may not be considered capable of achieving success if the child has not reached the appropriate developmental stage. Piaget has ascribed ages to each of the developmental phases, but it is important to note that the ages are simply a range and do not represent exact age norms (Maier, 1969). Although the range of age exists for each phase and is consistent for most, some children may enter a stage at an earlier or later chronological age (Piaget, 1929). In fact, Piaget (1935/1970) acknowledges that there may be individuals who vary by as much as 4 years. Therefore, chronological age should be considered a guide rather than as a criterion for progress.

When considering Piaget's theories of development, school entry should be based on developmental level rather than a specific chronological age. Even once a child enters school, the developmental stage of the child should help determine the appropriate method of instruction. If a child were in the preoperational stage of development, lectures would not be beneficial since the child is still lacking some mental operations such as conservation and deductive logic (Piaget, 1935/1970). Instead, the child would need to be exposed to concrete methods that allow interaction with the environment. The experiences then build on each other so that prior experiences influence present experiences and learning (Hergenhahn, 1982).

Gesell. Similar to Piaget, Arnold Gesell observed natural and sequential stages of development in children (Gesell & Ilg, 1936). As a developmental theorist, he proposed that children develop in progression, but the amount of time a child needs to grow and develop will vary (Gesell, Ilg, & Ames, 1956; Gesell

Institute of Human Development, 1997). However, every child has a unique pattern of development, and transformations in the first five years of a child's life far exceed those of any other half-decade (Gesell, Halverson, Ilg, Castner, Ames, and Amatruda, 1940). To further add variation to the developmental stages, Gesell and co-authors suggest that development may differ by gender as well. Regardless of gender, Gesell and colleagues warn that swings in development are not to be considered abnormal. Gesell and Ilg explain that growth cannot be expected to take a straight line of course.

With respect to school entrance age, the developmental theory of Gesell maintains that entrance to school is not a simple transition, and the smoothness of school entry largely depends on emotional maturity (Gesell & Ilg, 1946). Merely reaching a set chronological age does not guarantee development (Ilg, 1982) nor does it insure a child is ready for instruction (Gesell et al., 1940). Ilg further proposes that a child should start school based on developmental age rather than chronological age. Placement decisions should respect developmental differences (Gesell Institute of Human Development, 1997). Furthermore, after entrance, it is important to allow children time to mature as they progress through the elementary school years.

Gesell and colleagues not only discourage the entrance of a child to school before the child is ready but also warn that sending a child to school before ready will result in maladjustments, feelings of inadequacy, disappointments, confusion, and misdirected teaching (Gesell et al., 1940). The authors explain that even a five-year-old may not be ready for reading, writing, and math for another two

years. Unlike Vygotsky and Montessori who suggest writing begin in preschool, Gesell and colleagues state that the eye-hand coordination needed for writing means that some children may not be ready for writing until six years of age. Although Vygotsky and Gesell differ on their opinions as to when to begin writing instruction, they both agree that writing lags behind the development of speech and reading (Gesell & Ilg, 1946; Vygotsky 1934/1986).

Gesell insisted that school performance is affected by maturity and patterns of growth. Specific developmental problems such as vision and eye muscle development can relate to reading difficulties. He cites that a December versus June birthday may cause an effect on status in kindergarten, and six months difference in chronological age or developmental age may affect adjustment in first grade (Gesell & Ilg, 1946).

Early Successes and School Entry

Erikson. Erik Erikson was a child psychoanalyst whose theory blended biology, psychology, and sociology (Friedman, 1999; Maier, 1969). Friedman points out that Erikson's theory may have been influenced by his marriage to a woman with a background in sociology. However, Erikson's formal training was with Sigmund and Anna Freud in the area of psychoanalysis. Erikson chose to blend psychoanalysis with the social sciences. For Erikson, social circumstances were seen as integral to the development and behavior of the child. Therefore, growth is viewed as not only being related to the individual but also to the family and society (Maier, 1969).

Erikson created an eight-stage model of the human life cycle (Erikson, 1963; Friedman, 1999). The fourth stage that he coined “Industry versus Inferiority” is likely the most applicable to the topic of school entry age because school-age children (ages 7-11) are the focus group during this stage of development (Maier, 1969). During this stage, the primary virtue children develop is competence (Friedman, 1999). Since children are being exposed to academic knowledge and skills, developing competence in their ability to successfully achieve in school is a priority. Additionally, the child is progressing from play to semi-play or work. Bringing a production to completion becomes more important than play (Erikson, 1963). Maier (1969) states that during this stage, it is through learning that a child becomes competent. Erikson (1963) maintains that if a child does not feel equipped to learn, the self-perception may be one of mediocrity or inadequacy. Furthermore, he insists that a child’s will to learn can decide one’s own identity.

Although children have experienced social interaction in various settings prior to school, it is during the stage of “Industry versus Inferiority” that more meaningful, social interaction begins to occur. Society becomes significant (Erikson, 1963), and the child is constantly measuring himself with peers. In part, the social interaction begins as the children enter the new environment of school. The emphasis on social interaction and identity with peers will continue to increase through the stage that follows when childhood ends and adolescence begins.

The social world of school-aged children includes the teacher, classmates, and others. Friedman (1999) reports that Erikson placed considerable emphasis on the role of social influences, including the teacher-student relationship. Many observations and analyses were conducted by examining interactions between the student and the teacher. If one considers the characteristics and goals Erikson ascribes to this age, school entry becomes a critical time in the child's life. Not only must the child achieve competence and success, but there is also a comparison of one's own self and successes to those of the peers. If there are peers that are older and/or further along in development, the child may feel defeated instead of competent. Such comparisons may affect the child's self-esteem and chance of future success. Furthermore, the child is not aware of the chronological and developmental differences that make the comparison unfair.

The teacher may not recognize the chronological and developmental difference either and may think poorly of the student's abilities. The student-teacher relationship that Erikson views as important may be affected. The teacher, unknowingly, may interact differently with the children based on their successes and struggles, and the child may be aware of the differences in interactions. Additionally, because Erikson places emphasis on the social aspects at this stage, the relationship between classmates may also influence the child's own view of competence.

Although Erikson's theory may not define an exact age upon which school should be entered, there is no doubt that his theory places much emphasis on the need for a child to be successful during this stage of development. With Erikson's

theory, it is competence that is the main virtue that is to be developed during this stage, and children must be successful in order to develop competence. If children are unable to be successful in school due to their young age, the rest of their development could be negatively affected.

Bandura. Another theorist who places emphasis on early success is Albert Bandura. Bandura is often associated with observational learning and social learning theories, and his theories draw a distinction between learning and performance (Bandura, 1977; Hergenhahn, 1982). The theories incorporate reciprocal determinism, self-regulation, and self-efficacy. It is necessary to address each component to determine a position on school entrance.

Unlike the behaviorism of Watson and Skinner that maintains stimuli create responses without the learner being aware of the influence, social learning theory suggests that the learner is not just a “pawn of external influence” but has the ability to manipulate stimuli (Bandura, 1977). Bandura claims that the learner must be aware of the reinforcement in order for it to have an effect. Bandura’s social learning theory postulates that learning can involve vicarious, symbolic, and self-regulation processes, and behavior can be influenced by observation and direct experience. As a component of social learning theory, reciprocal determinism proposes that there is a continuous interaction among cognitive, behavioral, and environmental forces. Therefore, the environment influences the person, but the person also influences the environment. The following processes affect Bandura’s theory of observational learning: attention, retention, motor reproduction, and motivation (Bandura, 1977). In other words, in order for a

learner to engage in observational learning, sensory capacities must be present allowing attendance to current reinforcements, maintaining mental images of past experiences, translating the learning to performance, and being motivated by an expectation or incentive. The progression of those four processes demonstrates the notion of reciprocal determinism that explains how the learner, behavior, and environment interact to affect each other. Therefore, reciprocal determinism is integral to social learning theory.

Bandura asserts that intrinsic reinforcement is more influential than extrinsic reinforcement, and self-regulation can be utilized to attain the intrinsic reinforcement. Self-regulation is the way in which a learner selects, organizes, and transforms stimuli (Bandura, 1977). Self-regulation involves a self-evaluation of learned performance standards that can be evaluated either positively or negatively (Hergenhahn, 1982). Bandura maintains that people can regulate behavior once they determine the relationship among situations, actions, and outcomes. They also form an opinion of the behavior they feel they can regulate most effectively. One's perceived self-efficacy is the impression of what one is capable, and that efficacy can be derived from actual performance accomplishments but also from the vicarious experiences of others.

Bandura maintains that chronological age should not be relied on as an index of development (Bandura, 1977). Directly applying Bandura's theories to the topic of school entrance age may not seem as intuitive as the application of developmental theories; however, if accurate, Bandura's theories reveal

significant implications that must be considered when discussing the effects of age and early educational experiences.

Recall that self-regulation can result in a positive or negative evaluation, and self-efficacy results from indirect and direct vicarious experiences with success and failure. If a child enters school before ready to master the required tasks, success may not be achieved. Self-evaluation will likely be negative. Consequently, the impression of the child's own capabilities (self-efficacy) will be low. Bandura warns that false beliefs become self-perpetuating (Hergenhahn, 1982), and self-criticism can lead to self-produced distress that may result in deviant behavior (Bandura, 1977). Furthermore, one's belief about efficacy determines whether a learner will even try to cope with a task or intentionally avoid the task. Perceived self-efficacy and actual self-efficacy may not be the same, but the way the learners perceive their own efficacy will dominate. For this reason, the first experiences in school must be successful. If a child's young age or delayed development is preventing achievement in school, the lack of success and alteration to self-efficacy is likely to affect future performance as well. Additionally, Bandura states social comparison is inevitable. If young students do not perform well and then compare themselves to the older students who may be performing well, efficacy is likely to be affected.

Conflicting Views

Although the theorists may not have directly addressed the issue of the best time for a child to enter school, an examination of the theories provides an indication of the point of view each theorist might take.

As behaviorists, Watson and Skinner maintain that behavior can be controlled by manipulating the environment through reinforcement. Therefore, one might say that they would be less likely to be concerned about developmental readiness for school, and entrance age would be of less importance. Vygotsky and Montessori would also probably both propose sending the child without delay. However, school entrance would be conditional. With Vygotsky, the child would have to be within an acceptable range (zone of proximal development) to insure that the teacher could successfully aid the child in reaching the next level. Montessori advocates sending a child to school at a young age, but the school would be more consistent with the Montessori school not one of traditional setting and instruction.

Other theorists may be more hesitant to send a child at a young age. As developmentalists, Piaget and Gesell would likely assert that it would not be productive to send a child to school before developmentally ready. Erikson and Bandura place emphasis on the importance of early success. Since they maintain that future successes are dependent on early successes, they would likely propose to delay the child's entry into school until success can be insured.

It is important to examine the findings of studies that have explored the issue of entrance age to determine which of the theoretical perspectives most closely matches the reality of students entering school. In order to address whether there is a difference due to chronological age, it will be necessary to examine the performance among the youngest and oldest students. It will also be important to look at studies that analyze the long-term impact of school entrance

age. Erikson's theory involving the acquisition of competence and Bandura's view of self-efficacy will be best examined through long-term studies to determine if the students' successes change over time. Finally, a review of literature to explore the effects of delaying entry will provide insight into whether the developmental readiness theories of Piaget and Gesell make it necessary to delay a child's entrance and if doing so produces a positive effect.

CHAPTER TWO

LITERATURE REVIEW

Increasing Expectations

Children's knowledge level is different today than it was 20 years ago, in part, due to the increased participation in preschool, addition of educational electronic games, advances in technology, and exposure to many educational television programs (Shepard, 1997; Siegel & Hanson, 1991). The U.S. Department of Education in *The Condition of Education* (2000-2005) determined that the increase in preprimary enrollment of 3-5 year olds between the years of 1970-1998 was more than for any other age group. Although preschool was once offered only by private organizations such as churches, it is estimated that about 35% of public elementary schools offer pre-kindergarten classes (Wirt, Choy, Rooney, Provasnik, Sen, & Tobin, 2004). Children are acquiring skills and knowledge at early ages, and the trend appears to begin in the preschool years. In 2001, the Bush administration called for increased emphasis on academic content in the Head Start program (Coley, 2002).

Because many students are now entering school with the academic knowledge and skills that were previously not acquired until participation in school, the expectations of kindergarten have changed. Escalating demands are placed on kindergartners and rigorous standards imposed that were not as prevalent in previous years (Stipek & Byler, 2001). Many researchers maintain that typical kindergartners in the U.S. are now being taught material that was once

found in first grade (NAEYC, 1995; Uphoff 1989; Vecchiotti, 2003). It is not uncommon for a kindergarten class to have worksheets based on skills and an environment that requires them to sit still for extended periods of time (Shepard, 1997). Because of this shift in curriculum, some children may appear to be less “ready” for school (Bickel, Zigmond, & Strayhorn, 1991). The phenomenon is ironic since kindergarten, at one time, was an optional grade designed to help transition and prepare students for school. According to Zill and West (2001), kindergarten is now considered the first year of school for nearly all kids. In 1999, it was estimated that 93% of five-year-olds were enrolled in an education program (U.S. D.O.E., 2000).

Retention as a Result

Unfortunately, according to the National Association of Early Childhood Specialists (2000), demanding more of kindergartners has resulted in an increase in retention. One group of researchers determined that among a sample of kindergartners across the U.S., 5% were repeating kindergarten (Malone, West, Flanagan, & Park, 2006). Although it is possible that individuals may believe retention in kindergarten is not significant because of the young age of the child, Shepard (1994) disputes this notion and maintains that children do notice and refer to the experience years later. Frey (2005) and Jimerson (2001) assert that most of the research studies on retention have focused on students who were retained in kindergarten, first, second, and third grades. Frey adds that it is important to consider the long-term impact of retention in the primary grades because the repercussions of grade retention may not occur until later years.

Indeed, the curricular demands do not end in kindergarten. Students must be accountable for attainment of grade level standards throughout their school experience, and high-stakes testing has been implemented for that purpose. For this reason, Frey maintains there has also been an increase in retention in later grades. The National Association of School Psychologists [NASP] (2003) reports that an estimated 15% of students in American schools are retained each year. Furthermore, the NASP reports that between 30%-50% of all students in the U.S. are retained at least once before the ninth grade.

Many in-depth papers could be, and have been, written on the topic of retention. Yet, researchers have discovered that classroom teachers may not be aware of the findings from studies on the topic. Witmer, Hoffman, and Nottis (2004) reported that only 9% of teachers stated their knowledge about retention came from reading journal articles or attending workshops on retention. Additionally, 23% stated they had extremely limited knowledge about current research on retention. Although teachers were relatively unaware of research findings, researchers reported that 77% of the teachers stated retention was an effective practice that could prevent failure in later grades. It is important to note that there were only 35 teachers in the sample, and the findings from such a small group may not reflect the views or knowledge of all teachers.

Regardless of teachers' opinions regarding the effectiveness of retention, research findings appear fairly consistent on this issue. Reviews of literature on retention indicate that retention is a poor alternative for students experiencing difficulties in school (Bowman, 2005; Frey, 2005; Jimerson, 2001; Jimerson,

Anderson, & Whipple, 2002; Wolf & Kessler, 1987). Similarly, others have found that retention has no academic advantage and, instead, can result in negative outcomes academically, socially, and/or emotionally (Byrd, Weitzman, & Auinger, 1997; Malone et al., 2006; NAECS, 2000; Siegel & Hanson, 1991; Zill, Loomis, & West, 1997). Jimerson and Kaufman (2003) conducted an extensive review of literature on retention and concluded that the studies on grade retention failed to show support for retention as a means of enhancing academic achievement, socio-emotional, or behavioral adjustment. Frey's review of literature on retention revealed that low-income, minority students and boys experience the highest rate of retention. Likewise Malone and colleagues (2006) also found that retention was more likely to include those children who were male, in poverty, less likely to have attended preschool, and had parents with less than a high school education. Hong and Raudenbush (2005) examined a group of retained kindergartners and concluded that those retained were likely to be from lower socioeconomic families, single parent homes with more siblings, less likely to own a computer, and had fewer books. Furthermore, Kundert, May, and Brent (1995) found the IQ of students who were retained to be significantly lower than students who had delayed school entry. These findings will be important to consider in later discussion.

Retention often results in simply receiving curriculum a second time instead of receiving concentrated remediation for areas of difficulty (Zill et al., 97). Hong and Raudenbush (2005) found that after a year of retention, the retained students demonstrated a lower achievement level in both reading and mathematics

compared to their promoted peers. The researchers concluded that there was no evidence of any immediate benefit of the retention. Furthermore, the findings seemed to indicate that the retained students were even further behind. At the end of first grade, the retained students were achieving lower scores in reading and math than those who had been promoted (Malone et al., 2006). For this and other reasons, the NAECS (2000) and the NDPC/N (2005) maintain that retention can ultimately result in students dropping out of school. In their reviews, Jimerson et al., (2002) and Jimerson and Kaufman (2003) found that students who were retained were more likely to drop out of school, and the likelihood only continued to increase if the retention occurred in later grades. The researchers concluded that regardless of the grade, ethnicity, or locale, retention is highly associated with high school dropout.

