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# The effect of physical activity on fourth-grade students' reading achievement in one elementary school

Donna Lynn Bush

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**THE EFFECT OF PHYSICAL ACTIVITY ON FOURTH-GRADE  
STUDENTS' READING ACHIEVEMENT  
IN ONE ELEMENTARY SCHOOL**

by

Donna Lynn Bush, B.S., M.S., Ed.S.

A Dissertation Presented in Partial Fulfillment  
of the Requirements for the Degree  
Doctor of Education

COLLEGE OF EDUCATION  
LOUISIANA TECH UNIVERISITY

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by Donna Lynn Bush

entitled The Effect of Physical Activity on Fourth-Grade Students' Reading  
Achievement in One Elementary School

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## ABSTRACT

There is a critical need to improve students' reading and comprehending ability. In 2011, Louisiana's students scored well below the national average in reading on the National Assessment of Educational Progress (NAEP). Research suggests there is a connection between physical activity and students' ability to focus and comprehend during reading class, therefore improving reading comprehension. However, many school districts are cutting back physical activity time in favor of more academic time.

The purpose of this 12-week study was to examine the effect of physical activity on fourth-grade students' achievement in reading. A quasi-experimental design was used to study 108 fourth-grade students at one elementary school. The experimental group received 15 minutes of physical activity each day prior to reading class, while the control group had a story read to them.

This study found the experimental group's combined total comprehension and vocabulary posttest mean scores improved 15.36% over the pretest, while the control group's posttest mean scores improved 3.12% over the pretest. The experimental group's pretest and posttest comprehension mean score difference was statistically significant with a 19.34% increase, while the control group had a -3.95% decrease. Therefore, the main conclusion drawn from this study was that when physical activity occurs prior to fourth-grade students' reading class, it does have a significant effect on students' ability to comprehend. However, the difference between the vocabulary pretest and posttest

mean scores did not indicate that physical activity had an effect on the students' vocabulary, which indicated students may need more explicit instruction with new or unfamiliar words. Furthermore, there was no difference in students' daily attendance, which suggested physical activity had no impact on motivating students to attend class more frequently.

This research argues for the use of physical activity before reading class. Therefore, it is recommended to study physical activity with additional subjects such as mathematics, science, and social studies, all of which may provide a deeper understanding of the effects physical activity can have on students' academic success. In addition, using more than one elementary school and lengthening the duration of the study may impact the outcome, as well.

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Author Donna L Bush

Date 01-28-14

## DEDICATION

There are many friends and family members who have helped this dissertation reach fruition. First, I must say thank you to my Lord and Savior, Jesus Christ who has sustained me through it all. Reading Isaiah 41:10 each day was a precious reminder that I was never alone in this endeavor.

To my parents, Don and Dorothy Bush, you uplifted me daily through your prayers and encouraging words. I owe a great debt of gratitude to you, Mom, for proofreading countless papers throughout all my coursework. Dad, this journey began because of you. I could not have gotten through all the tears and discouragement without your wit and encouragement. This is just for you, Dad, "I did it!"

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## CHAPTER 1

### INTRODUCTION TO THE RESEARCH

#### **The Mission**

Teaching children to read is an enormous undertaking; however, it has the potential to produce extraordinary results. School is an important place for many children, a place where they enter with a sparkle in their eye, excited and ready to learn. Yet, somewhere along the way some students begin to struggle with learning to read. According to Blaunstein and Lyon (2006), 40% of fourth-grade children have not learned to read at their grade level and the sparkle has dimmed in defeat. Although these students are on the path of academic suffering, teachers of fourth-grade level children will still expect them to read to learn so as to gain information from content subjects such as science, social studies, mathematics, and English. The task of reading science and social studies texts becomes more frustrating for the student who is reading below level.

As stated by The Children's Reading Foundation (2012), "Our first step . . . has always been to teach children to read, because 85% or more of our curriculum is thereafter delivered by reading" (The Economics of Reading, para. 3). Fourth-grade students who read at a first- and second-grade level cannot read the text, therefore, comprehends less than one-third to one-half of the required curriculum. Which is to say, since the printed fourth-grade curriculum is on grade level, it cannot be read by students who read severely below grade level. Nonetheless, for the fourth-grade student who has

not learned to read, the crucial time for avoiding frustration may have passed (Blaunstein & Lyon). Anderson, Hiebert, Scott, and Wilkinson (1985) found “The early years set the stage for later learning. Without the ability to read, excellence in high school and beyond is unattainable” (p. 1). Therefore, learning to read in the primary grades is critical in order for fourth-grade students to have continued academic success.

**The foundation.** Reading is the foundational skill upon which all other skills are built. The Children’s Reading Foundation (2012) found the following:

Reading is the most fundamental access skill. It is more basic than any content area like history, social studies, or science. It is even more basic than math.

Students with initial aptitude in math will fall behind if they cannot read their math textbooks. (The Economics of Reading, para. 3)

Children must learn to read in order to become successful in all other areas, in addition to academics. According to Nevills and Wolfe (2009), “Those who do not read well find their opportunities for academics and occupational success severely limited” (p. 6). It has become clear that reading is a critical component of academic skills, as well as life skills.

In order to learn pertinent information from science, social studies, and even mathematics texts, reading on grade level is considered an essential component. Schools are where most children learn to read and gain valuable academic knowledge. As Moats (1999) stated, “The most fundamental responsibility of schools is teaching students to read” (p. 1). Most children seem eager to start school, but for some, frustration with learning to read begins early. If students do not learn the basic reading skills and begin to build the foundation for reading fluently during the primary years at school, it is doubtful that children will learn the basic skills of reading at all (Moats). Once a child begins to



have problems with beginning reading skills, without the appropriate interventions he or she may continue to struggle with learning to read. As Shaywitz and Shaywitz, (2006) suggest, “reading problems are not outgrown and reading interventions are most effective when they are provided early on” (p.26). In other words, children tend to continue experiencing difficulty in reading; therefore, the gap increases between the average reader and the struggling reader.

**Vocabulary connection.** Vocabulary is a crucial component in children learning to read, as well. According to Sedita (2005), “There is a tremendous need for more vocabulary instruction at all grade levels by all teachers” (p. 33). Students need to learn thousands of words each year they are in school. Beck, McKeown, and Kucan (2002) found the number of new words that students need to learn and add to their reading vocabularies on average is 2,000 to 3,000 yearly. Without the vocabulary to support reading and comprehension, students will continually fall behind. Reading on-level requires high-quality vocabulary knowledge to go with it.

### **Test Outcomes**

**Alarming results.** Growing concern for education and the poor reading ability of children has been the focus of federal and state officials for some time. In 1981, T. H. Bell, Secretary of Education, created the National Commission on Excellence in Education with the intent to examine the quality of education. The alarming results were found in the 1983 report, *A Nation At Risk, The Imperative for Educational Reform*. The National Commission on Excellence in Education (1983) stated that “individuals in our society who do not possess the levels of skill, literacy, and training essential to this new era will be effectively disenfranchised . . . from the chance to participate fully in our

national life” (The Risk, para. 3). For many years, the lack of literacy has continued to be a distressing issue. Without the ability to read, even the simplest of academic tasks become difficult and frustrating for both children and adults alike.

Likewise in 1999, a report from the U.S. Department of Education stated that three quarters of students who were poor readers in third grade would continue to be poor readers while in high school. A longitudinal study from Juel in 1988 found that a surprising 88% of children who had problems reading by the end of first grade also exhibited similar difficulties at the end of their fourth-grade year. McCardle & Chhabra (2004) found that due to the low reading ability of students, 10% to 15% dropped out of school and over 78% reported difficulties with reading.

**Louisiana’s students.** The students in Louisiana are not much different from students across the nation. According to the Louisiana Department of Education (2011) School Report Card, in 2010 the high school graduation rate in Louisiana (67.2%) was still below the national average of 75%. Many students, not only in Louisiana, but also across the United States, are not completing high school and some are finding themselves in prison. As a result of the rising high school dropout rate, the National Institute for Child Health and Human Development (NICHD) surveyed teenagers and young adults with criminal records and discovered that at least half had reading problems (Hearing on measuring success, 2001). The lack of reading skills continues to become the fundamental issue for many students. According to the U.S. Department of Education (2012) the 2011 National Assessment of Educational Progress (NAEP) results indicate no change in fourth-grade reading scores from 2009 to 2011 with only a four-point increase since 1992. The reading level of many children continues to remain the same with each

school year. Very little achievement has been made in raising test scores of fourth-grade students. With the low reading ability of students, many schools, elementary through high school, are still functioning at a low performance level.

Academic success is an outcome most parents and schools strive to attain for their children. Yet, recent evidence from Fiester and Smith (2010) suggests that many do not achieve academic success. In 2007, nearly 6.2 million students were high school dropouts. The National Assessment of Educational Progress (2007) reported that 70% of the nation's eighth-grade students scored below the proficiency level in reading. According to Christeson, Taggart, and Messner-Zidell (2010), even with a high school diploma, too many students still do not have the academic skills to enter the workforce or military.

Each state seems to have its own problems educating children, and Louisiana is no exception. The NAEP (2007) scale equivalent score for the fourth-grade reading standards for Basic was 208, yet in 2007 Louisiana's students scored 193. In 2011, the NAEP reported the national average of fourth-grade reading scale scores to be 221, yet Louisiana's students' average scale score of 210 was well below the national average. In 2008, Louisiana had 50% of four year olds in a state or federally funded pre-kindergarten, still 39% of students failed to graduate on time (Christeson, Taggart, & Messner-Zidell, 2010). Even with more children in pre-kindergarten programs, too many students are failing to become successful readers.