Thinking back to the theoretical perspectives discussed in Chapter 1, it is possible to view such circumstances from a behavioral perspective. Success serves as a positive reinforcement. If a student is not experiencing success, he/she is not being positively reinforced. Although the threat of being expelled from school may be used as a negative reinforcement or as a punishment when it occurs, the student who is not successful may not view the event in that manner. For a student that is failing, being expelled or choosing on one's own to dropout of school may provide an "escape" and serve as the "avoidance" (Skinner, 1953) that correlates with the behavioral theory.

The higher rate of retention among dropouts has further implications into adulthood. Failure in school results in a reduced number of employment

opportunities and lower wages once the student becomes an adult (Frey, 2005). One group of researchers reviewed the literature on retention to specifically examine the association of retention and dropping out of high school (Jimerson, Anderson, & Whipple, 2002). They concluded that grade retention is one of the most powerful predictors of dropout status. Jimerson (2001) concludes that student failures are society's failures. If one considers that dropouts are more likely to be unemployed, depend on social services, and be incarcerated, the negative effects on society would be difficult to dispute (Bowman, 2005). For many of the reasons discussed, the NASP (2003) and the National Dropout Prevention Center/Network [NDPC/N] urge the use of alternatives to retention when addressing the needs of students who are under-achieving. Furthermore, the NAECS asserts that retention should not even be considered an option for young children.

Readiness for School Entry

If the increase in academic expectations has led to retaining children after they have already begun school, the issue of readiness for school entry becomes more important. It is essential that students have a "good start" to their school experience. Considering the ideal time for students to enter kindergarten becomes critical. The study by Bickel and colleagues (1991) revealed a correlation between entrance age and the number of years spent in kindergarten.

The topic involving when a child is most "ready" to enter school is one that fuels much debate among researchers, parents, educators, and policy makers. When referring to the issue of entrance age and readiness, researchers describe the

issue and research findings as a subject of debate (Stipek & Byler, 2001), controversial (Crnic & Lamberty, 1994), clouded (Gullo & Burton, 1992), contradictory (May, Kundert, & Brent, 1995; Sweeney, 1995), confusing (Morrison, Griffith, & Alberts, 1997), unanswered in many respects (Crosser, 1991), an entity broader than birth date alone (Thompson, Barnsley, & Battle, 2004), and having no clear answers (Teltsch & Breznitz, 1988).

Entrance Age

It seems apparent that state education departments are in disagreement on this subject also. According to the NAECS (2000), many states in the U.S. have raised the age of kindergarten eligibility in recent years. While cut-off dates for entry are now earlier than in previous years, cut-off dates vary among states by as many as seven months (McMaken, 2005; Kauerz, 2005; National Association for the Education of Young Children [NAEYC], 1997b). Although states may allow districts flexibility with their policies, entry age is, primarily, handled as a state policy (Morrison et al., 1997). Agencies deciding on cut-off dates should have a basis for doing so; however, Siegel and Hanson (1991) and Wolf and Kessler (1987) maintain that policies are made and changed without respect to research.

Merely reaching a fifth birthday does not insure that a child is ready for school nor does it guarantee a specific level of development (Ilg, 1982). Crnic and Lamberty (1994) assert that 5 years of age may not be the optimal age of readiness. The authors point out that during the 19th century in Massachusetts, children entered school from a range as young as 3 years of age to 7 years of age. In an attempt to determine the ages of kindergartners today, several researchers

utilized a database that included a sample of kindergartners from across the United States. Among other data, the researchers examined the ages of kindergartners upon entry to school. The age range of kindergartners in the U.S. was estimated to be between 4 ½-years-old to just over 6 ½- years-old (Coley, 2002) with the typical kindergartner beginning the year at 5 ½ years of age (Zill & West, 2001).

There are many policy issues involved, and Vechiotti (2003) mentions that primary policy issues include mandating kindergarten and establishing a standard entry age. An examination of practices will reveal in which direction current policy leans.

Utilizing the tables compiled for the Education Commission of the States (ECS), only 14 states include mandatory attendance in kindergarten, and 12 of those states, despite being listed as mandatory, have provisions for exemptions or waivers of some type (Kauerz & McMaken, 2005). As for compulsory school age, the range of ages for compulsory attendance varied between 5-8 years of age. There were 8 states that required school attendance by 5 years of age; 23 states required attendance at 6 years of age; 17 states required attendance at 7 years of age; and 2 states required attendance by 8 years of age.

As for the assertion that the kindergarten entry age has been increased, tables compiled and updated for the ECS were utilized (McMaken, 2005). It was determined that 34 of the states in the U.S. implemented a cut-off date between July and September for eligibility to kindergarten. The cut-off dates of six additional states were not reported because the cut-off dates were not state-

mandated. An additional two states allowed the local districts to select a date within a specified state mandated range of months. Not considering the six states with local entrance ages, it is known that almost 80% of the U.S. states implemented a cut-off date falling between the months of July and October. Shepard and Smith (1988) warn that it is important to consider that when entry age is increased, access to public education is delayed. Parents are then faced with the added childcare expense or a parent must be forced to delay entering the work force for an additional year (Datar, 2006b).

While the core of the entrance age topic concentrates on the young child, it is important to remember that school entrance age is not just an early childhood issue. The effects of entry age may not become evident until later years (Morrison et al., 1997), even as late as high school (Byrd et al., 1997)—long after the entry decision has been made. Denton and West (2002) affirm that early education sets the tone for later learning. For this reason, the importance of establishing policies regarding entrance to school cannot be dismissed or considered half-heartedly.

Readiness

Considering the call by the Bush Administration for greater emphasis on readiness (Coley, 2002), those in the political system seem to be focusing on the issue of school readiness. Instead of using chronological age as the guideline for school entry, would it make sense to use readiness as the criteria for determining school entry?

There are individuals who believe assessing readiness is a more appropriate way to determine school entry than chronological age. Shank (1990) asserts that

readiness assessment tests should be used to determine readiness for school entry. However, many other individuals disagree. Readiness tests and readiness assessment are believed to be complex (Vecchiotti, 2003), unreliable (Charlesworth, 1989; NAECS, 2000; Shepard, 1994), incorrectly administered and misinterpreted (American Academy of Pediatrics [AAP], 1995; Shepard, 1997), or inappropriately used (NAECS, 2000; NAEYC, 1997a). Shepard also states that the tests often lack technical vigor, and it is difficult to insure accurate results with young children. Moreover, readiness tests may, inadvertently, exclude the students who need help the most (Crnic & Lamberty, 1994; Shepard, 1997). These students may be ones who are from disadvantaged backgrounds or require early intervention due to special needs. Furthermore, Graue (1993) maintains that readiness tests do not accurately predict later success in school. When students fail readiness tests, the reason could stem from a lack of experience rather than a lack of ability (NAEYC, 1995; Shepard, 1994). Inaccurate results of readiness tests could also be a product of differences in language and culture (NAECS, 2000). The AAP maintains that under no circumstances should readiness tests be used to determine special education service or to over-ride the child's legal age.

Crnic and Lamberty (1994) question whether it is the school's or family's responsibility to make a child "ready" for school. Relying on readiness testing as the means of determining school entry places the responsibility on the parents rather than the school. Siegel and Hanson (1991) assert that when a child fails readiness testing and is excluded from a school, it is a violation of his/her right to a free public education.

It is important to note that readiness assessment does not need to be discarded, but individuals must be assured that readiness tests can be valid, reliable, and used appropriately. Although Saluja et al. (2000) state that the assessment is a “hot topic”, challenging, and highly debated, they also add that measuring readiness has become very important. They contend that early assessment has a place in the educational system and can be beneficial when used correctly. Early assessment can help in planning and individualizing curriculum and establishing a baseline upon entry for school accountability purposes, but until tests can be made valid and reliable, chronological age will continue to be used as the criteria for school entry.

Siegel and Hanson (1991) and others (Brent, May, and Kundert, 1996) assert that chronological age should be the deciding factor in school entry. Stipek (2002) states the criterion of age is more equitable and less susceptible to cultural or social biases. The NAECS (2000) and NAEYC (1997a) concur that because readiness tests must be reliable and valid, the guideline of chronological age is the only legal answer for now. All indication is that U.S. states are adhering to the recommendation of chronological age. By examining school entry policies among the states in the U.S., Saluja et al. (2000) concluded that age is, indeed, the criterion used most often for kindergarten eligibility.

Academic Redshirting

Despite the imposed age criterion, the concern parents have about their child’s readiness may still exist regardless of the actual age of the child. According to a study by Graue (1993), parents expressed concern regarding their

children's readiness related to fundamental skills, social interaction, attitude for learning, and being prepared for later grades. Because a notion exists that older students are better able to handle curriculum (Stipek, 2002) and kids younger than classmates are at risk (McClelland, Morrison, & Homes, 2000), parents may choose to delay their child's entry into school. "Academic redshirting" is the practice of delaying a child's entry into school. The term is derived from a practice in athletics in which a beginning athlete is placed on reserve and ineligible to play for the season. The strategy is to groom the player so that the experience and maturity gained during the extra season will result in a better, more competitive, player. In school, academic redshirting is delaying school entry an additional year in hopes of providing an extra year to mature cognitively, socially, and/or physically so that there is a better chance of being successful in school. Such decisions to delay entry may be solely the parents' or may be recommended by the school.

Many experts, including teachers and administrators, advise parents to delay their "young" child's entry into school even without the knowledge of research (Crosser, 1991; Graue & DiPerna, 2000). One team of researchers found that 55% of kindergarten teachers think it is acceptable to have age-eligible children wait a year to enter school if they seem unready (Heaviside & Farris, 1993). Wolf and Kessler (1987) assert that teachers are taught that younger children are less likely to perform as well as older children, and other researchers have found that teachers view youngness negatively (Graue, Kroeger, and Brown, 2003). Although disturbing, several authors have speculated that those in the school

system may suggest delaying entry with the hope that doing so will also increase test scores (Marshall, 2003; Stipek, 2002). Because of these issues and others, delaying a child's entry into school is somewhat common.

Although one might anticipate that the increase in preschool attendance in recent years would lessen the need to delay entry, Graue and DiPerna (2000) found just the opposite to be true. Despite the increase in preschool attendance in recent years, there also has been a steady increase in delaying school entry. In a study they conducted, Graue and DiPerna examined the school records of more than 8,000 students and determined that there was a 7% incidence of delayed entry. They caution that the 7% calculation is likely an underestimate of actual occurrence due to the fact that an additional 3.2% was not included in the data since it was unknown if the students delayed entry or were retained. Similar findings occurred in other studies as well. Another study that examined students from across the U.S. determined that 6% of kindergartners had delayed entry even though they were eligible by age the previous year to enter (Malone et al., 2006). Despite the fact that teachers and administrators were not promoting the use of delayed entry, one school district was witnessing such an increase in delayed entries that a group of researchers came to examine the incidence. Upon examination, the investigators discovered that the percentage of parents in that district who delayed their child's entrance into school increased from 5% to 16% over a 12-year period (Brent et al., 1996).

Such delays in entry are typically made because it is believed that students who are the youngest in their class may not be ready for the demands of school.

Another team of researchers (Uphoff, Gilmore, & Huber, 1986) conducted studies to determine if younger students perform as well in school as the older students. The results of their investigation caused them to assert that any child who is not 5 ½ years of age when school begins should wait a year before entering kindergarten. Teltsch and Breznitz (1988) affirm that a few months difference in age can produce a significant effect on achievement and school adjustment.

It is necessary to examine the studies on younger and older students to determine if advantages or disadvantages do indeed exist. Furthermore, it is critical to ascertain whether such advantages or disadvantages occur in all areas of development and school success. The specific areas of academic, physical, and social/emotional/behavioral development need to be explored. It also will be necessary to determine if advantages or disadvantages occur over the long-term in the school process or only upon initial entry. The relationship between the youngest students and the use of special services should also be examined.

Differences within Developmental Domains

Although children may possess more content knowledge when entering school than they did in the past, these young children also have areas in need of development. Such areas are necessary for the tasks they are expected to complete. Just because a child is old enough for school does not mean the child is developmentally ready to succeed in school (Holloway, 2003). While students may have age in common, their development can vary greatly (Saluja et al., 2000). Saluja and colleagues maintain that development can be rapid, uneven, and influenced by the environment. Stipek and Byler (2001) agree that development is

uneven and add that age alone cannot be viewed as highly predictive of later behavior and skill attainment. They add that the volatility of predicting later behavior based on age alone is particularly intensified when considering such a narrow age range in early childhood. The NAECS (2000) also agrees that behavior expectations in young children can be highly variable yet still considered within normative standards. A few months difference in age can produce a significant effect on achievement and school adjustment (Shepard, 1986; Teltsch & Breznitz, 1988), and the Gesell Institute of Human Development asserts that, developmentally, a child can be six or more months younger than the actual chronological age. For this reason, the Gesell Institute of Human Development holds the position that children should enter school and be promoted based on developmental age rather than chronological age (Ilg, 1982).

Zill et al. (1997) maintain that the rate of development will vary across domains. They explain that while one 5-year-old can read, another may only be able to identify a few letters. Additionally, the child strong in academics may have social difficulties and cry easily. NAEYC (1997a) states that age is a crude index of developmental maturity. Furthermore, they maintain that individual variation should be valued.

The major focus of the Gesell Institute of Human Development is to better understand child growth and development. Their point of view is that every child passes through the same developmental stage but that the pattern and rate is unique to each child. One example of children passing through the same stages can be seen in a study that examined the reading stages of blind children. The

researchers concluded that in learning to read print or Braille text, students progressed through similar stages (Steinman, LeJeune, & Kinbrough, 2006).

Although development may occur at any time during a specified set of years and still be considered within the normal range, our educational system demands mastery of specific objectives and skills during an individual year of school. In a survey of kindergarten teachers, there were 88% who felt readiness can't be pushed but must be matured (Heaviside & Farris, 1993). Yet, it is possible that when schools and teachers fail to account for the varying rates of development, particularly with primary age children, unrealistic expectations may exist (Wallingford & Prout, 2000). Graue, Kroeger, and Brown (2003) concur that students may be judged by normative standards; yet, all children do not learn in the same way or at the same rate. Shank (1990) states that it is because of such struggles and failures experienced early in school that some students learn to be helpless. One must question whether the schools inadvertently put certain children into a position in which they feel inadequate or unsuccessful from the beginning of their school experience.

Because the early experiences of school shape the way in which children view themselves and their learning ability, feeling unsuccessful or inadequate at the beginning of school can affect learning in the future. The negative early experiences may cause a self-fulfilling prophecy (Pygmalion effect). Uphoff (1995) contends that when a student continually struggles, the result is often later school failure. Uphoff's study indicated even when a younger student possesses a higher IQ score, the older students with lower IQ scores have equal or higher

scores on tests of achievement. In a separate study conducted by Sweeney (1995), the population sample was gifted and high ability students and the findings were similar. However, it is unknown whether the lower achievement scores of students with higher IQ scores are due to a Pygmalion effect or if there is another plausible explanation.

Individuals working with athletes can observe a similar trend. The self-fulfilling prophecy can work positively or negatively depending on when a player is selected for a team. Glamser and Vincent (2004) suggest that it is possible that a player who has been selected early will think of himself as a talented athlete. Because of that view, the player may develop a greater interest in the sport and is likely to invest more time in practice and participation. Similarly, Thompson et al. (2004) speculated that the early selection creates a more self-confident player.

If such a phenomenon can be witnessed in sports, it is conceivable that the same effect could take place in an academic setting such as school. If being among the youngest equates to increased struggle and less success, it is clear to see how starting “behind” could cause a child to feel inadequate in the school environment. The Gesell Institute of Human Development maintains that children who start school before they are ready may suffer for the rest of their lives. Conversely, if the student begins feeling slightly “ahead” at the beginning of the school year, the Pygmalion effect could be one that manifests itself in a positive manner. Determining if there are advantages and disadvantages to being the youngest or oldest becomes critical in projecting future success in school.

Physical Domain

When contemplating readiness for school, some parents and teachers may consider the physical size of the child. Although there do not appear to be many studies that directly relate to physical stature and school entry, several authors did include discussion regarding other aspects of the physical domain. Specifically, the acquisition of fine and gross motor skills was addressed.

Upon analyzing data from over 19,000 kindergartners, researchers concluded that older children have better coordination than younger children both in gross and fine motor skills (Zill & West, 2001). The older kindergartners were twice as likely to score in the top third on fine motor skills. Similarly, the older kindergartners were two-thirds more likely than the youngest to score in the top portion for gross motor skills.

Uphoff (1989) maintains that many kindergarten students are in a classroom environment that demands pencil and paper activities. According to Uphoff, such physical demands may be harmful if the child is not ready and that such extensive, up-close work causes 25% of the cases of nearsightedness. If this is the case, not being physically ready for school could actually be damaging to students.