## **Learning to Read**

**Beginning to read.** Learning to read may be painstakingly difficult and laborious for some children. Reading instruction is most effective when children enter first grade and are motivated for literacy. In 1959, the United Nations Educational, Scientific and Cultural Organization (UNESCO) defined literacy as the “ability to identify, understand, interpret, create, communicate, and compute, using printed and written material associated with varying contexts” (as cited in Aaron, Joshi, & Quatroche, 2008, p. 4). Yet, despite the focus on literacy by UNESCO in 1959, many students are still growing into adulthood without being able to read at a reasonable rate for comprehension, which is the purpose for reading. According to the National Center for Educational Statistics (2013), adults who were assessed with The Assessment of Adult Literacy Survey in 2003, 14% of were illiterate (not able to read or write), while 29% who could perform simple everyday literacy activities in the United States were functionally illiterate, meaning reading and writing skills are inadequate “to manage daily living and employment tasks that require reading skills beyond a basic level” (Functional illiteracy, 2012, para 1). The burden of raising the level of reading and comprehension higher is greater now than ever before. According to the 2002 RAND Reading Study Group report:

The U.S. economy today demands a universally higher level of literacy achievement than any other time in history, and it is reasonable to believe that the demand for a literacy populace will increase in the future. Thus, ensuring advanced literacy achievement for all students is no longer a luxury but an economic necessity. (p. 4)

Reading is a process and one that is not always achieved easily by all children. For some children, listening to an adult reading to them begins as early as birth. For other children, the beginning of their school years is the first time they are exposed to print, or are read to by an adult, putting them at a distinct disadvantage. Typically, many of these children enter school unaware of print and will need to be taught specific skills to help them become readers. The process involved in reading is complicated and the human brain is not wired for reading. There is an explicit development to learning to read for most children. Breaking the code of reading begins simply with an understanding that the ‘sticks and balls’ used to form written letters have meaningful speech sounds, which come together to make words, sentences, paragraphs, and stories. Aaron, Joshi, and Quatroche (2008) found the following about learning to read:

When children begin to read, they tend to focus on letters and syllables rather than on words in order to decode. By about third grade, they are able to process bigger chunks of words and identify words instantly and automatically. Once children become instant word readers, they become fluent readers. When they reach this phase, they do not have to invest attention to decoding words but can focus on the meaning of text. The ability to read words instantly and effortlessly, therefore, is a prerequisite for good reading comprehension. (p. 13)

**The goal of reading.** Comprehension is the primary reason to read, whether reading for information or enjoyment. Aaron, Joshi, and Quatroche (2008) agree that the definition of reading consists of “extracting and constructing meaning from written language” (p. 4). The rate that children acquire reading skills varies greatly, which accounts for the vast differences in children’s reading skills. Nearly one in five children

will need help to attain satisfactory levels of literacy. If a child does not have phonemic awareness or misses a critical step on the phonological ladder, reading will be affected. Yet, students who can make a solid connection between speech sounds and letters, and can understand that many words have more than one meaning, may have better comprehension. The lack of text comprehension can affect a child's level of reading. Therefore, a deficiency in vocabulary consciousness and familiarity of words with multiple meanings can be detrimental to children who struggle to read and comprehend.

**Stumbling blocks to reading.** Aaron, Joshi, and Quatroche (2008) found there are several stumbling blocks that can prevent children from learning to read. These stumbling blocks may be manifested in any one or more of three domains, (a) cognitive; (b) psychological; (c) ecological. Cognitive components include word recognition and comprehension. Psychological factors are motivation and interest, locus of control, learned helplessness, learning styles, teacher expectation, and gender differences. The ecological domain contains areas such as home environment, culture, parental involvement, classroom environment, peer influence, dialect, and English as a second language. However, according to Aaron, Joshi, and Quatroche, "No single factor is responsible for children's acquisition of literacy skills or for their failure; rather a variety of factors contributes to children's literacy development" (p. 9). Since a variety of factors contribute to students' reading ability, one might ask what effect would the addition of physical activity just before reading do to improve students' reading scores? Keeping students' attention and focus while in class can be difficult; therefore, providing physical activity to help students retain a sustained focus while reading may help improve

comprehension. Maintaining focus is important because “. . . consistent, sustained attention, also facilitates reading performance” (Aaron, Joshi, & Quatroche, p. 14).

### **Movement in the Classroom**

**The need to move.** Many children struggle with being able to sit quietly and learn from lecture type instruction. Young children are unable to pay attention in class especially while learning the process of reading, which may contribute to the widening of the reading gap. Why are children not able to pay attention when learning to read? According to Aaron, Joshi, and Quatroche (2008), “Young children . . . become restless and lose concentration if they are required to sit quietly for a long time. Therefore . . . plenty of opportunities for movement, action, and interaction” should be included in the classroom (p. 28). Other studies such as Castelli, Hillman, Buck, and Erwin (2007) at University of Illinois at Urbana-Champaign, Sallis, McKenzie, Kolody, Lewis, Marshall, & Rosengard (1999) at San Diego State, and Shephard, Volle, Lavallée, LaBarre, Jéquier, & Rajic (1984) at University of Toronto are showing a relationship between exercise and cognitive ability (Van Dusen, 2008, para. 1). With the introduction of a regular cardiovascular fitness program, participants who had led a sedentary lifestyle were able to improve their ability to concentrate and focus on comprehending the text. Moreover, as Toporek (2011) reported, Rauner found 84.3% of students who passed the fitness test met or exceeded the state reading goals while 71.3% who failed the fitness test did not pass the state required tests.

**Physically active.** Recently, studies have found that children who are more physically active improved academically. According to Ratey and Hagerman (2008), humans are born to move, not become sedentary. The relationship between physical

activity and learning is hard-wired into the brain. Movement or physical activity makes us feel better, due to the boosting of endorphins. Getting the blood pumping makes the brain function at its best, which seems to be far more beneficial for learning to read than the actual exercise for the body. In fact, there is research evidence of a connection between physical activity, cognitive functioning, and academic achievement (Ratey & Hagerman). In other words, to keep the brain in good learning condition, the body must move actively daily. These findings have inherent implications for teaching and require that educators keep an open mind to learning new ways to help students achieve academic success. For example, while incorporating physical activity into the classroom may involve additional preparation the research suggests that it could positively impact student reading achievement.

Since children are failing to learn to read at shocking and unacceptable rates, and because there is evidence of a connection between increased physical activity and cognitive functioning, many researchers and policy makers have agreed on the need for a physical activity to be included into students' daily routine (Center for Disease Control and Prevention, 2010). Unfortunately, while many states require a specific number of minutes in physical education, others do not. Moreover, while some children learn to read no matter what happens in the classroom, there are other children who may need some type of physical activity to maintain or improve learning.

### **Reading Reform**

The creation of the National Reading Panel in 1997 and its findings began the slow upward climb toward achievement in reading for many students across the United States. Educators and the legislature began to work together to find the best avenues to



improve the reading skills of children who struggle with learning to read. McCardle and Chhabra (2004) suggested that at the outset of the current century there seemed to be a consensus among educators and policymakers "to reverse the decline in the reading skills of all Americans and to reach the day when every child and every adult can read with proficiency" (p.38). Yet, still too many students are failing or dropping out of school, many due to their low reading ability.

The top priority of current educational reforms is moving towards finding different ways to improve students' reading. Many educational policies at all levels, federal, state, and district, are calling for incorporating physical activity into the daily routine of teaching reading to students with the desired outcome being higher reading scores.

### **Statement of the Problem**

The problem addressed in this study is that fourth-grade students in Louisiana are not reading and comprehending on grade level. According to the National Assessment of Educational Progress (2007), Louisiana is ranked 50<sup>th</sup> in the United States. Paul Pastorek, Louisiana's former State Superintendent, once stated that he was "tired of being at the bottom in fourth-grade reading" (Maxwell, 2008, para. 2). Louisiana has consistently scored at the bottom or near the bottom for the last few years (National Assessment of Educational Progress [NAEP], 2007). A change is needed in order for Louisiana students to progress academically in reading. This study ascertained if fourth-grade student performance in reading is significantly impacted by students' daily physical activity before reading class.

**Purpose of the Study**

As stated previously, research suggests that there is a connection between physical activity and students' ability to focus on and comprehend what is read during class. The purpose of this study was to examine the effect of physical activity performed daily with fourth-grade students on student achievement in reading as evidenced by the Gates-MacGinitie Reading Tests. In addition, the students' Gates-MacGinitie Reading Tests pretest and posttest scores were compared to determine if there was a relationship between the experimental group receiving physical activity and the control group not receiving any physical activity. Student achievement was determined by analyzing and comparing the experimental and control groups' pretest and posttest scores.

**Justification for the Study**

Recently, local and national leaders have pushed reading to the forefront and declared it a priority for all children to be reading on grade level. Snow, Burns, and Griffin (1998) compiled a body of research, which began the foundational work of finding ways to avert the difficulties children have when learning to read. The National Reading Panel (1997) was formed and a report was submitted to Congress in 1999, which reflected the findings from the body of research, including information on the effectiveness of various approaches to teaching children to read (National Institute of Child Health and Human Development, 2000).

A number of researchers (Dunkle & Nash, 1991; Symons, Cinelli, James, & Groff, 1997; Marx, Wooley, & Northrup, 1998; Allensworth, Lawson, Nicholson, & Wyche, 1997) found that student health is a strong predictor of academic performance. If students are healthy, active, and well-nourished, they are more likely to attend school, be

engaged, and be ready to learn. According to Amanda Fienkeldie, guidance counselor at Leslie Bell Elementary School, the physical activity breaks have had a significant improvement in the students' academics, participation, and ability to stay on task to create an atmosphere of learning (University of Missouri-Columbia, 2010). The relationship between students' health and learning, as evidenced from the many studies over the past 15 years, suggests that physical activity keeps not only the body healthy, it also feeds the mind. Exercise is an education tool, which can be used to produce extraordinary academic results (University of California-Los Angeles Center for Health Policy Research, 2011). A student's poor health often affects his or her attendance and ability to learn, and, consequently, academic success.

Schools provide a unique venue for students to meet the physical activity requirements set forth by states and school districts. The World Health Organization has identified schools as important settings for promotion of physical activity among children (Wiley-Blackwell, 2009). A variety of changes in students can happen when physical activity is included in the academic setting such as, "academic achievement (grades, test scores), academic behavior (on task behavior, attendance), and cognitive skills and attitudes (attention, concentration, memory, mood)" (U.S. Department of Health and Human Services, 2010, p. 5). Eight of nine studies (Ahamed, MacDonald, Reed, Naylor, Liu-Ambrose, & McKay, 2007; Della Valle, Dunn, Geisert, Sinatra, & Zenhausern, 1986; Fredericks, Kokot, & Krog, 2006; Maeda, & Randall, 2003; Mahar et al., 2006; Molloy, 1989; Norlander, Moas, & Archer, 2005; Uhrich, & Swalm, 2007) found positive associations between classroom-based physical activity and indicators of cognitive skills and attitudes, academic behavior, and academic achievement. Seven of the nine studies

were conducted with elementary students. None of these studies found any negative associations. Additional support from these studies can be found in the literature review (i.e., Chapter 2).

As previously stated, research has found physical activity to play a significant role in achieving improved reading scores. This study adds to the support of reversing the trend of decreasing or eliminating physical activity in elementary schools. In addition, this study contributes to the existing body of research pertaining to the relationship of physical activity and reading achievement by examining the impact of introducing a 15-minute aerobic activity prior to reading instruction. In this study, each day's activity involved quick, precise body movements designed to enable the students to focus their attention and be ready to learn. The following is unique to this study: (a) the time for the physical activity was 15 minutes each day before reading class began for each of the three classes included in the experimental group, and (b) the same person who provided the physical activity for the experimental group also read a book each day to the two classes in the control group.