It is obvious that fine motor skills are an important acquisition necessary to functioning effectively in an academic environment that requires an extensive amount of writing. However, gross motor skills are also important. When students are less mature in physical development, the discrepancy is possibly most visible in the area of athletics. A study by Glamser and Vincent (2004) examined the

ages of elite male soccer players in the U.S. to determine if there was a correlation between age and the elite player status. They discovered that there were three times as many first quarter birthdays as last quarter birthdays among the elite players. Clearly, age was a factor in their elite status, and the cut-off criteria for the soccer clubs influenced the identification and placement of the skilled players.

Height, weight, and strength are just a few components of physical development; yet these areas of development are critical to success in athletics. It is important to note that a six to twelve month difference in development can be decisive in sports. Therefore, when a player has not yet matured physically, the lack of maturity can be incorrectly interpreted as a lack of ability. The problem of mistaking maturity for ability can occur on the athletic playing field or the classroom (Thompson et al., 2004).

Musch and Grondin (2001) point out that it is important to remember that participation in sports is voluntary but school attendance is compulsory. In some cases, athletes who are among the youngest may drop out of a sport because they do not feel as skilled. Unfortunately, they may be unaware they are comparing themselves with athletes who have a year or more physical growth and experience. Could it be that youngest students in school are conducting a similar comparison? Perhaps those who are struggling in school may give up early and drop out “mentally” until they can do so physically and legally.

Cognitive/Academic Domain

Although readiness may apply to all domains of development, one study reported that parents were most concerned about their child’s academic readiness

for school (Diamond et al., 2000). As demonstrated by the political movement toward academic readiness and early learning, it is not just parents that are concerned about academic readiness. When it comes to school readiness, Gullo and Burton (1992) found older students to be at an advantage. In their study, the youngest kindergarten students did not score as high as their older peers on the first grade readiness test. Although differences were found in readiness scores, there were also discrepancies in cognitive ability. Kinard and Reinherz (1986) determined that when students entered school, the youngest students in their study had the lowest scores on cognitive ability and the oldest group produced the highest scores.

West, Denton, and Reaney (2001) discovered that older kindergartners were more eager to learn and persist at tasks than younger kindergartners. Classroom teachers reported that older kindergartners were more eager to learn, pay attention, and complete tasks (Zill & West, 2001). Similarly, McClelland, Morrison and Holmes (2000) found that the youngest students scored the lowest on work-related skills. Examples of work-related skills include participating appropriately in groups, staying on task, and organizing work materials. Such skills demonstrate the responsibility and independence that some teachers and parents feel are needed for school readiness. The authors of the study suggest that identifying children with poor work-related skills may be as important as identifying those with poor academic skills.

There are additional studies that examined how the youngest students performed on academic tests of achievement. Cameron and Wilson (1990)

reported that older students produced higher composite scores than younger students in both second and fourth grades. Even when examining high ability or gifted students, there appears to be a discrepancy between youngest and oldest students. Sweeney (1995) examined the effect entry age has on high ability and gifted students. The findings revealed that, even with high ability students, the younger students had lower scores on achievement than their older peers. An additional study by Sheehan, Cryan, Wiechel, and Bandy (1991) also found that the youngest students scored lower on achievement tests than older students in the class, but they determined that socioeconomic status was a more significant predictor of success than entry age.

Gagné and Gagnier (2004) found that there were maturation differences between the youngest and oldest, particularly in the area of academics. Based on his findings, Uphoff (1987, 1989) agrees that the youngest students have academic difficulties. He adds that the younger students, typically, are the least ready for school, far more likely to fail a grade, to underachieve, and to be referred for a learning disability. A study conducted by DeMeis and Stearns (1992) also concluded that younger children were more likely to be placed in transitional classes, and older children were more likely to be referred for gifted evaluation. It is important to note, however, that DeMeis and Stearns found that entry age did predict referrals for evaluation, but entry age was not a significant predictor for actual placement within the gifted program.

In separate studies, Walsh, Ellwein, Eads, and Miller (1991) and Mantzicopoulos and Neuharth-Pritchett (1998) found that younger children were

more often placed in transitional classes. In particular, Walsh and colleagues reported that young, poor boys were 32 times more likely to be placed in a transitional class than older, non-poor girls, but the study by Mantzicopoulos and Neuharth-Pritchett found no difference by gender for referral to the transitional class.

As with differences in development, students that may be at risk in one subject area may not be at risk in another (Coley, 2002). Considering the theoretical perspective discussed earlier, Vygotsky asserted that each school subject has its own relation to development (Vygotsky, n.d./1978). An examination of the findings in the specific areas of language arts and mathematics will follow.

Language Arts. A study conducted in Northern Ireland found that younger students scored lower in literacy during Year 1, 3, and 5 than the older students (Menet, Eakin, Stuart, & Rafferty, 2000). Stipek and Byler (2001) also found that older students had an advantage in academic achievement in literacy. In kindergarten, younger students had lower verbal skills than older kindergartners (Kurdek & Sinclair, 2001).

Jones and Mandeville (1990) analyzed the reading test scores for students in grades 1, 2, 3, and 6 and found that although age was a minor factor in comparison to gender, race, or socioeconomic status, the risk of failure for younger students was higher than for older students even when gender, race, and socioeconomic status were controlled. Sweetland and De Simone (1987) reported similar findings from their study. They found that in grades 2, 3, 4, and 6 younger

students scored lower in reading. Cameron and Wilson (1990) also reported that the older students scored higher on tests of reading achievement than did the younger students.

Analyses of data gathered for over 20,000 kindergartners across the United States revealed that the older students demonstrated more knowledge and skills in reading (West et al., 2001; Zill & West, 2001). Older kindergartners demonstrated early literacy skills and were more likely to be reading. For the advanced reading level, the older group was 4 times as large as the younger group. Additionally, Coley (2002) reported that older kindergartners demonstrated more reading skills than the younger kindergartners.

Teltsch and Breznitz (1988) also found older first graders scored higher in reading than the younger first graders. The older students performed better on vocabulary, had fewer reading errors, greater reading comprehension, and read at a faster pace. A research study by Daniels, Shorrocks-Taylor, and Redfern (2000) found that in the specific areas of reading and writing, the age differences were significant. Morrison et al. (1997) conducted a study in Western Canada and discovered that the oldest first grade students outperformed the youngest first graders in reading both at the beginning and end of the year. A study by Crosser (1991) reported that it was specifically older males who entered school at age six who showed an academic advantage in reading over the males entering at five years of age. For the early grades, it can be concluded from the literature studies that the youngest students do not perform as well as older students in the area of reading/language arts.

Mathematics. Just as studies found disparities between youngest and oldest in reading, there are research findings that show differences with mathematic achievement as well. Coley (2002) found older students to be more proficient in math than the younger students. Findings indicated that older students demonstrated more knowledge and skills in math (West et al., 2001; Zill & West, 2001). The researchers found that it was the older kindergartners who were more likely to demonstrate early mathematic skills and to complete addition and subtraction problems. For students performing at the advanced mathematics level, the proportion was almost 5 times as large for older kindergartners as for the youngest kindergartners. Likewise, research studies concluded that older first graders scored higher in math than younger first graders (Bickel et al., 1991; Morrison et al., 1997; Sweetland & De Simone, 1987; Teltsch & Breznitz, 1988). Similarly, Stipek and Byler (2001) found that older students had an advantage in academic achievement in math. Sweetland and De Simone also discovered that the trend of the oldest students scoring higher in mathematics than the youngest students continued through fourth grade. One study by, Crosser (1991), however, did not find a significant difference in math between the older and younger students, but the older students' composite scores in academics revealed a statistical difference in favor of the oldest students. As with reading performance in the early grades, there appears to be a disadvantage to the youngest students in the area of math performance in the early grades.

Social/Emotional/Behavioral Domain

It is not only physical and academic development that are a concern. When considering readiness for school, one also considers social maturity. A study by Graue (1993) examined parents' views on the topic of school readiness. Many parents used the age of their child's friends as the gauge for their own child's maturity level. If their child played with younger children, they viewed their child as being less mature. Likewise, if their child's friends were older, they viewed their child as more socially mature. In terms of behavioral expectations, both parents and teachers in the study expressed that maturity also could be related to the child's independence and work habits. Uphoff (1987, 1989) maintains that the rate of development in social skills such as sharing, taking turns, and listening varies in young children.

In general, Zill and West (2001) found that the older children tend to be more mature. They also were more likely to exhibit cooperative behavior. Other researchers report similar findings. Uphoff (1987, 1989) concludes from his findings that the youngest students often exhibit discipline problems and are more likely to be emotionally insecure. A study by Menet et al. (2000) examined behavioral traits among children in a classroom. The teachers in their study reported that the youngest children do not behave as well as the older students. The youngest children were reported to have the most difficulty following instructions and concentrating. They also required more direct supervision. Although not as dramatic as in the first year, the younger students still demonstrated significant differences in Year 3 and 5. The authors suggest one

possible explanation may be that the children are less developmentally mature in the first year. For this reason, there was concern that the lack of developmental maturity was mistaken for misbehavior. Consistent with this theory is their finding that the youngest children were more frequently referred for psychiatric services.

Additionally, LeFever, Dawson, and Morrow (1999) found that being young-for-grade was associated with use of ADHD medication. In one city sample of almost 24,000 students, the researchers found that students who were young-for-grade were 21 times as likely to take ADHD medication. However, in a city with a lesser number of students in the sample (less than 6,000), it was old-for-grade that were 1.6 as likely to take ADHD medication as other students. The researchers speculate that the young-for-grade with the high incidence of medication use may be due to parent and educators misconceptions about expected behavior of young children. The researchers suggest that follow-up studies would need to address whether the parents' and professionals' expectations for young students are developmentally appropriate.

Younger students were also more likely to have social/emotional problems and psychiatric disorders that persisted through secondary school (Goodman, Gledhill, & Ford 2003), more at risk for social-emotional problems (Gagné & Gagnier, 2004), and had lower self-esteem even though they reported higher ability upon school entry (Thompson et al., 2004). Teltsch and Bretnitz (1988) concluded that the younger students were less adjusted socially and emotionally,

had lower trait anxiety and self-concept scores, and were more negatively rated by peers and teachers.

Not all researchers have drawn the same conclusions regarding the disadvantages of being the youngest in the class. Although Breznitz and Teltsch (1989) found that children who were among the youngest in the class were more anxious, in other social and emotional areas, there were no significant differences between the youngest and oldest students. Gagné and Gagnier (2004) also found that although the youngest may be at greater risk for social-emotional problems, conduct was not highly correlated with age. Similarly, Bickel et al. (1991) noted that no significant relation in conduct and entry age could be found. Stipek and Byler (2001) reported similar findings. The researchers found that the teacher ratings showed no significant difference in regard to social skills or task engagement. Because of their findings, DeMeis and Stearns (1992) concluded that the youngest students were not at greater risk for developing social problems. They further claim that some young students even excelled in school.

Spitzer, Cupp, and Parke (1995) found mixed results in their study. They noted that the youngest kindergartners received more nominations for being disliked, but the difference was already reduced by first grade. However, the oldest children receive more nominations for being well-liked and that trend increased in first grade. The authors concluded that there might be some social advantages in terms of popularity and pro-social behavior when starting kindergarten as one of the oldest students. In another study, there were contradictory opinions between teachers and parents. Although teachers indicated

that older kindergartners participated in cooperative behavior more often and were less likely to anger easily, parents reported that the kindergartners did not differ by age in respect to pro-social behaviors including accepting others' ideas, making friends, and comforting others (Zill & West, 2001).

The findings on the differences between youngest and older students in the affective area are mixed. This may be due to the subjectivity of rating behavior based on individual observation. Additionally, having different raters such as parents or teacher completing the assessment is likely to result in inconsistencies in expectations and reporting.

Gender and Developmental Domains

There is also research to suggest that development varies by gender. Gurian and Stevens (2005) investigated studies demonstrating the differences in brain development between boys and girls. They found that there is up to 25% difference between the size of the brain of girls and boys. Even in adulthood, a woman's brain is on average 10-15% smaller than a man's brain, but certain areas, such as those involved in language, are more densely packed with neurons (Hales, 1998; Marano, 2003). Furthermore, Gurian and Stevens explain that brain scans show the activity level of areas or lobes of the brain are different for males than females even when performing the same task. Studies have shown that girls have stronger neural connectors that facilitate better memory storage and listening. The authors note girls have more brain activity even when at rest, and the language centers of the brain are more advanced earlier than they are for boys.

In girls, the corpus callosum allows more cross-talk between hemispheres thus allowing better multi-tasking (Gurian and Stevens, 2005; Marano, 2003). Even in adult males, it appears that the compartmentalization of the brain of males may help explain the intense focus males can give to a single task while disregarding other background noises or events (Hales, 1998; Marano, 2003). Gurian and Stevens discovered that boys have more dopamine in their bloodstream than girls, which increases impulsive behavior and the need for physical movement. The hippocampus (memory storage area) differs in boys and results in boys needing more time to memorize facts. It is believed that this is one reason boys may benefit from the use of lists and outlines. Superiority in males' spatial cognition is another explanation (Marano, 2003). Furthermore, Gurian and Stevens explain that the brain differences make males more likely to become bored and have their minds drift during instruction. The authors stress that the challenge to pay attention is compounded when there is a female teacher that is highly verbal and uses excess words in instruction.

Other physical differences in gender were discovered with hearing and vision. Boys were reported to hear less well (Gurian and Stevens, 2005), and even in adulthood, females are reported to hear a broader range of sounds than males (Hales, 1998). Hales adds that hearing loss also tends to occur at least 10 years earlier for men than women. As infants, girls were observed to make more eye contact than boys (Gurian & Stevens, 2005; Marano, 2003). Even at 4 days of age, the girls were twice as likely to make eye contact as boys.

Interestingly, the time of puberty changes some of the biological differences. Girls tend to mature faster than boys (Sax, 2001), and later hormonal changes at puberty enhance brain development in both males and females (Gurian & Stevens, 2005). However, again, the hormones of males and females vary and so do the areas of the brain that are affected during puberty. A group of researchers studied the sex differences in intelligence. The researchers found that, in general, girls tend to do better at younger ages but performance declines relative to boys in older groups (Colom & Lynn, 2004). This decline appears to occur around 16 years of age. Although the researchers used a Spanish sample, the findings were consistent with previous, similar studies for the United States and Britain. The researchers maintain that the similarity in findings among the different cultures increases the robustness of the findings.

Obviously, all of these biological differences in gender have implications for the classroom. In general, girls tend to speak and read sooner and tend to have fewer learning disorders (Hales, 1998). Boys tend to score lower in reading (Kurdek & Sinclair, 2001; Oshima & Domaleski, 2006). Adding the issue of “youngness” may exacerbate the differences. One researcher feels so strongly about the differences in gender that he proposes a different kindergarten program and different school entry dates for boys and girls (Sax, 2001). Elaboration on such ideas and implications of gender differences will be important to consider later in the discussion.

Youngest and Special Education

There has been concern that younger students are at an increased risk of being placed in special education; however, the findings are inconsistent. Wolf and Kessler (1987) claim that there is little evidence that younger students are at an increased risk for special education. An additional study also determined that younger students were not over-represented among students with learning disabilities, emotional disorders, or speech/language disorders (May, Brogan, & Knoll, 1993). However, Menet et al. (2000) stated the one of the most marked results of their study was the discovery that the youngest children were significantly more likely to be referred for psychological services and were over-represented in referrals. Additionally, Wallingford and Prout (2000) determined that in the 5-7 year old age range, the summer birth date children were referred for special services at a significantly higher rate than the other groups. It should be noted however, that incidence of actual placement in special programs was not obtained for this study. Furthermore, the researchers did not distinguish between students who had been delayed or retained. Sheehan et al. (1991) also noted that summer born children received Chapter 1 services at a greater percentage than non-summer born children. Uphoff (1987) concluded that younger students are more likely to be classified as learning disabled than older students. Other studies demonstrated that older, delayed entry students were referred for special education at a higher percentage than the regular population (Graue & DiPerna, 2000; May et al., 1995). Considering the studies that examined special needs and

age position, one can conclude that there is no definitive answer on whether there is a difference between youngest and older students in regard to special needs.

Long-Term Impact of Being the Youngest

The Gesell Institute of Human Development (1997) asserts that their experience with multitudes of children indicates that children who entered school unready (not necessarily chronologically youngest) rarely “catch up” to their peers. As with other studies comparing achievement of youngest and oldest in class, there are studies with mixed findings regarding the long-term impact of being youngest in the class. While some research may indicate that the youngest students have difficulty upon entry into school, there are long-term effect studies that show the difference may not continue through subsequent grades. Morrison et al. (1997) maintain that despite the fact that the youngest students had lower test scores in comparison to older students, the rate of progress they experienced was normal. However, the study only included data through the first grade, and the researchers acknowledge that more longitudinal data is needed to substantiate the findings. Indeed, just following students through first grade is not sufficient.

Gagné and Gagnier (2004) discovered that a group of early entrants who were even younger than the cut-off age normally allowed were rated as performing significantly better in academics than older cohorts in second grade. In this study, the early entrants were comprised of high ability and gifted students that were allowed to enter school earlier because of their ability, so conclusions from their study may not be applicable to youngest students who are not intellectually gifted. Stipek and Byler (2001) noted that in the case of their

research findings, the advantage the older, delayed students had in achievement in literacy and math had disappeared by third grade.

Studies that include students in upper elementary have been conducted. Kinard and Reinherz (1986) found the youngest students had the lowest scores in cognitive ability upon entry to school; however, they reported there were no significant differences by age in performance during subsequent years through fourth grade. In the study by Bickel et al., (1991), the slight academic advantage of the older first graders appeared to level off by fifth grade. Similarly, Kurdek and Sinclair (2001) reported that the youngest kindergartners had lower verbal skills than the older kindergartners, but differences in math or reading were not found in fourth grade. The finding led the researchers to conclude that children who are youngest in kindergarten are not at a long-term disadvantage.

There are a substantial number of studies showing a more lasting negative effect of being among the youngest as well. Breznitz and Teltsch (1989) conducted a study in Israel to determine the effect of school entrance age on academic achievement and social adjustment. They found that younger students who had scored lowest in the academic areas of math and reading comprehension in first grade continued to score lower in fourth grade. Similarly, Cameron and Wilson (1990) reported that there was a small but significant difference in the achievement levels of youngest and oldest with the oldest performing better. Although it was a small difference, the difference remained in fourth grade. Crosser (1991) reported that older males demonstrated an academic advantage over younger males in reading that continued to persist in fifth and sixth grades.

Oshima and Domaleski (2006) also discovered that reading and math performance was lower for the youngest through fifth grade, but the difference no longer exists by middle school. In their study, Sweetland and De Simone (1987) found that in grades 2, 3, 4, and 6 younger students scored lower in reading, and they also discovered that the youngest students scored lowest in mathematics in grades 1 through 4. They indicated, however, the differences that existed between the age groups were somewhat lessened by the time the students reached fifth and sixth grades, and the overall rate of progress was normal.

Menet et al. (2000) found that younger students scored lower in literacy during Year 1 and, although not as dramatically different as in the first year, the youngest continued to score lower than the older students in Years 3 and 5

As mentioned previously when addressing the social/emotional domain, Spitzer, Cupp, and Parke (1995) noted that the youngest kindergartners received more nominations for being disliked but the difference was already reduced by first grade. However, the oldest children receive more nominations for being well liked and that trend increased in first grade. Gagné and Gagnier (2004) found that the risk for social-emotional problems for the youngest regularly admitted students still existed in second grade, and Goodman et al. (2003) reported that younger students were more likely to have social/emotional problems and psychiatric disorders that persisted through secondary school. As with the study by Menet and colleagues, this study was not conducted in the U.S., so it is important to consider whether it is appropriate to assume the findings could apply to students within the states.

Thompson et al. (2004) report that several years after entering school, the youngest students had lower self-esteem even when ability was perceived as high upon entry. Conversely, the oldest students in class appeared to have the highest self-esteem. However, Bickel et al. (1991) maintained that there was no significant relation in entry age and conduct when entering school or by fifth grade.

The findings from the long-term studies are clearly mixed but can be sorted more systematically and scrutinized more intently. A closer examination of the results of selected long-term studies was conducted and will be discussed later in the chapter.

Is Delayed Entry an Acceptable Option?

One could take the information presented regarding the youngest, compare to the results of being the oldest, and make inferences that since delayed students would be the oldest, they would have the same advantages. However, this may not be the case since the reason they are now the oldest is different. In addition, some of the delayed entry students would be many months older than the “oldest” group entering at the normal time. Simply extrapolating data from younger versus older studies may not be adequate. While not all research reviewed compared older versus younger with specific regard to delayed entry, some research did. One should keep in mind these findings may or may not specifically address delayed entrance results.

In a national survey, parents reported that students for whom entry was delayed demonstrated equal or better school performance than those of the

eligible age (Zill et al., 1997). In a separate study that included children across the nation, it was reported that students who delayed kindergarten entry performed better in reading in first grade but demonstrated lower mathematical knowledge and skills than other first graders (Malone et al., 2006). Datar (2006a) found that students who delay entry score better in reading and math in kindergarten.

Thompson et al. (2004) found that the first grade students displaying highest self-esteem were the over-age students who had delayed entry into school. Sheehan et al. (1991) also found that those children who had delayed entry performed better on standardized tests in kindergarten and first grade than children with summer birthdays who did not delay entry. Likewise, Crosser (1991) specifically studied children with summer birthdays. The findings indicated that students who were part of the older summer birthday group (6 years of age) had an academic advantage over the younger summer birthday students (5 years of age). Delaying entry appeared to be particularly advantageous for males in the specific area of reading but not math. The advantage in reading remained in fifth and sixth grades. In a separate study, it was reported that 77% of students who delayed entry scored above average on standardized tests in the fourth through seventh grades in comparison to 24% of students who were recommended but not delayed. Conversely, 9.68% of the delayed entry students scored below average in comparison to 33% of students who were recommended to delay but did not (Uphoff, 1995).

Just as some studies concluded that the disadvantages of being youngest appeared to level off in later years, there is research that suggests the advantages

of being the oldest were reduced in later years. Bickel et al. (1991) noted that older students performed slightly better in academics in the first grade, but no differences were seen after four years. Likewise, similar results could be seen in social adjustment.

Although Brent et al. (1996) reported that parents most often delay their child's entry for academic reasons, there are some research studies that have concluded that delayed entrance has not shown effectiveness or produced academic advantage at all (Cameron & Wilson, 1990; May & Kundert, 1997). Graue and DiPerna (2000) reported that the achievement of delayed entry students was comparable to those students who entered as age-eligible. However, they also found that students who had delayed entry to school were more frequently referred for special services. Additionally, there is research indicating negative outcomes of delaying school entry. In the area of social adjustment, Byrd et al. (1997) surmised that students who had experienced delayed entrance (specifically white adolescents) exhibited more behavioral problems in the adolescent years. These behavior problems were further increased if retention was involved.

At one time, delaying entry into school was necessary due to circumstances of war or political events (Ceci, 1991). In such cases, the students who experienced delayed entry were not at an advantage because they were not privy to preschool education. This effect best illustrates that it may not be the delay itself that makes a difference but rather what is done during that delay. Children from low socioeconomic homes were found to be less likely to be in pre-

kindergarten (Datar, 2006b). Though retention may not have a positive effect, an extra year prior to school entry appears to make a difference.

Children who did not attend preschool were almost twice as likely to be retained later in school (Sheehan et al., 1991). In addition, the researchers found that retention occurred less when students had attended a full-day kindergarten rather than a half-day program. That is why Stipek (2002) asserted that some individuals believe an advantage of delaying entry is that the need to retain children in the future will be lessened.

Although Graue and DiPerna (2000) reported the delayed entry might benefit some children, they cautioned against recommending all who are among the youngest delay entry. They assert that determining which students would benefit from delaying entry is necessary. Similarly, Goodman et al. (2003) acknowledged that research findings cannot be individualized. Despite any positive or negative findings, decisions regarding delaying school entry should be individually based. Furthermore, they advised that planning for what is done during that additional year may also be instrumental to success when delaying entry. Stipek (2002) added that it is important to consider that in delaying entry, early intervention is also being delayed. Such a consideration cannot be ignored.

Characteristics of Students Experiencing Delayed Entry

Regardless of whether delaying entry has proven to be an effective alternative for youngest students, Diamond et al. (2000) report that the incidence of delayed entry is increasing. Certainly, the primary characteristic that seems to have caused the discussion of delayed entry is chronological age. One might

assume that being younger in age is a characteristic of students experiencing delayed entry. Several researchers found that to be true (Brent et al., 1996; Graue & DiPerna, 2000; Zill et al., 1997). They concluded that having a birthday close to the cut-off date, especially for males, was a common attribute of delayed entry students.

When reviewing characteristics of those delaying entry, the characteristics of ethnicity, gender, and socioeconomic status often surface. In regard to ethnicity, Caucasian parents were more likely to delay their child's school entrance (Datar, 2006a; Diamond, Reagan, & Bandyk, 2000; Malone et al., 2006; Zill et al., 1997). This is consistent with the finding of Coley (2002) that determined Asian, Black and Hispanic populations were more likely to be among the youngest kindergartners. Ironically, despite the conclusion that Caucasian parents were more likely to delay their child's school entrance, Diamond and colleagues reported that there was a significant difference between ethnic groups in opinion of their children's readiness for school. It was the non-Caucasian group that most frequently expressed concern about their child's readiness for kindergarten. Yet, it was the Caucasian/non-Hispanic group that delayed entry at a higher rate.

For gender, researchers determined that males were more likely than females to be "held out" from entry (Brent et al., 1996; Datar, 2006a; Graue & DiPerna, 2000; Malone et al., 2006; May, Kundert, & Brent, 1995; Zill et al., 1997). Datar (2006b) also reported that the entrance age parents desired was earlier for girls than boys. Although males are more often recommended to delay

entry, research findings supporting this recommendation are limited. Several researchers concluded that there were no significant differences in achievement between males and females that were younger/older (Gullo & Burton, 1992; Sheehan et al., 1991; Teltsch & Breznitz, 1988). However, Crosser (1991) found that the older females were at an advantage overall but not specifically in reading or math, and Datar (2006a) reported that boys specifically benefit in reading when delaying entry.

The interaction of socioeconomic status and entry age has been examined as well. Bickel and colleagues (1991) suggest that socioeconomic factors may provide better predictors of achievement than entry age; yet, socioeconomic factors also directly affect entrance age. Findings indicate that middle, and above middle, class parents were most likely to desire a later entrance age (Datar, 2006b) or to delay their child's entry (Meisels, 1992; Shepard, 1997; Shepard & Smith, 1986). Conversely, Stipek and Byler (2001) and Datar (2006a) found those from lower socioeconomic backgrounds were less likely to delay entry. The study by Stipek and Byler examined schools that were considered to contain lower socioeconomic and culturally diverse populations. The researchers calculated that less than 1% of the students from the lower socioeconomic schools had delayed entry compared to the 10% national average. Interestingly, it is the lower socioeconomic group and those with disabilities who Datar (2006a) report benefit from delaying entry, especially in reading.

Parents who choose to send their "young" child to school rather than delaying entry may be doing so not because they feel their child is ready but

because they do not have any other options. Although early prevention programs, such as Head Start, originally focused on lower socioeconomic groups (Charlesworth, 1989), those programs are not available to everyone. Not having quality alternatives available is likely to affect the decision to delay entrance, and parents who are more highly educated or in a higher income bracket are likely to have more alternatives available that would allow them to delay their child's entry for an additional year (Diamond et al., 2000; Zill et al., 1997). Diamond et al. found that parents who are more highly educated are likely to delay their child's entrance. Malone and colleagues (2006) also found that students who delayed entry were more likely to have parents with a bachelor's degree or higher, and Datar (2006a) reported that children from families with less education were more likely to enter kindergarten at a younger age.

Charlesworth asserts that the lower socioeconomic students who delay entry but are not able to receive quality preschool experiences will be at further risk of falling behind academically while they "wait" a year to begin school. In a survey of kindergarten teachers' views about readiness, it was found that 67% of teachers in high poverty schools suggest entry for those with readiness problems as soon as the child is eligible (Heaviside & Farris, 1993). Because of the research findings in this area, policy decisions regarding school entry are critical for low-income children as they are considered to be at a greater risk of failure (Stipek, 2002).

When students delay entry into school, the composition of the class also changes (Graue, 1993). Shank (1990) claims that equal opportunity can fail to exist even at the kindergarten level. If children from homes with highly educated

parents and higher socioeconomic backgrounds delay school entry, the diversity of the class could change dramatically. As confirmed in a separate study, delayed entry students are a relatively advantaged group (Zill et al., 1997), and the socioeconomic discrepancy has been intensified (Stipek & Byler, 2001; Zill et al., 1997). Delayed students arriving at school with the advantages of socioeconomic stability, educated parents, and now as also older students create a polarization of extremes with the students who are from lower socioeconomic backgrounds, less educated parents, and are the youngest children in the class. Diamond et al. (2000) assert that such disparities between socioeconomic status and ethnicity lead to discrepancies in performance standards. Having large numbers of students delay entry ultimately can result in increased expectations of kindergartners.

Compounded by increased expectations, the most disadvantaged children are being compared to advantaged children, and this unfair comparison does not exist only in the initial year of school. Walsh et al. (1991) report that underprivileged children comprised 37% of the total population in their study, yet 58% of the students in transitional classes. Similarly, Zill et al. (1997) found that the students who are comparatively disadvantaged are more likely to be retained in grade. It may also be important to consider one additional factor. The guidelines for dropping out of school are based on age. Because students for whom entry is delayed will be older, they can potentially drop out of school with fewer years of school experience (Angrist & Krueger, 1992).

Although the date of school entrance age has been debated in the past, changes in our society's lifestyle and progress in technology cause the topic to

resurface. Because of the increasing number of single parents and families in which both parents work outside of the home, the need to place children in daycare or preschool begins earlier.

In the 1990s, the National Education Goals Panel (NEGP) proposed that all students entering school should be “ready to learn.” In attempt to achieve that status, the goal of reducing the gap between economic groups that had access to high quality preschools was established. The NEGP tracked the incidence of preschool attendance in 1991 and found the gap between high and low-income parents to be 28%. The NEGP continued to track the incidence of preschool attendance in 1999-- just prior to the 2000 goal year. They determined that the gap between high and low-income families had decreased to 13% and concluded that such a reduction was statistically significant.

Relative Age

Regardless of whether a student’s entry is delayed, classrooms will contain students who are the oldest and the youngest in the group (Charlesworth, 1989; DeMeis & Stearns, 1992; May et al., 1993). A review by Spitzer et al. (1995) suggests that relative age may be more important than chronological age. The practice of delaying entrance only magnifies the issue of relative age. When parents choose to delay their children’s entry until they are a year older, the difference in age between the youngest and oldest becomes greater (Brent et al., 1996; Crnic & Lamberty, 1994; May & Kundert, 1997; May et al., 1995; Shepard 1997) and can increase the average age of the class (Diamond et al., 2000). Because some parents will opt to wait an additional year to send their child to

school and others will send their “young” child as eligible, the age range between the oldest and youngest could be as large as 24 months (May et al., 1993; Meisels, 1992). Meisels states that 6- year-olds could then be compared with 7 ½-year-olds on standardized tests. When one considers the characteristics of the population of students most likely to be delayed, the differences are further heightened. Meisels contends that many of the oldest children (delayed entry) will be from economically advantaged families and many of the youngest children will be from homes that did not have the resources to send their child to preschool. Therefore, the youngest children arrive with the least advantage. Such a gap between youngest and oldest could lead to an increase in retentions and the number of transitional classes (May & Kundert, 1997). Thompson et al. (2004) assert that it is unacceptable that advantages or disadvantages exist based on birth date alone.

Whether in sports or the classroom, competition will exist. Thompson et al. (2004) considers that in an environment of competition, self-assessment will occur. How the student views himself is, in part, determined by comparing himself to others in the same setting. When the youngest child from a disadvantaged home compares himself with an older student from a home in which more opportunities were afforded, the comparison and self-assessment can be discouraging. The problem is magnified if the youngest child is already struggling in school. If the early experiences of school do indeed affect later learning, the youngest student is at a disadvantage from the first day. In their study, Graue et al. (2003) determined that teachers, parents, and administrators were using a set standard of gauging students’ achievement instead of considering

individual variability in children. When younger students are compared to older students who may be achieving more success, it is an injustice to the youngest students.

Curriculum and Instruction

There is little debate over the fact that children develop at different rates. Because of the varying development, Graue et al. (2003) affirm that a pedagogical response to kids who do not meet the developmental expectations is necessary. Even when young children are the same age, they may be 24 months apart developmentally (Meisels, 1992). For this reason, the curriculum must be developmentally appropriate and based on the individual child (Brent et al., 1996; May & Kundert, 1997; May et al., 1993; Meisels, 1992; Uphoff, 1989). Schools should provide effective programs regardless of age (Gesell Institute of Human Development, 1997; Wolf & Kessler, 1987), but Charlesworth (1989) believes that schools are not accommodating the child but attempting to have the child fit the curriculum. The schools' responsibility is equally, if not more, important when addressing the concerns of readiness and delayed entrance. Instead of asking a child to stay out of school a year, schools need to develop programs that will meet the needs of this group, and teachers should allow for developmental differences in learning and achievement (Goodman et al., 2003).

We should not encourage families to keep their children home from school in order to avoid failure; if failure occurs, it should be viewed as a failure of the school to meet the needs of a child, not of the child to meet the needs of a school (Brent et al., 1996, p. 132).