### **Theoretical Framework**

According to Ratey and Hagerman (2008), Darwin found nearly a century ago that learning is the survival mechanism used to constantly adapt to our changing environment. The memory physically becomes part of the brain when it encodes learned information. The brain is an adaptable organ that is similar to muscle in that the more you use it the stronger and more flexible it becomes. Therefore, the brain is constantly being rewired through learning.

Ramon y Cajal won the Nobel Prize in 1906 for proposing that learning involved changes at the synapses in the brain. Many scientists disregarded Cajal's findings until Donald Hebb, known as the father of neuropsychology and neural networks, stumbled onto the first clue of evidence in 1949 when he brought home some laboratory rats as temporary pets for his children. When the rats were returned to the lab, Hebb found the pet rats excelled in learning tasks as compared to their cage-bound peers. Hebb's work is connected to exercise and the brain because the rats' physical activity as pets counts as novel experience in the brain (Ratey & Hagerman, 2008).

According to Ratey and Hagerman (2008), Rosenzweig, Krech, Diamond, and Bennett, a group of psychologists at the University of California Berkley in the 1960s, developed the environmental enrichment model, which filled the rats' cages with toys, obstacles, and running wheels. When the rats' brains were studied, the rats with activity did better on learning tasks than those in bare cages. This study confirmed that an enriched environment produced significant changes in the brain. Following the Berkley study, Greenough and Volkmar (1973) found environmental enrichment made the neurons sprout new dendrites, which caused the synapses to form more connections through learning and exercise. From the research Ratey (1998) encapsulated, "Exercise spawns neurons, and the environmental enrichment helps those cells survive" (p. 49).

In 1998, Oliff, Berchtold, Isackson, and Cotman found that exercise seemed to elevate brain-derived neurotrophic factor (BDNF) in mice. Oliff et al. was able to show the BDNF was important for not only growth of neurons, but also for learning; exercise helps the brain learn. The improved rate of learning suggests that if a person is in good shape physically, the person may be able to learn and function more efficiently.

Oliff et al. also noticed the difference between the rodents and humans was that the rats actually seemed to enjoy the physical activity whereas humans usually do not.

German researchers, Laske, Stransky, Eschweiler, Klein, Wittorf, Leyhe, Richartz, Köhler, Bartels, Buchkremer, and Schott (2007) found that, following exercise, a group of people learned vocabulary words 20% faster than they did before exercise. Also, the rate of learning correlated with the levels of BDNF. Insufficient levels of BDNF can indicate a learning deficiency. Researchers have found significant changes in participants' learning can take place when physical activity is included daily.

Likewise, in 1957, the Ministère de l'éducation nationale, de la jeunesse et des sports reported Latarjet's early research in 1933 using children to find a relationship between physical activity and academic achievement. Latarjet studied a group of children whose academic schedule was reduced by two hours. Those two hours were replaced with physical education activities. The results indicated an improvement in not only attendance, strength, and weight, but in academics as well. In 1951, the French Ministry of Education replicated Latarjet's study at Vanves and concluded the results were similar.

### **Research Questions**

1. Does structured physical activity or exercise prior to the teaching of reading have an effect on fourth-grade students' scores on the comprehension test of the Gates-MacGinitie Reading Tests?
2. Does structured physical activity or exercise prior to the teaching of reading have an effect on fourth-grade students' scores on the vocabulary test of the Gates-MacGinitie Reading Tests?

3. Does structured physical activity or exercise prior to the teaching of reading have an effect on fourth-grade students' daily class attendance?

### **Hypotheses**

1. There will be no significant difference between the experimental group's Gates-MacGinitie Reading Tests comprehension pretest and posttest mean scores as compared to the control group's comprehension pretest and posttest mean scores at the end of the fall semester.
2. There will be no significant difference between the experimental group's Gates-MacGinitie Reading Tests vocabulary pretest and posttest mean scores as compared to the control group's vocabulary pretest and posttest mean scores at the end of the fall semester.
3. There will be no significant difference between experimental and control groups daily class attendance at the end of the fall semester.

### **Definition of Terms**

1. Physical activity is defined as any "bodily movement produced by the contraction of skeletal muscle that increases energy expenditure above a resting level. Physical activity can be repetitive, structured, and planned movement" (U.S. Department of Health and Human Services, 2010, p. 10).
2. Literacy, a word that has many implications, can be defined as the ability to read accurately for knowledge, write coherently, and to think critically about the written word (Literacy, 2012).
3. Cognition is the conscious mental activities of thinking, understanding, learning, and remembering (Cognition, n.d.).

4. Comprehension is the “extracting and constructing meaning from written language” (Aaron, Joshi, & Quatroche, 2008, p. 4).

### **Limitations and Delimitations**

Overall, this study was limited by the following: (a) compilation of participants’ response on pretest and posttest may not be valid and reliable with regards to guessing on multiple choice questions, and (b) instruction of reading may not be valid and reliable considering each teacher’s knowledge of reading.

Delimitations consisted of the following: (a) using one public elementary school, (b) integration of physical activity with only one subject area (reading), (c) using the Gates-MacGinitie Reading Tests, and (d) collecting data during one school semester (i.e., fall, 2012).

### **Assumptions**

The researcher made the following assumptions: (a) the research sample was similar to other fourth-grade students in other elementary schools in the district, and (b) teachers included in the study were certified and teaching in their respective areas of certification.



## CHAPTER 2

### REVIEW OF THE LITERATURE

#### Literacy Development

**In the beginning.** Literacy is a somewhat recent addition to the human development. Oral language has been around since the beginning of human life, but the ability to represent the oral language has been around only for about 4000 to 5000 years. Nearly everyone was illiterate until the 20th century. Yet, the critical importance of literacy has been brought to the forefront by society, lawmakers, researchers, and educators who have struggled to include everyone into the world of literacy. Nevills and Wolfe (2009) stated, “. . . the expectation for today’s society is that 100% of the population will be able to read and comprehend” (p. 6). Numerous literacy groups (e.g., Literacy How, Inc., Haskins Laboratories, Literate Nation, Grimes Reading Institute, The Haan Foundation for Children, Power4Kids Reading Initiative, National Institute of Child Health and Human Development, Moats Associates Consulting, Inc., National Comprehensive Center for Teacher Quality, Wisconsin Reading Coalition, and Center for Reading and Language Research) describe literacy as being comprised of the following characteristics:

Literacy represents the lifelong, intellectual process of gaining meaning from print. Key to all literacy is reading development, which involves a progression of

skills that begins with the ability to understand spoken words and decode written words, and culminates in the deep understanding of text. Reading development involves a range of complex language underpinnings including awareness of speech sounds (phonology), spelling patterns (orthography), word meaning (semantics), grammar (syntax), and patterns of word formation (morphology), all of which provide a necessary platform for reading fluency and comprehension. Once these skills are acquired the reader can attain full language literacy, which includes the abilities to approach printed material with critical analysis, inference and synthesis; to write with accuracy and coherence; and to use information and insights from text as the basis for informed decisions and creative thought.

(Literacy, 2012, para. 2)

**Significance of literacy.** Today, literacy is a critical component of society. Since literacy has been at the forefront, efforts to keep it as the focus has led to the understanding that literacy is a continuum of learning in enabling individuals to achieve their goals, to develop their knowledge and potential, and to participate fully in their community and wider society. Yet, educators have faced an enormous task to reform curricula and instruction to improve academic achievement so that all children become literate (Symons, Cinelli, James, & Groff, 1997). Federal and state officials have placed pressure on school districts to improve literacy achievement by developing goals and grading schools' performance. Also, an outcry from parents, concerned citizens, and business owners are pushing schools to make the necessary changes to improve their local schools' reading and mathematics scores.

Reading accurately and understanding what has been read serves as the primary foundation for all other learning. Many, if not all professions and employers, require prospective employees to read fluently, comprehend, and have graduated high school and have attended or completed college. Yet, the National Association of Educational Progress (NAEP, 2007) results indicate that only 67% of fourth-grade students read at or above the basic level, whereas in 1997, 62% read at or above basic. In fifteen years, a mere 5% increase has been accomplished. According to Reid Lyon's testimony before the House Committee on Education and the Workforce, Subcommittee on Education Reform (Hearing on measuring success, 2001), those students who could not read at the basic level are not able to read and understand a simple children's book. As indicated by NAEP, many students are not prepared for the type of literacy required in the world of business.

Learning to read successfully means to understand what has been read, in order to comprehend the text. Slavin (1994) stated research has shown that students' future academic success can be predicted with reasonable accuracy by their reading level at the end of third grade. Some states actually predict their future need for prisons by the fourth-grade reading scores on state tests (Hearing on measuring success, 2001). Literally being able to predict the number of prisons by students' lack of reading skills in fourth grade also indicates the dropout rate is high. Students who are not able to read at the basic level by fourth grade will struggle with reading and eventually become so frustrated with school they become part of the dropout statistics.

**Learning to read.** Learning to read English is particularly difficult for some children. Shaywitz (2003) stated, "Speaking is natural, and reading is not" (p. 49).

Teaching students the speech sounds, the alphabet, the connection between the sounds and alphabet known as alphabetical principle or phonics, how to decode words, how to comprehend, and spelling rules along with writing is challenging to say the least.

According to Nevills and Wolfe (2009), “A letter alone does not refer to anything. It must be combined with other letters to represent a meaningful unit or syllable. The child must learn this complex alphabet in order to be able to decipher written words” (p. 8).

The English alphabet is made up of 26 letters, but the English language is made up of 44-46 phonemes. All of which, the child must learn and apply in order to read the written language.

Reading is not an easily learned skill for many children. Some 20% to 30% of children struggle with learning to read (Hearing on earing, 1999). National attention has been given to the fact that too many children were not achieving success with reading texts of any kind. The National Reading Panel was established in 1997 to assess the status of research-based knowledge and the effectiveness of various approaches to teaching children to read (NICHD, 2000). There are a number of things that can be done to encourage the beginning of reading in children’s lives early on and children’s literacy should never be left to chance (Shanahan, 2010).

For several years, students have consistently not made any gains in reading scores on national or state tests. The NAEP, known as the nation’s report card, has reported only a slight gain in reading and no sustained trend of improvement for eighth-grade students while fourth-grade students’ scores have remained flat for the past twenty years (Gewertz, 2010). The results have been disappointing due to the influx of direct attention given to learning to read from national, state, and school district officials. Improvement

of reading skills has been the focus of legislators for years. Accountability systems have been established in many, if not all states, and aimed at raising student achievement, yet reading scores are still not showing a significant difference from previous years.