Lonnie Sherrod, Editor of the Social Policy Report and Ruby Takanishi, President of the Foundation for Child Development both maintain that the curriculum should be more comprehensive and integrative (Vecchiotti, 2003). Sherrod asserts that federal guidelines could help ensure equity among states. Additionally, the system should be more comprehensive rather than focusing just on preschool or Head Start. Similarly, Takanishi asserts that a program that integrates curriculum for preschool through grade three would be beneficial. Graue (1993) also suggested integration of curriculum. When planning a curriculum, Graue suggests that primary units could be created to span several grade levels instead of focusing on a set curriculum for a single grade level. The primary units suggested by Graue would include content for children three to six years of age. Graue and Vecchiotti also suggest that teachers across grade levels should plan together and participate with each other in professional development activities rather than only within their own grade level. Vecchiotti also suggests that utilizing “looping” could also assist in providing continuity of learning.

Despite research findings on positive or negative effects of being the youngest in the class, the needs of the individual child must always be considered. Rather than relying on a single criterion such as chronological age or readiness scores for determining placement in the school system, the schools in New Zealand attempt to evaluate the “whole child” (Goodman et al., 2003). The schools consider chronological age, maturity, academics, and progress when considering initial school entry and grade placement. Using several criteria may be more appropriate as it is unlikely that a single readiness test, chronological age

requirement, or other mandated standard could adequately predict the chance of success for every individual child. The entire development and background of the individual must be considered, and the NAECS (2000) asserts that such responsibility should be placed on the program not on the child.

Methodological Limitations in the Literature

The review of literature on being youngest is somewhat mixed. This is, in part, due to methodological discrepancies between studies that include differing data collection methods, parameters, and criteria for the sample. There are no definitive answers on the effects of delayed entrance or about the performance of the youngest students. Even the conclusions authors have drawn should be weighed cautiously and evaluated thoroughly. The limitations of the studies, whether acknowledged or not, could significantly affect the reliability of the results. In all fairness, it is equally important to remember that the possible limitations discussed here may or may not exist. Often, published articles are abbreviated for the sake of journal space, and detailed information about the study must be sacrificed.

Subjects

Defined parameters. Because of various cut-off dates for entry, the youngest students in one study may be closer in chronological age to the oldest students in a separate study (Bickel et al., 1991) or even considered under-aged by an additional study (Crosser, 1991). In the study by Brent et al. (1996), the cut-off date was later than many studies; therefore, children with summer birthdays were not the youngest of the group. Some studies did not include those who had

delayed entrance or were retained. Because those who delay entry and are retained are likely to be among the oldest in the class, the discrepancy between oldest and youngest was greatly reduced.

The inability to determine if researchers controlled for students being retained or delayed is a significant complication when reviewing the literature on youngest children. Although many studies did report how they accounted for the variable of retention, many did not. Although Jones and Mandeville (1990) discovered that the difference between reading performance of the youngest and oldest appeared to lessen in later grades, they also acknowledge that because they did not include those students who were retained, a portion of the lower scoring youngest students in the older grades would not have been included in the analyses because they had been retained. Additionally, they did not include students for whom school entry had been delayed. Kinard and Reinherz (1986) also did not include students who were over-age (likely delayed entry and retained students) or under-age, so the youngest and oldest in their study is relatively conservative.

Likewise, some studies included students who had delayed entry in their pool of older students and others excluded the students who had delayed entry. Since students who delay entry are likely the oldest in the class, comparing older to younger without acknowledging that group makes comparison between studies challenging. Clearly, when dealing with entry age and later school success, it is important to determine if the child was the age at entry due to delay or retention.

Representative population. The populations sampled may not reflect an accurate representation of one or more groups. Many of the studies consisted of either all, or primarily all, Caucasians in the samples (as in Brent et al., 1996; French, 1984; May et al., 1995; May et al., 1993). Bickel et al. (1991) acknowledge and caution that their group did not reflect an accurate cross section of student populations. The gifted population was over-represented with 17% gifted students in their sample, and there was an under-representation of special needs students since students labeled as mentally retarded were not included in their sample.

Although not a deliberate grouping for the purpose of the study, the preschool teachers in the Gullo and Burton (1992) study were all certified in early childhood education. Unfortunately, they may not be typical of most preschool teachers. Another possible limitation can be seen in the DeMeis and Stearns (1992) study. In this case, the referral guidelines were not stringent. A student referral could come from a principal or even a parent. The significance of a referral could be lessened if it was made subjectively without tangible evidence of the need.

Sample size. Some studies contain small sample sizes. The study by Cameron and Wilson (1990) provides an example of this limitation. In their study, there were only 12 students comprising the group who experienced delayed entrance from the total group of 191 students. Similarly, Graue et al. (2003) had less than 15 students in their sample group. In their defense, although a small sample size was obtained, their investigations were qualitative in nature and larger

sample sizes are difficult to manage in qualitative studies. In several cases of other studies, the size of the sample was not indicated.

Socioeconomic status. There is a need to control for socioeconomic status in any study. In the case of this literature review, socioeconomic groups may not be fairly represented when samples only include middle or upper middle class (as in Brent et al., 1996; French, 1984; May et al., 1995; May et al., 1993; Sweetland & DeSimone, 1987). In some cases, either the researchers could not account for socioeconomic status or socioeconomic status is unknown (as in Sheehan et al., 1991). Controlling for the variable of socioeconomic status is critical with this topic since many of the studies that did control for socioeconomic status found it to be significant, and in some cases a more significant, variable than chronological age. In their study, Jones and Mandeville (1990) found that the risk of failure associated with socioeconomic status was nearly twice that of being among the youngest. The risk of failure of being youngest appeared to lessen, but not disappear, in later grades. By sixth grade, the risk of failure associated with socioeconomic status increased to 13 times the risk associated with being youngest.

When comparing older and younger students it would seem best to match students by ability/IQ in order to make a fair comparison among students. May and Kundert (1997) assert that not all entrance age studies do so. Certainly, outcomes can be drastically different when abilities vary greatly. Sweeney (1995) concurs that the research specifically examining the effects of delayed entrance on students with high cognitive ability is limited.

Testing Methods

Testing can also be a concern. Group administration of tests (as acknowledged by Sweeney, 1995) is less accurate and conversion of scores can lead to inaccurate conclusions (May & Kundert, 1997). Other testing procedures may be more subjective in nature when obtaining teacher and parent opinions rather than actual statistics of achievement and progress. Marshall (2003) warns that teacher bias can affect studies utilizing teacher-rating scales. Although Gagné and Gagnier (2004) attempted to reduce teacher bias by camouflaging the purpose of their study, they admit that certain preexisting conditions and having the teachers enter the student's birth date may have been enough to influence the rankings. Additionally, the researchers chose to have the teachers use a ranking rather than rating system. Although students may not have been below average, the ranking system may have led to that interpretation. Even several teachers felt inclined to clarify with comments on the side of form that their "lower" ranking of the student was done in compliance with the guidelines imposed by the researchers and did not imply that the student was inadequate in those areas.

Interviewing very young children or conducting student questionnaires and peer ratings (as in Spitzer et al., 1995; Teltsch & Breznitz, 1988 studies) may be less accurate as statements and questions may be intentionally or unintentionally leading. Very young children may be easily influenced and feel inclined to answer in the manner in which they feel they are supposed to answer. Nor are young students as likely to be consistent with ratings. Although they attempted to account for the limitation, Spitzer et al. acknowledge that children can tend to

score high on measures of self-perception. For that reason, any of the studies in which very young children are interviewed or complete ratings will tend to be high. Obtaining the same information in later years may be advantageous for a true picture of the long-term impact of being among the youngest.

In the study by French (1984), students were reminded of the other students' ages during the process of collecting information. Depending on the manner and timing of those "reminders", the mentioned ages could have been leading in nature—even if unintentionally. Similarly, the behavior scale used for teenagers in the Byrd et al. (1997) study may not be the best measurement tool since it is likely that teenagers are probably more prone to the feelings expressed on the scale during that period of their development. Additionally, parents rather than teachers rated the behavior of the teenagers, and parents may not have a gauge of how representative their child's behavior is in comparison to other teenagers. A teacher may be a better judge of behavior that is common for a particular age range. Additionally, if the issue of delayed entry is to determine the effects on students' performance in school, it seems that measuring school behavior by examining school conduct reports or teacher ratings would be more appropriate than obtaining ratings from parents.

Generalizations

Current. It is equally important to be as current as possible. Education in early childhood has changed over the last 30 years in significant ways. Sweetland and DeSimone's study focused on children born in 1970. Even during the 17-year span between 1970 and the study's published date of 1987, the kindergarten

policies, practices, preschool attendance, and curriculum changed. Likewise, Angrist and Krueger, (1992) used data from 1955, 1960, and 1980. Findings from studies that occurred before many of the changes to the educational system, particularly in regard to preschool and early childhood education, are not likely to be representative of findings that would exist in the current system.

International comparisons. Because their sample group consisted of Israeli students, Teltsch and Breznitz (1988) and Breznitz and Teltsch (1989) suggest a limitation in their studies as implications and interpretations for American schools may be required. Likewise, other studies reviewed examined the effects of chronological age but were also conducted in differing countries. Besides the two studies in Israel, other international settings included England and Wales (Daniels et al., 2000; Goodman et al., 2003), Scotland (Goodman et al., 2003), Northern Ireland (Menet et al., 2000), and Canada (Morrison et al., 1997; Thompson et al., 2004).

Long-term impact. Many studies focused only on the effects of delayed entry on kindergarten and first graders. While the results are important, the students in both grades fall within the same broad developmental stage. It is essential that more longitudinal studies be conducted to evaluate the effects over an extended period of time and among developmental ranges.

Although most researchers are careful to acknowledge the limitations within their studies, the conclusions of such studies will likely be repeated and published by others without further mention of those limitations. Questionable findings will be stated as reliable results without further investigation, thus, perpetuating

unsubstantiated recommendations. It is critical to review all details of each study before making drastic recommendations that have the potential of permanently altering a child's future.

After reviewing the various and conflicting literature, it was necessary to conduct a more systematic and closer examination of the findings. Because the majority of the studies indicated differences in the early grades, the focus of this examination was to review studies with findings beyond the first years of school. Criteria were set and studies that met the criteria were included. Studies to be included must be quantitative in design, measure academic performance, have publication dates of 1990 or more recent, have samples derived in the U.S., and examine effects through a minimum of third grade. There were a total of seven studies that met the criteria. However, two of the seven studies (Cameron & Wilson, 1990; Crosser, 1991) examined older students who had delayed school entry. Therefore, it may be argued that the comparisons may not be appropriate because of the parameters used in the studies. Table 1 provides a summary of the study results.

Table 1

Comparison of Selected Long-Term Effect Studies

Authors	Year	Grade	Reading/Lang. Arts	Math	Covariates	Comments
Bickel, Zigmond, & Strayhorn	1991	1st & later in 5th	Difference in 1st; No difference by 5th	Difference in 1st; No difference by 5th	race, SES, preschool, yrs in K	Over-representation of gifted with 17% in sample; Sample may include those retained in K
Cameron & Wilson	1990	2nd & later in 4th	Difference in 2nd; Difference in 4th	No difference	IQ and gender	Possible conflict between text and tables
Crosser	1991	5th-6th test scores	Difference in 5th/6th	No difference; However, difference in academic composites	IQ and gender	Did not account for SES; appears "youngest" who failed a grade were excluded
Jones & Mandeville	1990	1st-6th (not a followed group)	Difference through 6th	N/A	gender, race, and SES	Lower scores of "youngest" who failed are not included; SES and race were better predictors
Kurdek & Sinclair	2001	K & later in 4th	Difference in K; No difference in 4th	No difference	gender and race	Authors caution sample is non-representative with mainly white, living with biological parents, and not free/reduced lunch students.
Oshima & Domelski	2006	K-8 (not a followed group)	Difference through 5th; No difference by 8th	Difference through 5th; No difference by 8th	gender and race	Unclear how retention was addressed
Stipek & Byler	2001	K & later in 3rd	Difference in K; No difference in 3rd	Difference in K; No difference in 3rd	IQ and gender	Low income families

Upon reviewing the studies that examined the long-term effects of being the youngest, it appears math performance is the least affected by age. Only one of the seven studies (Oshima & Domelski, 2006) indicated a difference in math performance by fifth grade and that difference disappeared by eighth grade. For reading, however, the findings were split. Four studies indicated a difference in reading performance that remained through at least fifth grade (Cameron & Wilson, 1991; Crosser, 1991; Jones & Mandeville, 1990; Oshima & Domaleski, 2006) with the findings of Oshima & Domaleski showing the difference observed in fifth grade was no longer evident by eighth grade. Three of the studies revealed no difference by either third (Stipek & Byler, 2001), fourth (Kurdek & Sinclair, 2001), or fifth grade (Bickel et al., 1991).

Although the studies had to meet several criteria to be included in the comparison, problems with the existing literature remain. All seven studies considered long-term effects by examining 3rd grade or later, but only four of the studies were longitudinal in following the same group of students through subsequent grades (Bickel et al., 1991; Cameron & Wilson, 1990; Kurdek & Sinclair, 2001; Stipek & Byler 2001). The remaining three studies looked at independent groups in older grades (Crosser, 1991; Jones & Mandeville, 1990; Oshima & Domelski, 2006). It is important to follow the same group so that a complete picture of performance over time is obtained. Examining different groups over time presents complications due to demographic and diverse backgrounds among the groups being examined.

By reviewing the comments in Table 1, some methodological limitations in the selected studies are exposed that could weaken the study's findings. For example, by not including the youngest students who failed, a portion of the youngest students who likely had low scores was not included in the comparison. Excluding low performing youngest students could mean that more significant differences between the youngest and older groups were masked. Additionally, samples that had a disproportionate number of gifted or a select socioeconomic group could have similar or even the opposite effects on the findings as well. Furthermore, using isolated or selected groups in the sample limits or prevents the use of generalizations that can be made to the population.

Research that examines the effects of being among the youngest in class needs to control for key variables and needs to include a sample that is representative of the population within the U.S. school system. The research should consider gender, ethnicity, socioeconomic status, sample size, U.S. setting, testing methods, and a current school system. Additionally, the research needs to be longitudinal so that a single group can be followed for a period of time in order to assess the long-term effects of being among the youngest students. This current study attempts to accomplish that by using a resource that meets the criteria and also avoids the majority of the methodological limitations associated with the studies listed in the literature review. The resource that will be used for this study is discussed in the following section.

CHAPTER THREE

METHODOLOGY

Data Source

The Early Childhood Longitudinal Study, Kindergarten Class of 1998-99 (ECLS-K), sponsored by the U.S. Department of Education, National Center for Education Statistics (NCES) has been collecting data on a sample of approximately 22,000 students from across the U.S. who entered kindergarten in the fall of 1998 (Tourangeau, Nord, Le, Pollack, & Atkins-Burnett, 2006). In addition, 3,000 kindergarten teachers and the parents of the students were also included. The sample includes children who attended both public (85%) and private (15%) schools. A diverse group of students from various ethnic groups, language minorities, special education, and socioeconomic backgrounds are included. Among other information, data on gender, school entry age, preschool experience, parental education, and academic performance were collected. Individualized personal assessments, parent interviews, teacher questionnaires, and standardized tests were utilized to obtain the information. Because the ECLS-K is a longitudinal study, the students were followed from kindergarten through the fifth grade. Later, it was decided that the study would continue to follow the students through the eighth grade. The collection round for eighth grade is scheduled to take place in the spring of the 2007 school year.

Researchers have already utilized the database to examine the effects of being among the youngest in kindergarten (Coley, 2002; West et al., 2001; Zill &

West, 2001) and will use the database once again to determine if the advantages/disadvantages of being among the youngest still exist when the students are in fifth grade. Knowing that there are plans for such a robust study, this dissertation study was directed toward a slightly different path.

Research Questions

This study will address the following research questions:

1. What variables, if any, correlate with the performance of students?
 - a. What variables correlate with reading performance?
 - b. What variables correlate with math performance?
2. Are the characteristics of the youngest students the same as the characteristics of their school entry peers?
3. Does the academic performance of the youngest change more over time relative to their school entry peers?
 - a. Does the reading performance of the youngest change more over time relative to their school entry peers?
 - b. Does the math performance of the youngest change more over time relative to their school entry peers?
4. When controlling for confounding variables, does the academic performance of the youngest change more over time relative to their school entry peers?
 - a. When controlling for confounding variables, does the reading performance of the youngest change more over time relative to their school entry peers?

- b. When controlling for confounding variables, does the math performance of the youngest change more over time relative to their school entry peers?

The ECLS-K database can be utilized to obtain the information needed to address the research questions. The ECLS-K database includes standardized achievement scores in reading and math. Because the database is so rich with background information on the students, the database provides information that may help explain characteristics associated with performance and if those characteristics are also present for the youngest students.