Another concern for citizens and legislators was the increasing numbers of high school dropouts. Students who drop out of school and struggle with reading have difficulty reading advertisements for employment, reading and comprehending written instructions on the job, and reading transportation schedules for getting to and from work, among their everyday challenges. The negative consequences of an illiterate society are innumerable, especially in the area of employment. Riley (2006) stated, “The economic future of our society as a whole demands that we have a literate workforce” (p. ix). Individuals who drop out or fail to attend college will have a significantly lower income, which will in turn affect our economy. Riley and Peterson (2008) found every student who does not graduate from high school will cost society an estimated \$260,000 in lost earnings, taxes, and productivity. In 2007 alone, there were nearly 6.2 million high school dropouts (Center for Labor Market Studies, 2009). The economic cost from dropouts is rising yearly. Many factors can affect children’s difficulties with reading; despite the issues there is no greater gift when children learn to read, which will lead to academic achievement, graduating high school, and proceeding to college.

**Problems with learning to read.** If parents want their child to become a pianist, they would not buy a piano and a lot of sheet music and say now play. Likely, the first step would be to provide the child with a knowledgeable teacher who would teach about the basic notes and chords. Then, the child would continue to build his or her knowledge about music from the teacher and through much practice. It is much the same with

reading. Parents would not just buy books for their child and say now read. The first step is providing proper instruction in reading that will teach a child to read. Despite the concerted efforts of the child, just reading practice alone does not make the child a reader. Therefore, without explicit instruction, some children become classified as learning disabled, due to their inability to grasp the early reading skills. Nevertheless, according to Joseph (2006), as many as 95% of children can learn to read if effectively taught foundational skills.

Children with reading problems come from all types of families. Blaunstein and Lyon (2006) found, "It is not race or ethnicity that causes such great numbers of our kids to have reading problems" (p. 8). Regardless of a person's environment or circumstances, the code for reading must be unlocked by every child in order for the letters on the page to make sense. The lines and squiggles on a page have to be recognized as having meaning.

Shaywitz and Shaywitz (2006) found a strong consensus among investigators of reading that the central problem of struggling readers reflects a deficit within the language system of the brain. The brain imaging enhances researcher knowledge in understanding how the "brain uses the innate language pathway to learn to read; the development of language is a precursor to reading" (Nevills & Wolfe, 2009, p. 3). Well-worn pathways, the firing between synapses in the brain, are needed to make the connection between sounds and letters to begin the task of learning to read. Taking into consideration all the cognitive tasks the brain is required to use in order to read, Schneider and Chein (2003) found it is not surprising that 20% to 35% of students, elementary to high school, experience significant reading difficulties.

**Linking vocabulary and comprehension to reading.** Vocabulary is one of the critical components of reading successfully on grade level. Nevills and Wolfe (2009) found, “Reading comprehension depends on word recognition” (p. 155). Vocabulary and comprehension go hand-in-hand when it comes to reading. According to Biemiller (2003), vocabulary growth comes from the interactions with people we encounter, activities in which we participate, and books that engage us and teach us words, ideas, and concepts. An enhanced vocabulary comes from a variety of places and continues throughout the life of the avid reader. Therefore, the expanded vocabulary comes with knowledge of word meanings which can increase the level of comprehension. Perfetti (2010) stated, “Comprehension is obviously dependent on knowing the meanings of words being read” (p. 293). When a reader encounters text, it is imperative that the reader access the meaning of the word and apply it to the text. However, reading the text with an unknown word can cause the reader to “learn something about the meaning of the word” (Perfetti, p. 293). Therefore, it seems that having a large vocabulary with multiple meanings for words is necessary for comprehension. According to Grabe (2008), learning vocabulary is key in learning to read fluently and comprehend. The “combination of direct instruction, vocabulary-learning strategies, extensive reading and word learning from context, heightened students awareness of new words, and motivation to use and collect words” should be used for the students’ vocabulary learning (p. 283).

Ouellette’s (2006) research suggests, “the lack of depth in vocabulary knowledge may explain the dissociation between decoding and comprehension” (p. 564). The study further suggests that adding activities to increase vocabulary could prove to be advantageous. “Increasing vocabulary knowledge is a basic part of the process of

education, both as a means and as an end” (Nagy, 1988, p. 9). Learning vocabulary is necessary to comprehension. Incorporating a variety of strategies for vocabulary instruction can support students’ learning of words and their meanings. Grabe (2008) developed the following 17 key principles for vocabulary instruction:

1. Prioritize instruction so that key activities are practiced consistently and systematically over time. (Vocabulary learning is a long-term incremental process).
2. Provide vocabulary exposures in multiple contexts. Teach different words in different ways.
3. Teach words while working with the reading texts that they come from. Teach at the point of contact; use discussion around texts to teach vocabulary.
4. Read aloud to students and draw their attention to key words while reading.
5. Develop procedures for selecting words to teach.
6. Teach a limited set of key words for depth, precision, and multiple encounters.
7. Focus on word relationships (parts-of-speech variations, word families, synonyms, antonyms, graded relations).
8. Provide word instruction that combines contextual information and definitional information (word-part information, cognates, context cues, affix information, flash cards, imagery).
9. Help students learn word-part information and apply it to greater word awareness.
10. Use visual supports and mapping techniques.
11. Work with dictionary definitions and rewrite more accessible definitions.



12. Develop activities that recycle a lot of words at one time (e.g., sorting words into lists, semantic mapping, matching activities, word-recognition fluency activities, repeated reading practice).
13. Create a vocabulary-rich environment.
14. Raise student awareness of words: Have students collect, keep, use, and share words they want. Talk about words and build words consciousness and word interest.
15. Recycle vocabulary over time to ensure multiple exposures to words throughout vocabulary instruction (rereading prior texts for new words from prior units as part of sorting, classifying, and connecting activities).
16. Give students some choices in word learning.
17. Develop student motivation for word collecting and provide a supportive learning environment. (p. 284)

Use of these vocabulary principles can help students support their reading and comprehension to prevent failure in reading. “The end goal is to ensure that key words are overlearned, that large numbers of related words are learned, that students appreciate the power of words, and that they become life-long collectors of words” (Grabe, 2008, p. 284). If vocabulary strategies are learned and applied appropriately, students can gain thousands of words to add to their oral and reading vocabulary, which in turn can create successful readers.

**Preventing reading failure.** The majority of children who are at-risk of reading failure rarely catch up with their peers if they are not reading fluently by third grade (Blaunstein & Lyon, 2006). According to Shanahan (2010), for most children, literacy

skills start developing the moment they are born. Yet, some children have never had the opportunity to sit upon a lap to be read to or are given a book to experience print. It is these children who begin school lacking the experiences necessary to start the journey of learning to read. These children come from families with parents who have graduate degrees and those without high school diplomas (Blaunstein & Lyon). Some children need to be explicitly taught to read, while others learn to read more easily and without difficulties. According to Blaunstein and Lyon, children from poverty are the most at risk. There is a timeframe when children begin to have an interest in print and are more ready to begin the reading process. Blaunstein and Lyon found, “When we fail to work within a young child’s window of opportunity for learning to read, the child’s life course is permanently affected” (p. 6). If the timeframe is not observed, the reading gap begins to widen and the child becomes a frustrated, struggling reader. For some children when learning to read becomes a chore, an interest in reading becomes non-existent.

McCutchen et al. (2002) found it is because “reading and writing are complex cognitive activities consisting of multiple levels of interactive processes” (p. 69) that some children do not learn to read successfully. The child is not necessarily the one responsible for not learning to read. Research findings from Darling-Hammond (1996) indicate that some children are dependent on teachers, and student success is determined by the knowledge and skills of the teacher. It is that teacher who needs to find the right combination to engage the cognitive ability of children.

Research has shown that children who are poor readers at the end of first grade almost never acquire average-level reading by the end of the elementary grades (Frances, Shaywitz, Stuebing, Shaywitz, & Fletcher, 1996; Juel, 1988; Shaywitz et al., 1999,

Torgesen & Burgess 1998). For example, Torgesen (2004) found, “Children who are destined to be poor readers in fourth grade almost invariably have difficulties in kindergarten and first-grade with critical phonological skills” (para. 1). Students then spiral downward toward failure, and their ability to become fluent readers is diminished.

The good news is that we, as educators, can identify students before they fail (Torgesen, 2004). Scientifically-based reading research has demonstrated over and over the strategies that work for children to become successful readers. Through engaging students’ cognition, teachers can prevent the downward spiral of failure that many students experience. Therefore, the reading break does not have to occur for so many children. By engaging students through physical activities, the reading gap can be reduced. Students at risk for reading failure can be helped by including physical activity before reading instruction. Students become dynamic participants in movement activities and in the process become successful readers with better comprehension. When teachers provide meaningful cognitive activities with physical activity, students’ success in reading can be achieved and sustained.

Physical activity has been studied recently in students who are struggling readers. Some researchers have found test scores were higher in children, while others found no significant difference in students who had not had any physical activity. Increased mental alertness and higher academic achievement have been associated with physical activity (University of California-Los Angeles, 2011). The use of physical activity can lead to a variety of extras, such as becoming healthy and improving academics for students.

**Brain research.** Researchers are also studying the brain and its activity when students are engaged in physical activity before reading class occurs. A definitive connection has not been determined as to why physical activity affects reading success, but the belief is that if a student is physically active, blood sugar and hormone levels maximize brain function and focus.

President George Bush (1990) declared the 1990s would be the decade of the brain. However, recent research has provided an enormous wealth of information about the brain and how it functions, as well as how it learns to read. Functional magnetic resonance imaging (fMRI) of the brain has shown specific areas of the normal brain light up when it is activated by text. The brain of a child who has dyslexic characteristics does not light up in the same way (Willis, 2008). Through the use of brain imaging researchers are able to see which children experience greater challenges in becoming successful readers.

Children who have a larger hippocampus will perform better on test of memory than their less fit peers. Chaddock et al. (2010) found nine- and ten-year-old children who are more fit will have a larger hippocampus, which provides the ability to recall and assimilate different types of information. The hippocampus plays an important role in memory, as well as encoding during language processing, all of which plays a critical role in learning to read.

With a more active body, the brain can change in its structure and benefit the child's cognitive function. Williams (1986) recognized "changes in brain structure and function are more likely to occur if there is physical activity or manipulation of the environment by the organism" (p. 17). If cognitive performance is an indication of

optimal brain growth and development, then an important factor to consider in the early development of the child's cognitive behavior is sensory-motor. According to Williams when vision and proprioception (the ability to sense the position and location and orientation and movement of the body) are stimulated by physical activity, it could contribute significantly to neural development and in turn affect reading success.

### **The Need for Physical Activity**

**Lack of physical activity.** Humans need physical activity every day. Too many adults and now children find themselves with Type 2 diabetes and are obese. According to Ratey and Hagerman (2008), "What's even more disturbing, and what virtually no one recognizes, is that inactivity is killing our brains too – physically shriveling them" (p. 4). Physical activity provides much more than just adding strength to the body. Physical movement of the body can help the brain perform much better on learning tasks and testing.

The rise of childhood obesity has caused alarm in many cities and schools. "Obesity in children is a simple process that results from excess food intake in relation to caloric expenditure" (Abadie & Brown, 2010, Prevalence of Obesity, para. 2). Children's activity level has been reduced since the evolution of technology replaced the traditional forms of entertainment from previous generations, resulting in a sedentary lifestyle. Furthermore, while being sedentary, advertisements and television commercials encourage the consumption of high fat foods. Therefore, students who are obese and less active are consequently less physically fit. On the contrary, Taras (2005) found that students who are physically active demonstrate greater attention during class than

students who are sedentary. Castelli, Hillman, Buck, and Erwin (2007) determined students who are physically fit have better attention and working memory.

The increased public attention to the escalation of childhood obesity and low academic success has led to the need to include more physical activity in the schools. Many schools, due to the lack of academic achievement, have opted to discontinue recess, directed play, and even physical education in some cases. Mostly, the stress of meeting state and national achievement standards has caused many schools to shift away from having free or directed play for students. Castelli, et al. (2007) stated, “The relationship between physical fitness and academic achievement has received much attention owing to the increasing prevalence of children who are overweight and unfit, as well as the inescapable pressure on schools to produce students who meet academic standards” (p. 239).

Even resources used previously for physical education have been redirected to accommodate students’ preparation for testing in hopes to raise test scores. According to Chomitz et al. (2009), 14% of school districts decreased physical education time to increase mathematics and English class time. High school students’ physical activity time has decreased since 1991 from 41.6% to 28.4%. Alarming health trends are emerging, which suggests schools must renew and expand its role in promoting physical activity. The consequences of less physical activity time may not be fully known yet; however, research is finding several medical concerns such as obesity, Type 2 diabetes, high blood pressure, and more Attention Deficit Hyperactivity Disorder (ADHD) identification, all of which may have an effect on academic success.

Alliance for a Healthier Generation (n.d.) stated that obesity is a serious health problem because of its connection to shortened longevity, non-insulin dependent diabetes, heart trouble, hypertension, and joint diseases. The obesity rates in children have escalated during the past 20 years. Traditionally, children have had recess breaks to engage in physical activity. More children, in the past, have walked to school or have ridden their bicycles. In today's society, many parents drive their children to school, which for parents may save them time in getting to work on time or keeping the parents from worrying if the children arrived at school safely. Today, only one-third of the trips to school are made by children walking or biking, which has contributed to the past twelve years of less physically active transportation. In addition, Hedley et al. (2004) found 15.8% of children between 6 and 11 are overweight or at risk for overweight.

Childhood obesity affects one of every six children in the United States, partly due to the lack of physical activity. School districts' budget decisions to reduce or eliminate recess and physical activity classes are affecting children everywhere. Yet, many parents are concerned by the lack of physical activity at schools. Davis, Clark, Singer, and Butchart (2011) found through the University of Michigan C.S. Mott Children's Hospital National Poll (2011), 94% of parents think it is very important for elementary school children to get physical activity during the school day, while 33% of parents think their children do not get enough physical activity at school; obese and overweight parents are more likely to say that their kids do not get enough physical activity; 26% think there is not enough playground equipment, whereas 22% say there is too little time for recess.

Some children do not have an opportunity to be engaged in physical activity at school nor do some children take advantage of physical activity time while at home. Children, many times, participate in after school programs only to go home and become more sedentary by watching television or playing video games. Therefore, children's inactive lives begin traveling toward the road to obesity and health problems. Davis, et al. (2011) found parents indicated that promoting healthy physical development, not just avoiding obesity, as the reason physical activity is critical for their children during school hours. School-based physical activity initiatives could not only improve students' physical health, but also could improve their cognitive ability, which could impact academic achievement. According to Vail (2006), if students are participating in daily physical activity, they will become healthier. A focus on physical activity can only enhance students' academic ability.

**Benefits of physical activity.** While many children do not participate in physical activity nor do they reap the benefits, some children are physically active. Malina (1986) found the appropriate kind of physical activity does have numerous advantages:

1. Promotes changes in brain structure and function in infants and young children. Sensory stimulation through physical activity is essential for the optimal growth and development of the young nervous system.
2. Promotes early cognitive function through stimulation, symbolic play, the development of language, and the use of symbols.
3. Assists in the development of refinement of perceptual abilities involving vision, balance, and tactile sensations.



4. Enhances the function of the cerebral nervous system through the promotion of a healthier neuronal network.
5. Aids in development of cognition through opportunities to develop learning strategies, decision making, acquiring, retrieving, and integrating information and solving problems.
6. Fortifies the mineralization of the skeleton and promotes the maintenance of lean body tissue, while simultaneously reducing the deposition of fat.
7. Leads to proficiency in the neuromuscular skills that are the basis for successful participation in games, dances, sports, and leisure activities.
8. Is an important regulator of obesity because it increases energy expenditure, suppresses appetite, increase metabolic rate, and increase lean body mass.
9. Improves aerobic fitness, muscle endurance, muscle power, and muscle strength.
10. Is an effective deterrent to coronary heart disease due to its effects on blood lipids, blood pressure, obesity, and capacity for physical work.
11. Improves cardiac function as indicated by an increased stroke volume, cardiac output, blood volume, and total hemoglobin.
12. Is associated with a reduction in atherosclerotic diseases.
13. Promotes a more positive attitude toward physical activity and leads to a more active lifestyle during unscheduled leisure time.
14. Enhances self-concept and self-esteem as indicated by increased confidence, assertiveness, emotional stability, independence, and self-control.

15. Is a major force in the socializing of individuals during late childhood and adolescence.
16. Is instrumental in the development and growth of moral reasoning, problem solving, creativity, and social competence.
17. Is an effective deterrent to mental illness and the alleviation of mental stress.
18. Improves the psychosocial and physiological functions of mentally and physically handicapped individuals.
19. Deters the depletion of bone mineral and lean body tissue in elderly individuals.
20. Prevents the onset of some diseases and postpones the debilitating effects of old age. (p. 2)

The maximum benefit of physical activity can only be found when it is initiated early in life and continued throughout the life span. Incorporating physical activity at home and school will let children realize a full range of benefits (Seefeldt & Vogel, 1986).

### **Physical Activity in the Classroom**

**Academics and physical education.** In years past, academics and physical education existed as separated entities and the two were never mixed. According to Vail (2006), some “educators still continue to see them as competing factions, with one fighting for the mind, while the other is fighting for the body” (p. 14). However, more educators are finding the two go hand in hand. Some physical education teachers are incorporating mathematics, science, and spelling curriculum into their instruction while students carry out the activity of wall climbing. Children can solve 20 to 30 mathematics problems while climbing an artificially constructed wall with grips for hands and feet.

Incorporating academics with physical education gives students the idea of playing a game instead of being subjected to classroom lectures or work. Vail determined it stimulates the students' minds, as well as improves their bodies. Physical education allows students the opportunity to release the stress and problems that sometimes cause behavior issues within the classroom. Taras (2005) found, "Physical activity improves general circulation, increases blood flow to the brain, and raises levels of norepinephrine and endorphins – all of which may reduce stress, improve mood, induce a calming effect after exercise, and perhaps as a result improve achievement" (p. 214). In addition, classroom teachers are including physical activity to boost students' concentration and focus. Perhaps the change has been "spurred on by the mounting research suggesting physical activity and fitness may actually help students do better in the classroom" (Vail, p. 14).

However many schools, especially at the elementary level, are cutting back on physical education and recess time. According to Vail (2006) eliminating physical education could do more harm than good. Therefore, not only are students not physically benefiting, academics are not improving. In addition, Tremblay, Inman, and Willms, (2000) determined the trend of removing physical activity in elementary schools runs contrary to research. Exercise and fitness might affect the brain functions and halting physical education may be depriving students of what they need to succeed in the classroom. Physical education is a vital component of education; it provides the movement that students critically need to help reduce stress, anxiety, and depression (Vail). Exercise can even boost the students' self-esteem.

**Linking physical activity with student achievement.** Demands on school districts, academically unsuccessful schools, administrators, and educators to improve students' test scores may often mean more instructional time for students and less time for physical activity. Strong evidence has been found to suggest that if students are more physically active, it can positively improve students' cognitive functions. Researchers have found that physical activity is related to improved academic performance and two areas of physical activity – free play and directed physical activity. The University of California-Los Angeles Center for Health Policy Research (2011) found, “Physical fitness is an intrinsic part of the educational process . . . educators need to understand that physical [activity] is just as essential to a student’s academic success as reading, writing and arithmetic” (PE participation varies by county, para. 3). With the strong link between physical activity and academic achievement, reducing or eliminating physical activity from the budget may not be the best way for a district to plan financial resources.

Through a systematic review of literature, Strong, Mauna, Blimkie, Daniels, Dishman, Gutin, Hergenroeder, Must, Nixon, Pivarnik, Rowland, Trost, and Trudeau (2005) found, “Indicators of academic performance include grade point average, scores on standardized tests, and grades in specific courses; measures of concentration, memory, and classroom behaviors are indirect estimates” (p. 735). The inclusion of physical activity does result in small positive gains in academic performance. Providing more time for physical activity does not have a negative effect on students’ academic success. As indicated by the following body of research, a positive relationship between academic performance and physical activity is demonstrated. In addition, studies indicate physical

activity does have a positive influence on cognitive function and intellectual performance.

Physical activity has been linked with student achievement and demonstrated through studies by Cottrell, Northrup, and Wittberg (2007), which found physical activity may be improving children's health and making them smarter at the same time. Additionally, from Singh, Uijtdewilligen, Twisk, Mechelen, and Chinapaw (2012) reviewed research, which found compelling evidence of a significantly positive relationship between physical activity and academic performance. The fact that cognitive ability of students can be improved with physical activity could possibly be one way to move students toward extraordinary success in academics.