The ECLS-K has already engaged in six rounds of data collection. The rounds included collections during fall and spring of kindergarten and first grade and during the spring of third grade and fifth grade. The information gathered in the rounds of data collection varied in some aspects each period, but every effort was made to preserve the integrity of the sample. NCES compiled a Kindergarten-Fifth database that is designed to simplify the process necessary to conduct a longitudinal study without merging files. When using the longitudinal dataset, the developers advise against comparing fall and spring scores. Therefore, the four rounds of collection included in this study are the spring rounds during kindergarten, first, third, and fifth grades.

Groups of Interest

The sample was subset to include only those students who were entering kindergarten for the first time during the base collection year. The case group is defined as the “youngest” students in the sample who were born in June, July, or

August of 1993 and who entered kindergarten for the first time during the base year collection. Students, who were born during the months of September through December of 1993, and thus younger than the case group, were excluded from the analyses of this study.

The exclusion of these students was based, primarily, upon two notions. First, the review of literature indicated that, although entrance cut-off dates varied from state-to-state, the trend seemed to be for schools to set an entrance cut-off date near the start of school. For many schools, the cut-off date was September. Even many of the states with later cut-off dates were in the process of gradually moving their cut-off dates to that general timeframe. Therefore, students born in the months of September through December would not have been eligible to enter kindergarten in many of the school systems in the U.S. during the year the data was collected.

Second, the reason a child was allowed to enter school at a “younger than average age” was not known. It is possible that those students were high ability students who took and passed screenings to allow them to enter school early. Thus, they would be classified as early entrants rather than regular entrants, and their higher academic ability may cause an unjust comparison. By excluding first time kindergarten students born in September through December 1993, 1,267 students were excluded from this study.

The control group includes first time kindergartners who were neither in the youngest group nor the excluded group. Therefore, for the purpose of this study, the case group will be referred to as the “youngest” and the control group as

“school entry peers”. There are 6,493 students in the sample with 1,699 students in the case group and 4,794 students in the control group.

Measures

Predictor Variable

The primary predictor variable was birth date (DOBMM, DOBYYY). By using the birth date, the case and control groups were formed and one additional group was excluded from the study as just discussed.

Dependent Variable

Academic performance was measured by direct cognitive assessment that was individually administered at all collection rounds. The ECLS-K assessment battery was designed to assess children’s academic achievement at a single point in time but also to provide a way to measure growth over time. Test items were reviewed by curriculum and content area specialists for appropriateness of difficulty and content. Items that passed the screenings were then field tested. The validity of the final content was established by comparing results from the field tests with the Woodcock-McGrew-Werder Mini-Battery of Achievement (1994). For the purposes of this study, academic performance will include performance in reading and math.

Reading performance for each spring round of collection (C2R3RTSC, C4R3RTSC, C5R3RTSC, and C6R3RTSC) was derived from assessment that, depending on grade level, included the broad categories of letter recognition, beginning and ending sounds, sight words, comprehension, literal inference, extrapolation, general literature evaluation, and evaluation of non-fiction. Because

t-scores can address how students compare with their peers and how the gaps among subgroups may increase or decrease over time, the t-scores from the reading assessment were utilized for the longitudinal analyses.

Depending on grade level, the math performance for all spring rounds of assessment (C2R3MTSC, C4R3MTSC, C5R3MTSC, C6R3MTSC) included, but was not limited to, number identification, shape, relative size, ordinal numbers, sequence, addition, subtraction, multiplication, division, problem solving, place value, rate/measurement, fractions, and area/volume. As with the reading assessment, math t-scores were utilized since such scores can be used for longitudinal comparison among groups. The standardized t-scores have a mean of 50 and a standard deviation of 10.

Covariates

In order to gain a comprehensive view of the sample, a test of frequencies was conducted for the variables of gender, race, socioeconomic status, disability status, pre-kindergarten care, parental education, and Head Start. The variables of gender, race, socioeconomic status, pre-kindergarten experience and disability status served as controlled variables in later analyses.

Gender. Gender (GENDER) was a required variable in the dataset and a variable that was identified during the review of literature to be of interest in comparing performance among youngest students. As discussed earlier, there are biological differences in the development of boys and girls. Furthermore, the findings of several, but not all, studies indicated that performance among the youngest students varied by gender. With that in mind, this study will examine

differences of being youngest by gender as well. Males were scored as 1, and females as 2.

Race. Race/ethnicity (RACE) is a required variable in the dataset and was also used in this study. In the review of literature, the issue of race/ethnicity was examined in relation to being among the youngest, and will be considered in this study as well. For descriptive purposes, the number of students for each race/ethnic group was determined. However, to simplify further analyses, race was dichotomized into two groups: white, non-Hispanic (scored as 1) and a compilation of all other ethnicities (scored as 0).

Socioeconomic status. The role of socioeconomic status was considered by some studies to be integral to the successful performance of students and also could be associated with retention or delayed entries. Since the youngest students may be affected by either retention or delayed entry more than other students, it is imperative to examine the effect socioeconomic status may have on being among the youngest.

Socioeconomic status (W5SESQ5) is a categorical and composite variable derived from parent's/guardian's education, parent's/guardian's occupation, and household income. The quintiles for the value of the composite were assigned a range from 1 (lowest SES category) to 5 (highest SES category). In order to simplify analyses, the variable was dichotomized into two groups: low (Quintiles 1-2) and mid-high (Quintiles 3-5). The low SES category was scored as a 0, and a score of 1 was assigned to the mid-high SES category.

Disability status. In order to determine if any of the students had special needs, the child's disability status variable (P6DISABLE) was included in the dataset. The definition of disability includes those who had already received a diagnosis indicating a "problem" (Tourangeau et al., 2006), received therapy, or had vision-related problems that were not correctable. For the analyses, a 0 indicated not disabled, and a 1 was an indication that there was an identified disability.

Pre-kindergarten experience. The pre-kindergarten experience variable (WKCAREPK) indicates whether the child received any non-parental care the year prior to entering kindergarten. Participation in non-parental care includes non-relative care, center-based care, or participation in Head Start. Those who did not receive non-parental care the year prior to kindergarten were scored as a 0 and a 1 was assigned to those who did receive non-parental care prior to kindergarten.

Parent education level. The education level of the parents/guardian (W5PARED) was assessed and provided information regarding the highest level of education for the child's parents or guardians. The education levels consisted of nine categories ranging from eighth grade level or below to doctorate or professional degree. The frequency for each category was obtained. To simplify reporting and further analyses, the nine categories were collapsed into four categories: less than a high school diploma, high school diploma or equivalent, some college or vocational/technical program, and bachelor's degree or higher. Because the socioeconomic variable was confounded with parent education, the

parent education variable was not used when conducting the multivariate analysis of covariance (MANCOVA).

Head Start. Participation in the Head Start program (PIHSEVER) was considered. Those who did not attend Head Start were scored as a 0, and score of 1 was assigned to those who attended Head Start. Because the Head Start variable was confounded with socioeconomic status, the Head Start variable was not used when conducting the MANCOVA.

To provide descriptive information on students who had been retained during the collection years, the variables for grade level (T4GLVL, T5GLVL, and T6GLVL) and retained in grade (T5RETGRA, T6RETGRA) were entered into the dataset. For ease of assessment, the grade level variable was dichotomized in order to determine the number of students who were and were not at the fifth grade level during the fifth grade collection round. A student below grade level received a score of 0, and a student at grade level received a score of 1.

Complex Sample Design

Because of the complex sample design of the ECLS-K, data must be adjusted before performing analyses. The parent panel weight (C2_6FP0) was used to produce all estimates in this study. Further, the data were weighted to avoid over-representation or under-representation of certain groups. In this way, the sample weights can be applied to produce population estimates. By adjusting the standard error estimate by the root design effect, approximate standard errors were estimated. Ultimately when sample weights are used, a generalization to the population can be made.

Data Analytic Strategy

To address the first question: “What variables, if any, correlate with the performance of students?”, an analysis of variance (ANOVA) was used to examine reading performance with each of the following covariates: gender, race, socioeconomic status, disability status, pre-kindergarten care, and Head Start. A Pearson’s Correlation was conducted to examine reading performance and the continuous variable parent education. The same series of analyses was used to examine math performance with the covariates. The analyses determined which variables are associated with academic performance in reading and math for the whole group and indicate which covariates should be controlled in the repeated measures analysis of covariance (MANCOVA).

For the second question: “Are the characteristics of the youngest students the same as the characteristics of the school entry peers?”, a chi-square test was used to determine the associations between age and the following covariates: gender, race, socioeconomic status, pre-kindergarten care, disability status, and Head Start. An ANOVA was used to examine the association of age with the continuous parent education variable. Significant findings indicated how youngest students and their school entry peers differed and also indicated which covariates should be controlled in the repeated measures MANCOVA analyses.

For the third question: “Does the academic performance of the youngest change more over time relative to their school entry peers?”, the reading and math t-scores (standardized scores) provide a means of viewing youngest students’ positions relative to their school entry peers. The reading and math t-scores

collected during four rounds of collection are included and a multivariate analysis of variance (MANOVA) with repeated measures was utilized to determine if the performance of the youngest changed over time relative to the performance of their school entry peers. Two parallel MANOVAs were conducted: one with the four reading performance t-scores serving as the dependent variables and one with the four math performance t-scores serving as the dependent variables. The model included a between-subjects factor (youngest and school entry peers) and a within-subjects factor (grade when assessment occurred). A significant between by within subject interaction would indicate if the rate of change over time differed between the two groups (youngest and school entry peers).

One additional analysis was used to determine the prevalence of students who were at grade level (not retained) or below grade level during the fifth grade collection. This analysis examined prevalence for both the youngest and their school entry peers. A chi-square test was used to determine if there was a statistical significance difference between the two groups.

For the fourth research question: “When controlling for confounding variables, Does the academic performance of the youngest change more over time relative to their school entry peers?”, a MANCOVA with repeated measures was used. This analysis indicated if any differential change in reading and math performance, based on age, is observed even after holding constant other factors that are related to performance.

All tests of statistical significance were two-tailed, and an alpha level of .05 was used for all statistical tests.

CHAPTER FOUR

RESULTS

Sample Descriptives

Prevalence

Size. The sample included 6,493 students who entered kindergarten for the first time in the base collection year and participated in the collection rounds through the year 2003. Of the 6,493 students, there were 1,699 (26%) students born in June, July, or August of 1993 that comprised the youngest group, and there were 4,794 (74%) students in the school entry peers (SEP) group.

Gender. There were 3,289 (51%) males and 3,204 (49%) females in the sample.

Race/Ethnicity. A frequency analysis was conducted for the race/ethnicity variable. Table 2 shows the distribution for each race/ethnicity category in the sample. To simplify further analyses, race was dichotomized into two groups: white, non-Hispanic and a compilation of all other ethnicities. Using the dichotomized variable for race, the sample included 3,842 (59%) white, non-Hispanic students and 2,648 (41%) students of other races/ethnicities.

Table 2
Distribution by Race/Ethnicity

Race/Ethnicity	Frequency	Percent
White, non-Hispanic	3,842	59
Black or African American, non-Hispanic	1,011	16
Hispanic, race specified	590	9
Hispanic, race not specified	566	9
More than one race, non-Hispanic	165	3
Asian	154	2
American Indian or Alaska Native	122	2
Native Hawaiian, other Pacific Islander	40	1
Missing	<u>2</u>	<u>≤1</u>
Total:	6,493	100

Note: Frequency and percents have been rounded.

Socioeconomic status. There were 2,452 (38%) students in the “low” SES group and 4,041 (62%) students in the “mid-high” group.

Disability status. The sample included 1,278 (20%) students identified as having a disability and 5,185 (80%) students not identified as having a disability. Data on disability status were unavailable for 30 students (.5%).

Pre-kindergarten experiences. Results indicate that 5,397 (83%) students received pre-kindergarten care the year prior to kindergarten and 1,085 (17%) students did not receive pre-kindergarten care the year prior to kindergarten. There were 11 students (.2%) missing data for this variable.

Parent education level. Table 3 includes the frequencies for all nine categories. Before performing further analyses, this variable was collapsed into the following four categories: less than a high school diploma, high school diploma or equivalent, some college or vocational/technical program, and

bachelor’s degree or higher. The frequency for each collapsed category was obtained. There were 484 (7%) students who had a parent with less than a high school diploma, 1,457 (22%) students who had a parent with a high school diploma or equivalent, 2,324 (36%) students who had a parent with some college or vocational/technical program training, and 2,228 (34%) students who had a parent with a bachelor’s degree or higher.

Table 3
Distribution by Highest Education Level

Parent/Guardian Highest Education Level	Frequency	Percent
8th grade or below	137	2
9th-12th grade	347	5
High school diploma/equivalent	1,457	22
Voc/Tech program	378	6
Some college	1,945	30
Bachelor's degree	1,233	19
Grad/professional school-no-degree	180	3
Master's degree	538	8
Doctorate or professional degree	278	4
Total:	6,493	99

Note: Percent does not equal 100 due to rounding.

Head Start. There were 1,188 (18%) students who attended a Head Start program and 5,295 (82%) students who did not attend a Head Start program. Data on participation in Head Start were not available for 10 students (.1%) in the sample.

Question 1 - Associations with Academic Performance

Associations with Reading Performance

The variables of gender, race, socioeconomic status, disability, pre-kindergarten care, parent education, and Head Start were all associated with reading performance and statistically significant for all collection periods (kindergarten, first, third, and fifth grades). Table 4 includes the corresponding F or r values for each variable. Students more likely to have higher reading scores were as follows:

- females
- white, non-Hispanics
- those with mid-high socioeconomic status
- those who received pre-kindergarten care the year prior to kindergarten
- those without disabilities
- those who had parents with higher education
- those who did not participate in Head Start

It is important to note that participation in Head Start is based on income level and therefore is confounded with the socioeconomic status variable. Additionally, those receiving pre-kindergarten care included those in Head Start.

Socioeconomic status also included parent education level in the composite.

Table 4

Associations between Reading Performance and Covariates

	Gender	Race	SES	Disability	Pre-K	Head Start	Parent Education
	F	F	F	F	F	F	r
K	33.98***	565.11***	989.34***	131.82***	114.77***	122.50***	0.39***
1	48.66***	341.21***	850.73***	281.27***	69.26***	129.27***	0.38***
3	51.14***	327.73***	933.66***	515.53***	30.72***	237.36***	0.40***
5	33.50***	331.92***	954.41***	402.30***	20.27***	287.72***	0.43***

*** p<.001 **p<.01 * p<.05

Note. Parent education was analyzed using Pearson's Correlation.

Associations with Math Performance

The variables of race, socioeconomic status, disability, parent education, and Head Start were all associated with math performance and statistically significant for all rounds of collection (kindergarten, first, third, and fifth grades). Table 5 includes the corresponding F or r values for each variable. Students who were more likely to have higher math scores were as follows:

- white, non-Hispanics
- those with mid-high socioeconomic status
- those without disabilities
- those who did not participate in Head Start

Again, it is important to note that Head Start participation is based on income level and therefore is confounded with the socioeconomic status variable. Pre-

kindergarten care included those in Head Start, and socioeconomic status composite variable was, in part, derived from parent education level. There was not a statistically significant association between gender and math scores at kindergarten and first grade, but there was a significant association ($p < .01$) at grades 3 and 5 such that males had higher math scores than females. For pre-kindergarten care, there was a statistically significant association between receiving pre-kindergarten care and higher math scores at the kindergarten ($p < .01$), first grade ($p < .01$), and third grade ($p < .05$) collections. At the fifth grade collection, there was not a significant association between pre-kindergarten care and math scores.

Table 5
Associations between Math Performance and Covariates

	Gender	Race	SES	Disability	Pre-K	Head Start	Parent Education
	F	F	F	F	F	F	r
K	2.88	474.04***	791.44***	301.55***	27.46***	254.38***	0.36***
1	0.03	365.18***	867.40***	312.76***	8.11**	318.25***	0.37***
3	49.43***	406.95***	891.46***	263.11***	6.04*	329.28***	0.39***
5	47.71***	350.71***	953.27***	276.67***	0.42	375.74***	0.40***

*** $p < .001$ ** $p < .01$ * $p < .05$

Note. Parent education was analyzed using Pearson's Correlation.

Question 2 - Associations between Predictor Variable (Age) and Covariates

Gender

Gender was significantly associated with age ($\chi^2[1, N=6493] = 7.54, p < .01$) such that females were more likely than males to be in the youngest group. There were 887 (52%) females and 812 (48%) males in the youngest group. There were 2,317 (48%) females and 2,477 (52%) males in the SEP group.

Socioeconomic Status

Socioeconomic status was significantly associated with age ($\chi^2[1, N=6493] = 3.83, p = .05$) such that the youngest students were more likely than the SEP group to be in the mid-high socioeconomic status than to be in the low socioeconomic group. There were 1,091 (64%) young students in the mid-high socioeconomic status group and 608 (36%) young students in the low socioeconomic status group. In the SEP group, there were 2,950 (62%) students in the mid-high group and 1,844 (39%) students in the low socioeconomic group. Totals did not equal 100 due to rounding.