Cottrell, Northrup, and Wittberg (2007), researchers from West Virginia University, tested almost 1,200 fifth-grade students in four areas: mathematics, reading, science, and social studies, using the West Virginia Educational Standards Tests (WESTEST), a statewide standardized academic performance test. Actual sample size was 978 students with 50.7% being male. Participants were primarily white from a rural area. The fitness levels of the students were evaluated using the *Children's Standardized Fitness Test Scores*, which measures the students' ability to do tasks such as aerobic capacity, abdominal strength, upper body strength, flexibility, and trunk strength. A posttest was used in all content areas when the students were in seventh grade. The group mean subscale for all subject areas, except social studies, was significantly affected by the children's Body Mass Index (BMI) category after controlling for financial need with the meal program enrollment proxy variable. Blood pressure, total fitness score, sex, over-weight category, and meal program were included as independent variables in a

multiple covariate ANOVA model examining children's academic performance. Test results indicated students who had the highest fitness levels in both fifth and seventh grades performed the best on the posttest. Those students who had low fitness levels also scored below mastery in the area of reading.

One cross-sectional study by Chomitz et al. (2009) used a diverse, urban public school system in the upper northeast to determine a relationship between physical fitness and academic achievement. There were approximately 3,990 students in 12 elementary schools, 64% were non-white [*sic*], and 43% qualified for free or reduced lunch. Each participant's height, weight, and physical fitness were measured by the Physical Education Department at the beginning of the school year. The participants' body mass index (BMI) and fitness data indicated 37.6% of kindergarten to eighth grade students were over-weight or at risk of becoming over-weight as indicated by the BMI for age charts. Only 31.9% of the participants passed all the fitness tests. This study recorded only school data and standardized tests scores for students who were enrolled in fourth through eighth grades.

Chomitz et al. (2009) used the Massachusetts Comprehensive Assessment System (MCAS) achievement test to measure students' academic success. A passing score in mathematics and English and the physical fitness assessment was needed to signify success. A multivariate logistic regression analysis was used to assess the probability of passing the MCAS tests, controlling for students' weight status (BMI z score), ethnicity, gender, grade, and socioeconomic status for school lunch. The probability of passing the MCAS Math test ( $p < .0001$ ) and the MCAS English test ( $p < .05$ ) increased as the number of fitness tests passed increased. Both, the raw MCAS scores and dichotomous

(passing or not passing) was used. Passing of the fitness tests was determined by the number of fitness tests passed by an individual (0 to 5 tests passed).

A series of bivariate analyses were conducted to identify explanatory variables and diagnostic analyses were run to assess any confounding effects among the variables. Frequencies of health and demographic characteristics of the overall sample were stratified by the binary academic achievement outcome variables to find potentially explanatory variables for logistic regression modeling. To assess the statistical difference a Chi-square test was conducted. The raw mathematics and English scores and the proportion of students passing the MCAS mathematics and English tests were controlled by gender, ethnicity, free or reduced lunch, and weight status through regression analysis. Adjusted scores were plotted according to the number of fitness tests passes to assess the shape and strength of the relationship.

Of the 2,127 children enrolled, all participated, excluding 157 who did not complete all five fitness tests, 26 who had biologically implausible BMO z scores with implausible MCAS scores, 11 who were Native Americans, and 80 who had special needs. The study found 40% were overweight or at risk of being overweight and on average 3.6 fitness tests were passed. Overall, 72% passed mathematics while 89% passed English. The logistic regression analysis estimated the odds of passing MACS Math increased by 38% for each 1-unit increase in the number of fitness tests passed, while a statistically significantly weaker relationship was found between the MCAS English test and passing fitness tests ( $p < .05$ ). The results of this study found a statistically significant relationship between fitness and academic achievement. In

addition, this study determined fitness was more strongly associated with mathematics achievement than with English.

Likewise, Tremarche, Robinson, and Graham (2007) studied 311 male and female fourth-grade students between the ages of 9 and 11. Two school districts in southeastern Massachusetts participated in the study. Each participant was required to take the English and Language Arts (ELA) and Mathematics parts of the Massachusetts Comprehensive Assessment System (MCAS) and complete a survey about the frequency of his or her physical activity. School 1 had 28 hours of physical activity, while School 2 had 56 hours. An independent *t* test was used to compare the ELA scores between the two schools. The mean scores of School 1 and School 2 were significantly different when the hours of physical activity were considered. School 1 had an average of 43% of students score Proficient and Advanced on the MCAS ELA while School 2 students scored 61% in Proficient and Advanced on the MCAS ELA. The purpose of the study was to determine if more hours of quality physical activity per week impacted the students' MCAS test scores. The study indicated students who received more hours of physical activity performed better than those who had fewer hours.

Eight different studies (Ahamed et al., 2007; Della Valle, Dunn, Geisert, Sinatra, & Zenhausern, 1986; Fredericks, Kokot, & Krog, 2006; Maeda, & Randall, 2003; Mahar et al., 2006; Molloy, 1989; Norlander, Moas, & Archer, 2005; Uhrich, & Swalm, 2007) were found to have positive results with physical activity on cognitive skills, academic behaviors, and academic achievement. Each study involved physical activities by a trained teacher or facilitator in the classroom setting, with activities lasting 5-20 minutes each day. The implementation varied by study from one day to 16 months with most



lasting between two and three months. Six of the eight studies were conducted with elementary school children in Sweden.

Ahamed et al. (2007) evaluated the effectiveness of a school-based physical activity intervention and whether boys' and girls' academic performance changed after participation in the program. The study was a 16-month, randomized controlled trial in which 10 schools participated. Of the 10 schools, only eight were included in the final analysis. Fourth- and fifth-grade students were recruited for the study, with 287 participants (143 boys and 144 girls). The Canadian Achievement Test was used to measure the students' academic performance. The amount of physical activity, delivered by the teachers, was noted weekly in activity logs. Independent *t* tests compared descriptive variables between both the groups and the genders. The results indicated no significant difference between groups or between boys and girls, all the while maintaining successful levels of academic performance. The physical activity program could be considered attractive for schools to increase physical activity without losing a high level of academic performance.

Additionally, Della Valle, Dunn, Geisert, Sinatra, and Zenhausern (1986) found the use of movement with seventh-grade students exhibited greater concentration and higher math fluency after engaging in five minutes of vigorous exercise after lunch. While, Mahar et al. (2006) observed greater frequency of verbal and motor behavior of following class rules which gave way to a better learning environment for third- and fourth-grade students. The teachers led students in ten minutes of physical activities such as jumping, hopping, rolling, and twisting during the instruction of academics. Furthermore, Norlander, Moas, and Archer (2005) found students achieved a higher

concentration level after stretching exercises. Teachers' observation of students concluded the stretching exercises were very beneficial to focus and increase duration of concentration during core subjects. Each of these studies found physical activity contributed to the students' academic achievement.

Likewise, Castelli, Hillman, Buck, and Erwin (2007), studied the relationship between physical fitness and academic achievement of third- and fifth-grade students in Illinois. An analysis was conducted of the relationship between the components of physical fitness, which included aerobic capacity, muscle fitness, and body composition and the academic achievement of mathematics and reading. The researchers hypothesized that aerobic fitness would be linked most with that of academic success. Dependent *t* tests were used to determine mean difference between the high-performing/low poverty schools and the low-performing/high poverty schools. The findings indicated that physical health was related to academic performance. The need for physical activity was evident from the study, as well as beneficial to the students' academic success.

The uniqueness of the Carlson et al. (2008) longitudinal study included the measuring of students' academic achievement administered at five points with a standardized measure, examining the association between academic achievement with physical education, and a cohort of students entering kindergarten and followed through fifth grade. A difference between boys and girls achievement was noted. Of the 5,316 participants, the girls achieved more success in academics than did the boys. The researchers (Carlson et al.) concluded that "time spent in physical activity did not harm academic achievement and had a modest favorable effect on achievement" (p. 724).

Likewise, research from Caterino and Polak (1999) found fourth-grade students showed a significantly better performance on the Woodcock-Johnson Test of Concentration when participants participated in physical activity just prior to testing. Participants included 54 children in second through fourth grade. The students were divided into two groups, physical activity and no physical activity. On-task behavior and cognitive performance of the participants were improved. Physical activity did not adversely affect the students' academic achievement. All the students were given the Woodcock-Johnson Test of Concentration.

**Indecisive findings.** While some studies have found a relationship between academics and physical activity, others have not discovered a definite link. One such study was Daley and Ryan (2000) in which 232 students in grades eight through eleven were randomly selected to participate. Academic performance was assessed using the most recent examination in English, mathematics, and science. The various correlations between academic performance and physical activity were not significant.

Likewise, in 2000, Tremblay, Inman, and Willms studied 6,856 sixth-grade students in New Brunswick. Physical activity was reported through a questionnaire in which students disclosed the amount of time spent on physical activity while at school and outside of the school day. The results indicated girls scored slightly lower on the mathematics test than boys; however, on the reading test, the girls scored considerably higher than the boys. The increased levels of physical activity showed a weak relationship with academic achievement in both mathematics and reading.

In addition to the shortfall of finding a relationship between physical activity and academic success, Symons, Cinelli, James, and Groff (1997) stated, "Many

administrators, parents, and concerned citizens remain unconvinced that an investment for improving learner health status [by participating in physical activity] will pay dividends in enhanced performance on proficiency tests and overall academic achievement” (p. 220). Inconclusive findings not demonstrating the connection between physical activity and academic success hinders the inclusion of more physical activity in schools, which in turn impedes academic achievement.

Today’s educators are facing tremendous pressure to reform schools and improve students’ test scores; therefore, physical activity is not the focus in many school districts. According to Mathes (2012), there is a thirty-year gap from research to application of the research within our schools. Recent research supports the need of physical activity; however, many schools are still moving away from daily physical activity and embracing more academic time for students. Blom, Alvarez, Zhang, and Kolbo (2011) found “administrators are constantly evaluating curricula to maximize learning opportunities” (p. 13) since the focus is on academic achievement and test scores, rather than physical activities. The stress for students to perform well on standardized tests is felt by all, whether an administrator, classroom teacher, parent, or student.

Symons, Cinelli, James, and Groff (1997) pointed out three barriers of comprehensive school health programming. The first barrier is the lack of administrative support, which stems from the communities’ belief that child health issues are not the responsibility of the school. Many schools are under extreme pressure to improve students’ academics; therefore physical activity time is allotted for additional instruction of reading and mathematics. A second barrier is one of diminishing financial resources. When school districts experience severe budget issues, this usually signals the

elimination of personnel and frequently the cutting of time allocated for physical activities. Administrators are citing more instructional time is needed to improve academics and budget constraints as a rationale for discontinuing time for physical activity. Finally, there is limited governmental support for comprehensive school health programs. While redistricting, security, and contract negotiations are on the top of the list, a comprehensive health program has not been recommended or mandated. States are less likely to assess students' health awareness and skills than their academic knowledge.

**The power of physical activity.** Despite barriers and the belief of some that there is only a moderate to no significant connection between physical activity and academic achievement, physical activity is critically important to children. The participation in physical activity as a child is significant to the beginning of a physically, healthier life. Tremblay, Inman, and Willms (2000) indicated, "The evidence linking physical activity and health is stronger for adults than children; however, the likelihood of being active as an adult is influenced by habits established during childhood" (p. 312). When children are physically active, a healthier lifestyle can be lived, and as a result, students' benefit academically.

The emerging research and positive findings of a relationship between physical activity and academic achievement may eventually turn educators' attention towards including physical activity or some type of movement into the school day. To become physically active is a powerful message to send to school age children. Research indicates physical activity is important for children; therefore, it has the potential to produce extraordinary results in reading.

## CHAPTER 3

### METHODOLOGY

#### Research Method

**Research design.** A quasi-experimental design was employed to examine the effectiveness of the physical activity on fourth-grade students' reading measured by the Gates-MacGinitie Reading Tests in this study. The researcher administered the Gates-MacGinitie Reading Tests Level 4 to each of the five Grade 4 classes. The mean of the pretest and posttest from the experimental and control groups was analyzed using a Repeated Measure ANOVA. Participants were from a local elementary school, which included pre-kindergarten through fifth-grade students. The school was selected by convenience since the researcher was employed at the school.

The quasi-experimental design benefited this study by offering a framework to test the hypotheses in order to establish a result. With this design, the researcher collected data, which provided insight about the effects of physical activity on reading comprehension and vocabulary. The quasi-experimental design allowed the researcher adequate control to provide information on the impact of a treatment on its target population. Furthermore, this design was effective because of the pretesting and posttesting of the participants. The internal and external validity was maximized in this design. Finally, the use of a quasi-experimental design provided a method to prove or

disprove the hypotheses, which narrowed down the possible directions for further research.

### **Method**

A quasi-experimental study was conducted using the Gates-MacGinitie Reading Tests pretest and posttest given to the fourth-grade students. An experimental group participated in a 15-minute aerobic activity built into their daily schedule for physical activity prior to the reading class. The 15 minutes took place at the beginning of reading instruction. One certified retired teacher was trained on the procedures and aerobics activities for the study. The trained teacher worked with both the experimental and control groups. The trained teacher provided an aerobics activity for the experimental group prior to reading instruction. Then, the trained teacher, who provided physical activity to the experimental group, read a book to the control group for 10 to 15 minutes. Furthermore, the book was not to be discussed with the students or comprehension questions asked about the story.

The same pretest and posttest was given to both groups. The mean of the pretest and posttest from the experimental and control groups were analyzed using a Repeated Measure ANOVA. Student attendance data were documented each day by the classroom teacher. Daily attendance was taken to determine if students' absences affected the outcome of the study. The study was conducted during the 2012-2013 fall semester for a 12-week period.

**Participants.** The total number of students in the fourth-grade was 117. Five of the 117 fourth-grade students did not return the Human Subjects Use form to the researcher in order to participate in the study. Therefore, 112 students participated in the

study. During the 12-week study, four students dropped from the enrollment of the school; two were in the experimental group and two were in the control group. Therefore, 108 participants remained in the study. At the end of the study, the experimental group consisted of 64 participants, while the control group had 44 participants. The total number of boys who participated was 57 while the number of girls was 51. Of the 108 students who participated, 105 (97%) were receiving free or reduced lunch. Additionally, 29 participants in the experimental group received reading intervention for 30 minutes daily with a program designed to address mild to moderate decoding issues. Participants in one class (17 students) of the experimental group used a reading program which addressed reading, writing, grammar, spelling, and vocabulary. Five participants in the experimental group had a 504 plan, which included accommodations for reading.

**Population.** The population for this study was fourth-grade students attending a public elementary school in a northwest parish of Louisiana. Most children were from middle-class families whose parents worked in the local businesses. Many of the students were living in a single-parent home with at least one other sibling. Utmost importance was placed on high-stakes testing in this grade and students were being prepared for academic success from the first day of the school year.

**Sample.** The fourth-grade participants were from this one elementary school, which educates pre-kindergarten through fifth-grade students. All Grade 4 classes were used for this study. The school had 88.4% students eligible for federal free and reduced meal program with 90.2% minority attending. During the 2011-2012 school year, the school was on the Louisiana Department of Education watch list for failing schools due



to 40.2% of its students performing below grade level (Louisiana Department of Education, 2011). Some 78 students (18.6%) performed below basic and repeated the fourth grade. During the 2012-2013 school year, the school was no longer on the watch list due to fourth-grade students' performance of 67% scoring Basic or above on the state-mandated test.

Of the 117 fourth-grade students included in this study, 45% scored below Basic on the 2012 Grade 3 *integrated* Louisiana Educational Assessment Program (*iLeap*) (Louisiana Department of Education, 2012). Ten students repeated the fourth grade, which is 8% of the fourth-grade student population. There were no full inclusion students in Grade 4 with reading as their exceptionality. However, there were five students in the experimental group who had a 504 plan (Section 504 from the Rehabilitations Act and the Americans with Disabilities Act) which included accommodations for reading.

The participants were placed in their fourth-grade class at the beginning of the fall 2012-2013 school year by the students' previous year's *iLeap* scores. The fourth-grade classes were randomly selected to participate in the experimental and control groups by the researcher at the beginning of the study. Each teacher's name was written on a small piece of paper and folded. The folded papers were placed into a basket and three names were drawn out for the experimental group. The remaining two names were the control group.

**Instrumentation.** The Gates-MacGinitie Reading Tests, Fourth Edition, Forms S and T (GMRT-4) were used as the pretest and posttest for this study. According to Kathleen Johnson's (2010) review of the Gates-MacGinitie Reading Tests in Buros

Mental Measurements online, the GMRT-4 is a norm-reference achievement tests which, includes subtests for assessing literacy skills. The subtests of the GMRT-4 vary depending on the grade level of the student. The Level 4 subtests include Vocabulary (45 items) and Comprehension (39 items). The fundamental purpose of the Gates-MacGinitie is to “measure the general level of student reading achievement” (para. 1).

According to Johnson (2010) the GMRT-4 has “reliability estimates which indicate strong total test and subtest internal consistency levels with coefficient values at or above .90 for the total tests and the subtests at all levels” (Technical, para. 1). Both Form S and T Comprehension have a reliability of .89. The content validity was documented using a thorough process of test development using conventional and item response methods. Item-bias studies were used by the authors to eliminate any problematic test items. Correlations between the GMRT Third Edition and the Fourth Edition, as well as the Preliminary Scholastic Aptitude Test (PSAT) and Scholastic Aptitude Test (SAT) provide the validity data for the GMRT-4.

The fourth-grade participants were assessed with the Level 4 Comprehension and Vocabulary subtest, which was completed in one session. The researcher tested each of the five classes as a group and scored each participant’s tests.

**Procedure.** During the summer, prior to the 2012-2013 school year, the principal and coordinator placed fourth-grade students into classes by the students’ previous year’s iLEAP score. In June, 2013, the teachers, principal, and superintendent were presented with a letter (see Appendices A, B and C) about the proposed study, which they both signed and dated. The superintendent also prepared a letter for the researcher (see Appendix D) explaining who would oversee the study for the school district.

Permission to use the Gates-MacGinitie Reading Tests<sup>1</sup> Level 4 was requested from Riverside Publishing in July, 2012 (see Appendix E). The researcher was granted permission to use the testing materials in September, 2012 (see Appendix F). All documentation for the Louisiana Tech University Human Use Committee (see Appendices G, H, I, J, K, and L) was prepared and given to the Human Use Committee in September, 2012. Confirmation of approval was received from the committee (see Appendix M) in early October, 2012. The researcher ordered and received testing materials, such as self-scorable answer sheets, Manual for Scoring and Interpretation, scoring key, and class record books from Riverside Publishing. The Gates-MacGinitie test booklets were available for use from the school, and therefore, were not ordered.

The researcher prepared the Human Use forms with an attached cover letter for the fourth-grade students and parents (see Appendices H, I, and N) the first day of the 12-week study. Each of the fourth-grade students received the information to take home in their Tuesday Folder. The Human Use forms were collected each day of the first week. The participants included 117 fourth-grade students and their parents, five classroom teachers, the school's principal, and the district superintendent. The retired certified teacher who provided the physical activity for the experimental group and read a book to the control group was contacted by telephone. The researcher and retired teacher worked together for two, one-hour sessions to create the aerobic exercises for the students.

After the Human Use forms were collected from all participants, the researcher tested each of the fourth-grade classes with the Gates-MacGinitie Reading Tests, Level 4.

<sup>1</sup>Copywrite © 2000 by the Riverside Publishing Company. Gates-MacGinitie Reading Tests® (GMRT®), Fourth Edition reproduced with permission of the publisher. All rights reserved.

Each class was tested as a whole group and each student was provided No.2 pencils along with the test booklets and self-scorable answer sheets. The participants were pre-assigned a number to place on the answer sheets instead of their names. The researcher read directions verbatim from the Gates-MacGinitie Level 4 test manual. As per instructions in the Gates-MacGinitie testing manual, the participants were given 20 minutes for the vocabulary test and 35 minutes for the comprehension test. The entire Gates-MacGinitie test was given in one session to each class.

The names of the five fourth-grade teachers were written on the same size paper, folded, and placed in a basket. The researcher drew out three teachers' names for the experimental group, while the remaining two names were the control group. The researcher created a schedule for the retired teacher to provide physical activity to the three classes in the experimental group and to read a book to the two classes in the control group. The researcher received approval of the schedule (see Appendix O) from the principal. The retired teacher, who provided the physical activity, received a printed schedule of times and classrooms (see Appendix P) to begin the aerobics exercises for the experimental group and to read a book to the control group. The researcher checked for fidelity each day using a checklist (see Appendix Q). The time in each classroom, as well as the steps of physical activity, was verified each day.

The fourth-grade student population for the study was a total of 117 students. The experimental group consisted of three fourth-grade classes with a total of 67 students. Of the 67 students, one participant did not return the required Human Use form in order to participate. The control group included two fourth-grade classes with a total of 50 students. Four of the students in the control group did not return the Human Use form

and, therefore, did not participate in the study. Of the 112 participants, four students dropped from the school during the study. Five participants in the experimental group had a 504 plan, which included accommodations for reading.

The retired teacher who provided the physical activity began the fifteen minutes of exercise with the experimental group on Thursday of the second week of the study. Also, the same retired certified teacher read a book to the two classes in the control group. The researcher created a daily attendance sheet for each class. The retired certified teacher took the attendance sheets to each class and the classroom teacher marked students who were physically in the room receiving the exercise or hearing the book read.