Parent Education

Students having a parent or guardian with a higher education were more likely ($F = 4.52, p < .05$) to be in the youngest group than the SEP group. For the youngest group, 111 (7%) students had parents with less than a high school diploma, 386 (23%) students had parents with high school diploma or equivalent, 575 (34%) students had parents with some college or vocation/technical schooling, and 626 (37%) students had parents with a bachelor's degree or higher. For the SEP group, 373 (8%) students had parents with less than a high school

diploma, 1,071 (22%) students had parents with high school diploma or equivalent, 1,748 (37%) students had parents with some college or vocation/technical schooling, and 1,602 (33%) students had parents with a bachelor's degree or higher.

Head Start

Head Start was significantly associated ($\chi^2 [1, N=6493] = 14.41, p < .01$) with age. Those students not attending Head Start were more likely to be in the youngest group than those who attended Head Start. There were 1,438 (85%) students who did not attend Head Start and 259 (15%) students who did attend Head Start in the youngest group. In the SEP group, there were 3,857 (81%) students who did not attend Head Start and 929 (19%) students who did attend Head Start.

Other Covariates

Age was not significantly associated with race, pre-kindergarten care, or disability status.

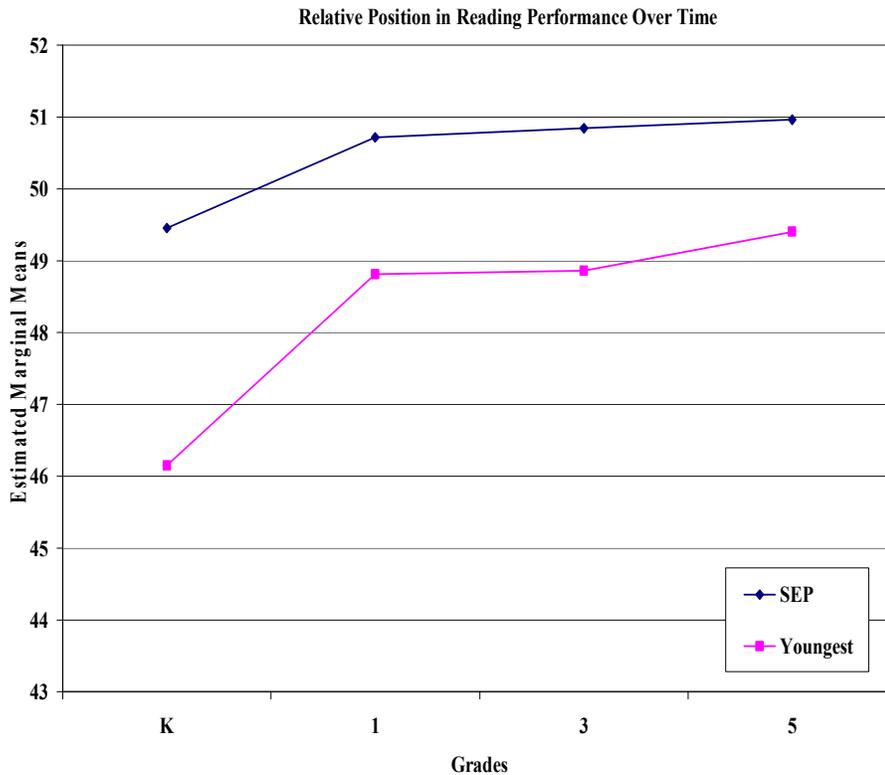
Question 3 - Relative Position over Time

Reading Performance

Figure 1 shows that the youngest students' reading scores increased from kindergarten through fifth grade, and it appears the youngest students are beginning to "catch up" with their school entry peers. The within-subjects effect (shared change over time for sample as a whole) produced by the repeated measures MANOVA revealed that for reading, students' performance changed significantly over time ($F = 11.30, p < .01$). The between-subjects factor

(performance for each group averaged across the four assessment periods) indicated that youngest students performed less well than the SEP group ($F = 44.01, p < .01$) See Table 6. Of particular interest, the interaction term between the within-subject factor and the between-subjects factor indicated a different rate of change over time between the two groups (multivariate $F = 8.66, p < .01$). The differential rate of change was observed between kindergarten and first grade ($F = 19.61, p < .01$), kindergarten and third grade ($F = 11.44, p < .01$), and kindergarten and fifth ($F = 20.17, p < .01$).

Figure 1
Relative Position in Reading Performance over Time



Note. SEP = School Entry Peers

Table 6
Reading Performance Over Time

Grade	Group	Estimated Marginal Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
K	SEP	49.45	0.24	48.99	49.91
	Youngest	46.15	0.4	45.37	46.92
1	SEP	50.72	0.19	50.34	51.1
	Youngest	48.81	0.32	48.18	49.44
3	SEP	50.84	0.18	50.48	51.2
	Youngest	48.86	0.31	48.26	49.46
5	SEP	50.96	0.17	50.62	51.29
	Youngest	49.4	0.28	48.84	49.96

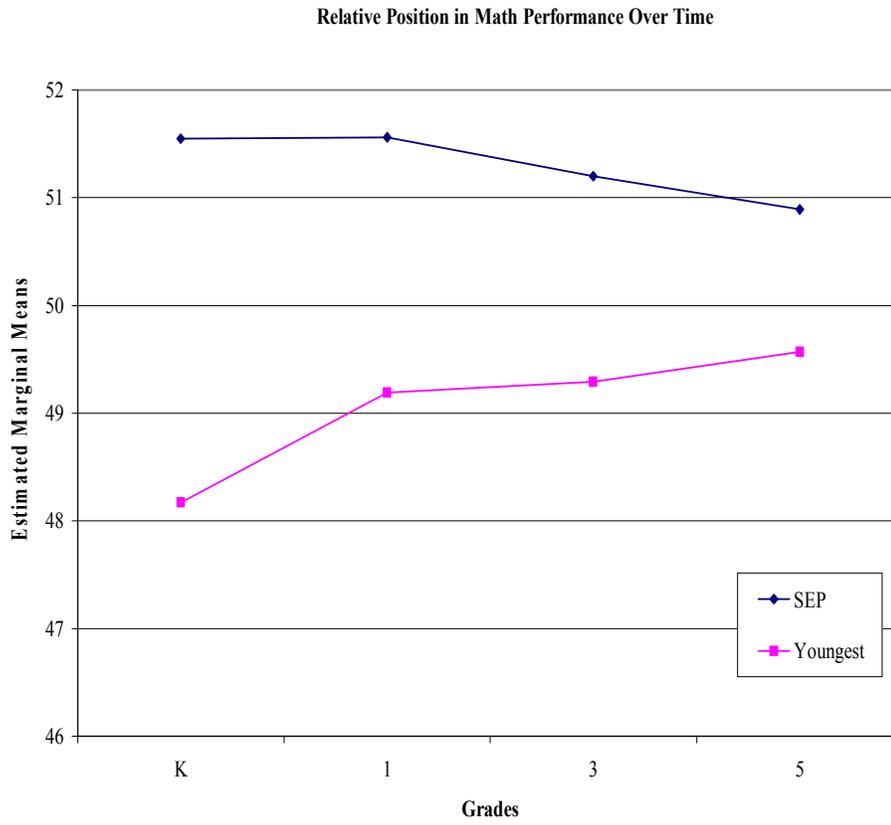
Math Performance

Figure 2 shows that the youngest birthday students' math scores gradually increase through fifth grade. As with reading, the within-subjects factor indicated that students' math performance as a whole changed significantly over time ($F = 28.93, p < .01$). The between-subjects indicate that the average math score across the four grade assessments was lower for the youngest students than the SEP group ($F = 61.34, p < .01$). See Table 7. The interaction term between the within-subject factor and the between-subjects factor indicated a different rate of change over time between the two groups (multivariate $F = 21.46, p < .01$). The differential rate of change was observed between kindergarten and first grade

($F = 18.71, p < .01$), kindergarten and third grade ($F = 33.90, p < .01$), and kindergarten and fifth grade ($F = 64.18, p < .01$).

Figure 2

Relative Position in Math Performance over Time



Note. SEP =School Entry Peers

Table 7
Math Performance Over Time

Grade	Groups	Estimated Marginal Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
K	SEP	51.55	0.17	51.22	51.88
	Youngest	48.17	0.28	47.62	48.72
1	SEP	51.56	0.15	51.26	51.86
	Youngest	49.19	0.26	48.69	49.69
3	SEP	51.2	0.17	50.87	51.53
	Youngest	49.29	0.28	48.75	49.84
5	SEP	50.89	0.17	50.56	51.21
	Youngest	49.57	0.28	49.03	50.11

Supplemental Analysis: Grade Level Placement

In order to determine if the youngest students were able to remain at their expected grade level, a chi-square analysis was performed. It was determined that within the group of youngest students, there were 83% at grade level and 17% below grade level during the fifth grade collection. In comparison, within the SEP group, there were 91% at grade level and 9% below grade level during the fifth grade collection. A chi-square analysis revealed statistical significance ($\chi^2 [1, N=5762] = 69.42, p < .01$) between the youngest students and the SEP group with grade level status.

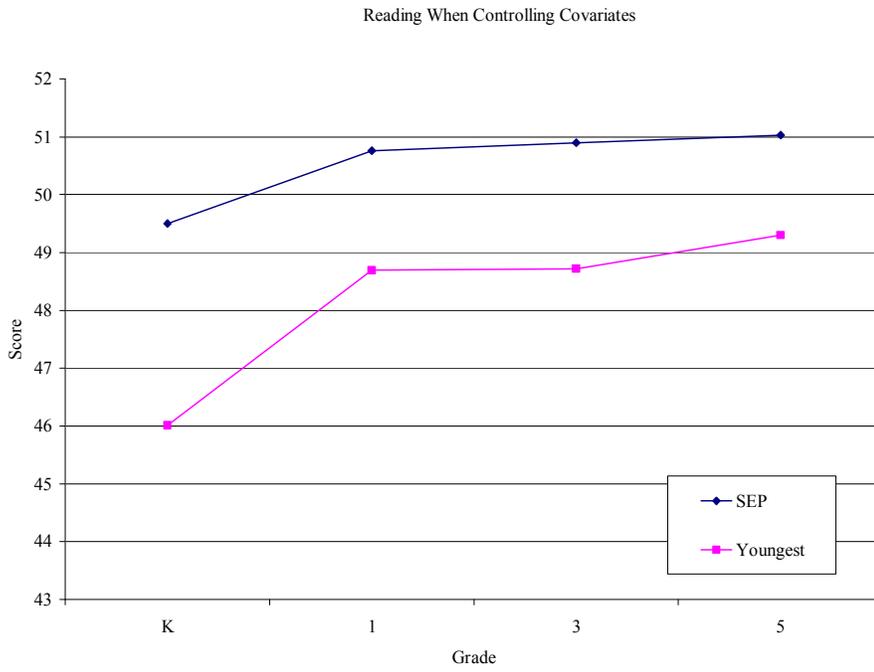
Question 4 - Performance When Controlling for the Covariates

Reading Performance

The difference in reading performance over time between the youngest students and the SEP group was compared while controlling for the covariates of gender, race, socioeconomic status, disability, and pre-kindergarten care (Table 8). The purpose of this analysis was to determine if the differential rate of change between the youngest and SEP groups would persist after controlling for other important variables (Figure 3). This analysis was conducted using a repeated measure MANCOVA. The within-subjects effect (shared change over time for sample as a whole) produced by the repeated measures MANCOVA revealed that for reading, students' performance changed significantly over time ($F = 11.58, p < .01$). The between-subjects factor (performance for each group averaged across the four assessment periods) indicated that youngest students performed less well in reading than the SEP group ($F = 71.23, p < .01$). The interaction term between the within-subject factor and the between-subjects factor indicated a different rate of change over time between the two groups (multivariate $F = 9.21, p < .01$). The differential rate of change was observed between kindergarten and first ($F = 20.82, p < .01$), kindergarten and third grade ($F = 11.37, p < .01$), and kindergarten and fifth ($F = 20.88, p < .01$).

Figure 3

Reading Performance When Controlling for Covariates



Note. SEP =School Entry Peers

Table 8

Reading When Controlling for Covariates

Grade	Group	Estimated Marginal Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
K	SEP	49.5	0.21	49.08	49.91
	Youngest	46.01	0.35	45.32	46.7
1	SEP	50.76	0.18	50.41	51.1
	Youngest	48.69	0.29	48.12	49.26
3	SEP	50.9	0.16	50.59	51.22
	Youngest	48.72	0.27	48.19	49.24
5	SEP	51.03	0.15	50.74	51.33
	Youngest	49.3	0.25	48.8	49.78

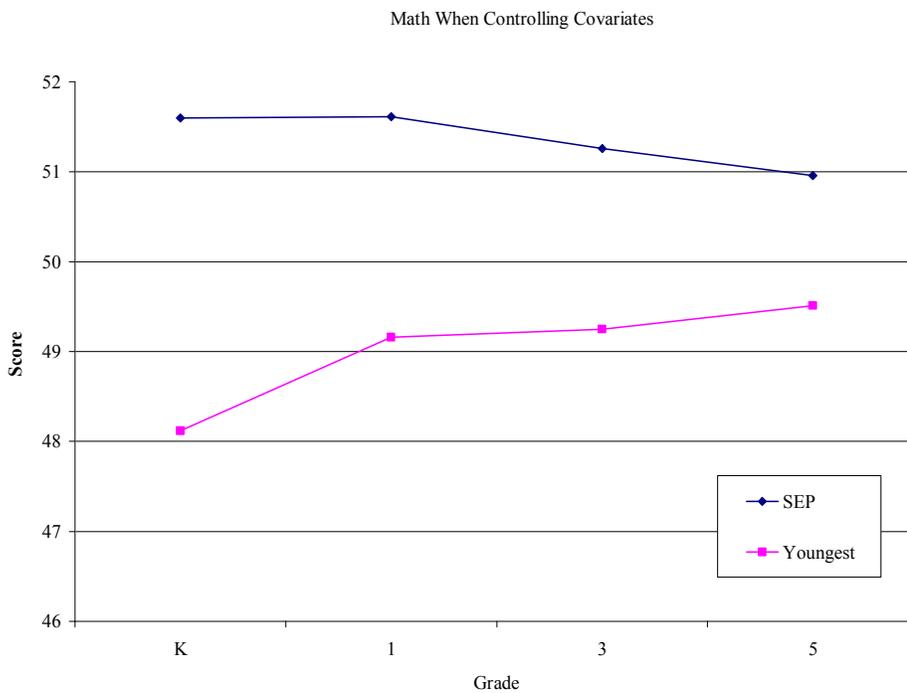
Math Performance

As with reading, the analysis for math included the repeated measure MANCOVA analysis that controlled for the covariates of gender, race, socioeconomic status, disability, and pre-kindergarten care (Table 9). The within-subjects effect (shared change over time for the sample as a whole) produced by the repeated measures MANCOVA revealed that for math, students' performance changed significantly over time ($F = 28.48, p < .01$). The between-subjects factor (performance for each group averaged across the four assessment periods) indicated that youngest students performed less well in math than the SEP group ($F = 90.25, p < .01$). The interaction term between the within-subject factor and the between-subjects factor indicated a different rate of change over time between

the two groups (multivariate $F = 21.12, p < .01$). The differential rate of change was observed between kindergarten and first grade ($F = 19.70, p < .01$), kindergarten and third grade ($F = 34.75, p < .01$), and kindergarten and fifth grade ($F = 63.31, p < .01$). See Figure 4.

Figure 4

Math Performance When Controlling Covariates



Note. SEP = School Entry Peers

Table 9

Math When Controlling for Covariates

Grade	Group	Estimated Marginal Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
K	SEP	51.6	0.15	51.3	51.9
	Youngest	48.12	0.25	47.62	48.61
1	SEP	51.61	0.14	51.34	51.88
	Youngest	49.16	0.23	48.71	49.61
3	SEP	51.26	0.15	50.97	51.55
	Youngest	49.25	0.25	48.77	49.73
5	SEP	50.96	0.15	50.67	51.25
	Youngest	49.51	0.24	49.03	49.98

Supplemental Analysis: Grade Level Placement

After controlling for the covariates of gender, race, socioeconomic status, disability, and pre-kindergarten care, the differences in grade level attainment were significant ($F = 90.64, p < .01$) with the youngest students less likely to have attained fifth grade status during the fifth grade collection round than the school entry peers.

CHAPTER FIVE

DISCUSSION

Summary of Findings

Associations with Academic Performance

Researchers have noted from their studies that gender, race (Jones & Mandeville, 1990) and socioeconomic status (Bickel et al., 1991; Jones & Mandeville, 1990) are more significant predictors of academic performance than is age. This study also confirms that there are various variables, other than age, associated with academic performance. However, as with Jones and Mandeville's study, age remained a significant association with performance even when controlling for these variables.

Reading. Findings for reading performance indicate that gender (consistent with Oshima & Domaleski, 2006), race, socioeconomic status, disability status, pre-kindergarten care, parent's level of education, and Head Start are all associated with the reading performance of students. Those with higher reading scores were more likely to be female, be non-Hispanic Caucasians, be mid-high socioeconomic status, be non-disabled, have participated in non-parental care the year prior to kindergarten, have parents with higher education levels, or have not participated in Head Start. As mentioned previously, caution should be taken with the analysis involving the Head Start data because participation in Head Start is based on income and the socioeconomic variable was also used separately in the analyses.

Math. As with the reading findings, the associations with math performance were the same for race, socioeconomic status, disability status, parent's level of education, and Head Start. In the study by Oshima & Domaleski (2006), gender was not significant for math. For gender in this study, however, males in the 3rd and 5th grade collection rounds were more likely to have higher scores in math than the females. There were no significant associations with gender found for the kindergarten and 1st grade collection rounds. Pre-kindergarten care and math performance also differed slightly from the findings for reading in that statistical significance was evident at kindergarten, 1st, and 3rd grade collections but not for the 5th grade collection.

Associations with Age

Being in the youngest group was significantly associated with being female, having mid-high socioeconomic status, having parents with higher education levels, and not participating in Head Start. These findings are contradictory to those in the literature review that suggested lower socioeconomic children would be more likely to be in the youngest group, in part, due to financial inability to delay entry (Meisels, 1992; Shepard, 1997; Shepard & Smith, 1986; Stipek & Byler, 2001), and parents with higher educations are more likely to delay their child's school entry thus preventing them from being among the youngest (Diamond et al., 2000; Malone et al., 2006; Zill et al., 1997). The finding of the youngest students' association with being female is consistent with the literature review suggesting that parents may be considering entry based on gender (Datar, 2006). If parents are tending to delay school entry for boys rather

than girls (Brent et al., 1996; Graue & DiPerna, 2000; Malone et al., 2006; May, Kundert, & Brent, 1995; Zill et al., 1997), then the youngest group would be more likely to be associated with being female. It is unknown whether decisions about entry for these students were influenced by previous research findings about males or socioeconomic status.

Regardless of the reasons, the youngest group was comprised of a seemingly, and unexpectedly, “advantaged” group. The implications of this finding to further performance analyses are notable. Although many of the studies in the literature review, as well as this study’s findings, indicated males and lower socioeconomic children are at a disadvantage in reading and math (males at a disadvantage only in reading for this study), it was not those students who were most likely to be in the youngest group. Despite the fact that the youngest group was not substantially comprised of students believed to be most “at-risk”, the youngest “advantaged” group still performed significantly less well than their school entry peers.

Academic Performance - Relative Position over Time

Reading. Although the youngest students showed gains in reading performance over time, the differences in performance between the youngest and their peers did not disappear in older grades as they did in other studies (Bickel et al., 1991; Kurdek & Sinclair, 2001; Stipek & Byler, 2001). Analyses of other studies (Crosser 1991; Jones & Mandeville, 1990; Oshima & Domelski, 2006) revealed that the youngest did not perform as well in reading through the fifth grade.

Math. As with the reading performance, the youngest students showed gains in math performance over time. However, contrary to studies that indicated there were either no differences in long-term performance in math (Kurdek & Sinclair, 2001) or that the differences disappeared in later grades (Bickel et al., 1991; Stipek & Byler, 2001), the analyses of this study indicated that the differences remained through fifth grade.

Differential rate of change. There was a different rate of change between the youngest group and the school entry peers' group. The scores of the school entry peers remained relatively consistent throughout the collection rounds; however, the youngest students made the largest gains in performance between the earlier collection periods with smaller gains in the later rounds.

Grade level attainment. In examining academic performance, it was also revealed that there was a significant difference between the youngest students and school entry peers in being at the expected grade level, such that the youngest students were less likely than their school entry peers to be in fifth grade during the fifth grade collection period.

Performance When Controlling for Covariates

The results of this study indicate that the differences in academic performance between the youngest students and their school entry peers remains significant through the fifth grade even when controlling for gender, race, socioeconomic status, disability status, and pre-kindergarten care.

Implications and Considerations

The findings from this study reveal that younger students are less likely to perform as well as their school entry peers through fifth grade. Because the data set is considered to be a nationally representative sample, the results allow for generalization to the population. For that reason, the implications of the findings may be far-reaching and must be considered. Evaluating, and possibly modifying, existing school entry policy, curriculum, and assessment are recommended. Furthermore, it is essential to disseminate research findings that may be instrumental in making such decisions.

School Entry Policy

Entrance age requirements. As already discussed, many states have changed the entrance age cutoff dates in order to increase a student's age when entering kindergarten. However, even with the change of entrance date, there will still be younger and older students who may be inappropriately compared with each other. School entry policy that is based on chronological age alone may need to be reconsidered.

Developmental and readiness assessment. The entire development and background of the individual must be taken into account. State departments and districts need to consider allowances, provisions, and alternatives for students who may be at a disadvantage by entering at a young age. Such decisions need to be based on research findings and deemed to be in the best interest of the child. A thorough investigation of the effectiveness of developmental or readiness assessment should be conducted to determine if such an assessment would be a

viable alternative to the chronological age requirements for school entry. Furthermore, the utility of including readiness assessment for entry and remediation decisions should be considered. Most importantly, assessing the long-term effectiveness of such testing will be critical in determining if it is an option for all students or even just a select group.

Delaying entry. Many parents choose to delay their child's entry to school to prevent him/her from being among the youngest or with the hope that the child will be more "ready" to enter school the following year. Unfortunately, as discussed in the literature review, the research findings are not definitive on the long-term advantages or disadvantages with delaying entry. Additionally, not all parents are in the financial position to either keep their child home another year or pay for the added expense of day care. Finally, one questions whether it is the parent and child's responsibility to insure readiness or the responsibility of the school.

If chronological age remains the school entrance guideline, yet the youngest students perform significantly less well than their peers, what is recommended? Is there a way to prevent, intervene, or remediate so that youngest students can achieve the same level of success as their peers?

Curricular Options

Although early childhood teachers may be trained to consider developmental differences in children and to adjust curriculum and instruction to meet the developmental differences with students, such practices may be especially critical for the youngest students who are likely to be at a different

stage of development than their peers. Graue (1993) recommends academic units that span several grade levels instead of focusing on a set curriculum for a single grade level. These findings support such an approach.

Preschool. One form of prevention may be attendance in a preschool program. Gullo and Burton (1992) suggest that when a quality program exists, the preschool experience may offset negative effects of being the youngest. Although this study did consider whether a child participated in non-parental care the year prior to kindergarten, care by a non-relative, center-based, and Head Start were grouped together rather than examined in isolation. Conducting or examining studies that specifically address the effects of preschool participation and the performance of youngest students is recommended. The ECLS-K longitudinal data set could be used to examine such relationships.

Year-round schedule. A type of intervention or remediation that may be utilized is the adoption of a year-round schedule. A year-round schedule would not add more days to the calendar but would distribute the sessions more evenly throughout the calendar year. Such a schedule could provide remediation opportunities during the “off” times which would be more immediate than waiting for a summer school program. Likewise, a year-round schedule would reduce the length of the summer break and possibly decrease learning loss. Furthermore, having a school session during a portion of the summer would allow academic experiences to better coincide with unexpected developmental gains that may occur during the typical three month summer period. The NAEYC (1995) asserts that children’s progress in development does not always match the yearly

calendar. Perhaps a year-round schedule could provide a more continuous cycle of learning than the traditional schedule and would, therefore, be more likely to accommodate spurts of development occurring throughout the year. Further research on the impact a year-round schedule has on youngest students is suggested.

Multiage classroom. Because young children (specifically those 5-7 years of age in the transitional stage) vary in their rate of development, placing children in a single grade class may not be the most advantageous approach. Placing young children in a mixed age, cross-age, or cooperative learning environment may prove beneficial (Graue, 1993; May et al., 1995) --- especially with the primary grade range. The NAECS (2000) suggests that it could be a less costly alternative to other options. Such a classroom could make provisions for the developmental differences that occur within an age range rather than a specified chronological age. Additionally, Graue suggests implementing a multi-grade report card that shows the continuum of development of the student. Children readily learn from other children. A multiage classroom could make the developmental differences more acceptable and purposeful. Another advantage may be that every child will eventually have the opportunity to be the “oldest” in the class. Conducting research to determine how the youngest in grade perform in an un-graded or multi-grade environment would be beneficial.

Assessment

As with curriculum accommodations, there also needs to be an adjustment to the assessment and performance expectations. Because of the varying ages and

developmental levels, basing performance on grade level expectations may not be equitable. Graue and colleagues (2003) found that educators were using a rigid set of standards for gauging students' achievement instead of considering individual variability in children.

The "No Child Left Behind Act of 2001" (NCLB) Public Law 107-110 has created a similar assessment system (U.S. D.O.E., 2002). Although NCLB allows states to decide on the content standards, the standards used for assessment are based on grade level and content area expectations rather than developmental ranges of abilities or individual variability (U.S. D.O.E., 2003). Because this and other current research studies illustrate the differences in performance between youngest students and their school entry peers in the same grade, it seems apparent that assessing the entire group based on grade level expectations is not equitable. When younger students are compared to older students who may be more successful only because of developmental and chronological age differences, it is an injustice to the youngest students.

An assessment system based on developmental ranges may be more appropriate, particularly in the early grades. Further research on such assessment models and making modifications to the assessment system within NCLB are necessary to insure that expectations are realistic without being diluted.

Dissemination of Findings

Because not all individuals are aware of research findings on the youngest students, results of research need to be presented. Policy makers need to be aware of the findings so that policies regarding entrance age, assessment, and

accountability standards can be re-assessed. Faculty involved in teacher education programs need to be informed so that programs can address the discrepancies in performance of the youngest and their peers. Preparation includes making future teachers aware of the differences in performance of the youngest students and providing ways in which teachers can intervene on the students' behalf. Likewise, administrators and educators need to be made aware of the findings so that the appropriate classroom environment, instruction, and intervention or remediation methods can be applied. Parents need to be informed so that they can be involved in making decisions about early pre-kindergarten experiences, school entry, and the progress of their child. In becoming educated on the topic of school entry age, all parties will have better opportunity to make informed decisions for the youngest students. Published studies, newsletters, and workshops are possible ways of disseminating the information.

Limitations

Intelligence

One limitation of this study is that a measurement of the cognitive ability or aptitude of the child is not available. Although cognitive assessment in the form of standardized tests and teacher ratings is available, only measures of achievement are available for analyses. Knowing and being able to control for the cognitive abilities (intelligence) of the students could provide explanation for the differences in student achievement between the two groups. Furthermore, it could provide an explanation for why some youngest students succeed and other youngest students do not perform as well.

Behavior

To truly assess the performance of the youngest, assessing the behavior of the students would provide a more comprehensive view of how the child is adapting to the classroom environment. Having such information would indicate whether the youngest children are performing well not just academically but also emotionally and socially.

Pre-Kindergarten Care

A variable that identified whether a child experienced non-parental care prior to kindergarten was used; however, it would have been beneficial to use a variable that identified the type of non-parental care utilized. For example, analyses using a variable that isolated those with center-based preschool would have provided more detail and would have avoided the overlap with the separate Head Start variable as well.

Attrition

Although this study consisted of a sizeable sample, the sample size was reduced from the original base year sample due to attrition. As with any longitudinal study, maintaining the sample group over a six year period is difficult. Researchers with ECLS-K did attempt to follow up with students who had moved and changed schools, but it was not always possible. Other families may have opted to not participate in future collection rounds.

Future Research

Although this study used a sample that was current, sizeable, culturally and economically diverse, nationally representative, longitudinal, and contained a

rich source of background information on each child, this study was not exhaustive. There are endless possibilities of variables that can be examined and further analyses that can be conducted with this data set. In addition to research that explores curricular options, research that further examines the topic of youngest students' performance is advisable.

Differences in Performances beyond Fifth Grade

Examining the performance of the youngest students beyond fifth grade is recommended and will be possible using data that is currently being collected to assess the base year students who are now in eighth grade. Once the data has been collected and is available, a follow-up study of the group could be conducted.

Social/Emotional/Behavioral Differences

Although the review of literature included studies examining the affective domain, this study did not include analyses of the affective domain. Research that includes the affective domain, while also following the methodological considerations discussed earlier, would provide a more comprehensive view of the performance of youngest students.

Successful Youngest Students

The results of this study indicate that the youngest do not perform as well as their peers. However, as the researchers that utilized the ECLS-K database for their study of kindergartners have noted, although the oldest kindergartners were more likely to score in the highest quartile in reading, mathematics, and general knowledge, some of the youngest students also scored in the highest quartile (West, Denton, & Germino-Hausken, 2000). It is important to consider that when

averages are obtained having scores that are both higher and lower are what created the tabulated mean. Although a study may have concluded that there was an advantage or disadvantage to being among the youngest in class, the higher and lower scores demonstrate that there are students who are exceptions to the conclusions drawn by the researchers. Why or under what conditions such exceptions occur may be important to the discussion and policy decisions regarding school entry. Knowing why some youngest students go on to succeed in school despite their age may provide insight into how the school system can make students better “ready” for school and improve the chances of the child’s success. If there were a group of youngest students who continue to succeed, it would be worthwhile to determine what characteristics those students have in common that possibly contributed to their success in school.

Youngest and Oldest Students

The approach to formulating the comparison groups for this study was conservative. As discussed earlier, students who were actually younger than the “youngest” group were excluded from the study. This group was excluded, primarily, because those students would not have been eligible to enter schools that had common fall cut-off dates. Conversely, the school entry peer group did not contain students who had delayed school entry and would be even older than those in the school entry peer group. The ECLS-K data set can also be utilized to compare youngest students with oldest students, particularly those who delayed entry to school.

Returning to Theoretical Perspectives

The current study can be analyzed to determine how the findings relate to the theoretical perspectives discussed earlier. As evident by states moving the school entrance cut off date to earlier in the year, a behaviorist manipulation of the environment has taken place. However, the conservative grouping of youngest students in this sample were students who were born in June, July, and August and thus would qualify to enter under most of the “new” cut-off dates, and yet, the youngest students performed less well than their peers.

The importance of early childhood that Montessori advocates is also apparent in the findings of this study. Figures 1-4 provide a visual of the dramatic strides in learning that occur in the early years between kindergarten and first grade. Similarly, the differences in performance between the youngest students and their peers also demonstrates how chronological age can be tied to more broad stages of development that appear to go through a natural cycle that is difficult to force. Gesell and Piaget both maintained the importance of a child reaching the next developmental stage before sequences of new learning can take place, and the findings from this study support the notion that pushing a child too soon may not yield the desired results or expectations.

The discrepancy in performance between the youngest and their peers also illustrates the need to consider conditional terms for school entry. As supported by Vygotsky, a child needs to be within a range of development (zone of proximal development) in order to advance to the next level, and teachers and classmates must assist in the scaffolding of the learning. Additionally, tools for assessing

students (such as those proposed by Gesell) must be offered so that chronological age is not the only deciding factor in school entrance. Such tools may include readiness tests or involve intervention/prevention methods such as preschool attendance.

It is unclear whether the differences in performance that exist through fifth grade can be attributed to earlier negative experiences such as the self-fulfilling prophecy for which Erikson and Bandura might suggest, but it is apparent that such discrepancies in performance remain in later grades.

Conclusions

This study utilized a base year sample that was nationally representative, longitudinal (over a 6 year period), and from a recognized and respected source (NCES). General associations with academic performance in reading and math were obtained, and associations with age were also determined. Additional analyses yielded statistical differences in performance in both reading and math between the youngest students and their school entry peers such that the youngest students did not perform as well in reading and math as their school entry peers. A differential rate of change existed between the two groups. The differences in performance remained through the fifth grade collection, and even when controlling for selected factors related to academic performance, the differences between the two groups remained significant. Furthermore, a separate analysis revealed that the youngest students were less likely than their school entry peers to be in the expected grade (5th) during the 5th grade collection.

The findings are strengthened because the youngest students in the study were found to not be “at-risk” in other identified areas (gender, socioeconomic status, parents’ education level). Although the youngest group did not have the identified “at-risk” characteristics, they still performed less well than their school entry peers in both reading and math. It is possible that if the youngest group also had other characteristics that made them more “at-risk”, the differences in performance may have been even more pronounced.

For future research, it would be beneficial to control for cognitive ability (intelligence) and to examine the affective (social, emotional, and behavioral) performance of the youngest students. Examining the characteristics of youngest students who perform at academic levels above their school entry peers would be advantageous. Additionally, following up with the data from the eighth grade collection is recommended.

Policy makers, administrators, educators, and parents must be made aware of research findings regarding the performance of the youngest students so that policy, curricular options, and assessment can be evaluated and revised to best address the needs of all students, including those who are among the youngest in their class.

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