**Data collection.** Prior to the collection of data, the researcher collected the signed Human Use forms from all participants; 117 students and their parents, five teachers, principal, and superintendent. The researcher administered The Gates-MacGinitie Reading Tests, Level 4, Form S at the beginning of the study, during the fall 2012 school year, to each participant in the experimental and control groups. The researcher scored the Gates-MacGinitie Reading Tests self-scorable sheets using the Manual for Scoring and Interpretation. The participants' raw scores for vocabulary, comprehension, and total were recorded and analyzed using a coding sheet. The raw scores data were inputted into the Statistical Package for the Social Sciences (SPSS) software to be examined using a Repeated Measure ANOVA in order to identify if the groups were similar.

**Analysis of data.** The experimental and control groups data were inputted into the SPSS software on a laptop. The pretest and posttest scores were entered into the

SPSS software. The attendance data for the 12-week period, as well attendance for the same 12-week period for the previous school year (2011-2012) was inputted into the software program. The gender and free or reduced lunch data were included in the analysis. The data for the experimental and control groups were analyzed using a Repeated Measure ANOVA.

## CHAPTER 4

### PRESENTATION OF FINDINGS

#### Results

The Gates-MacGinitie Reading Tests data were collected from the participants during the last week of the 12-week study. The pretest and posttests' raw scores were analyzed using the Repeated Measure ANOVA from the SPSS software. The Gates-MacGinitie Reading Tests Level 4 had a total possible raw score of 93. The total possible score for the vocabulary was 45, while the total possible score for comprehension was 48. The independent variable was the physical activity performed each day for 15-minutes prior to reading class with the participants in the experimental group. The dependent variable was the Gates-MacGinitie Reading Tests comprehension and vocabulary scores from the participants in both the experimental and control groups.

**Total score results.** The participants' Gates-MacGinitie Reading Tests raw scores were inputted into the SPSS software. The results of the combined total (vocabulary and comprehension) pretest data are presented in Table 1. The data included the mean and standard deviation for the control and experimental groups. The number of participants in the experimental group was 64, while the control group included 44 participants. As indicated by the Gates-MacGinitie Reading Tests, the control group ( $M = 46.84$ ,  $SD = 15.57$ ) performed at a higher level than the experimental group ( $M = 37.44$ ,  $SD = 11.49$ ) on the total pretest by an average of 9.40 points.

Table 1

*Descriptive Statistics of Pretest and Posttest on Gates-MacGinitie Reading Tests*

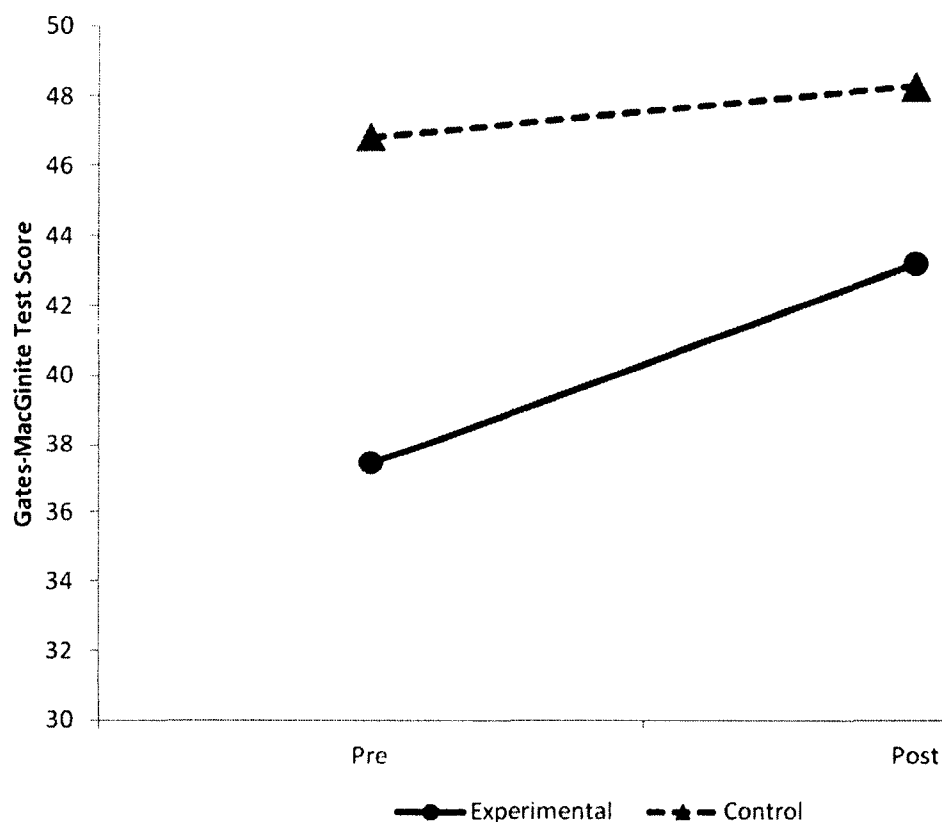
	<i>Group</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>Percent</i>
Pretest	Experimental Group	64	37.44	11.49	
	Control Group	44	46.84	15.57	
Posttest	Experimental Group	64	43.19	13.595	15.36%
	Control Group	44	48.30	16.449	3.12%

The results of the participants' combined total pretest and posttest mean and standard deviation were listed in Table 1. The experimental group showed growth from the combined total pretest mean of 37.44 to the combined total posttest mean of 43.19. The control group also showed growth from the combined total pretest mean score ( $M = 46.84$ ,  $SD = 15.57$ ) to the combined total posttest mean score ( $M = 48.30$ ,  $SD = 16.449$ ); however, its growth was less than that of the experimental group. The participants in the experimental group had an improvement of 15.36% over their combined total mean pretest score; while the control group showed a 3.12% improvement over their combined total pretest mean score. The percent was determined by subtracting the pretest mean from the posttest mean and dividing the difference by the pretest mean for the group.

The results of the Gates-MacGinitie Reading Tests combined total scores for the experimental and control group participants can be demonstrated in a line graph as shown in Figure 1. The graph showed a significant difference between the combined total pretest and posttest score of the comprehension and vocabulary tests from the Gates-MacGinitie Reading Tests of the experimental group, while the control group demonstrated normal growth between the combined total pretest and posttest score. The Repeated Measure ANOVA result showed that the interaction between time (i.e., pretest



and posttest) and group (i.e., experimental and control) is statistically significant,  $F(1, 106) = 10.76, p < .01, \eta^2 = 0.09$ . The Eta-squared for the total score is a moderate effect size. This result indicated that the improvement of the experimental group is statistically significant than that of the control group.



*Figure 1.* Combined total score of Gates-MacGinitie Reading Tests level 4.

**Results of hypotheses.** Each of the hypotheses will be addressed individually in the null hypotheses form. The Repeated Measure ANOVA was used for all three hypotheses to determine if there was a difference between the experimental and control groups Gates-MacGinitie Reading Tests pretest and posttest and the participants' attendance. The data from the Gates-MacGinitie Reading Tests Level 4 comprehension, vocabulary, and combined total score were analyzed individually.

**Null hypothesis 1.** There will be no significant difference between the experimental group's Gates-MacGinitie Reading Tests comprehension pretest and posttest mean scores as compared to the control group's comprehension pretest and posttest mean scores at the end of the fall semester.

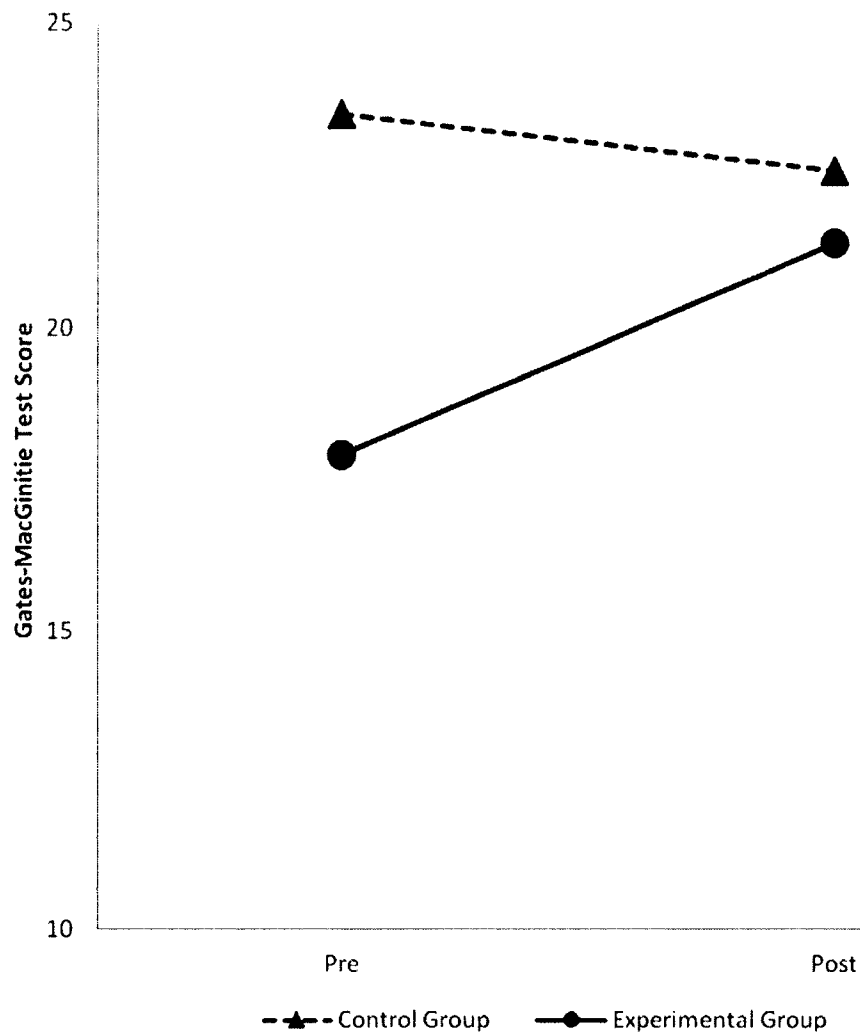
The comprehension test indicated an improved score between the experimental and control groups pretest and posttest scores. The experimental group's pretest mean score was 17.94 with a standard deviation of 6.749, while the posttest mean score was 21.41 with a standard deviation of 8.188. The experimental group's pretest mean score ( $M = 17.94, SD = 6.749$ ) was subtracted from the posttest's mean score ( $M = 21.41, SD = 8.188$ ) and the difference (3.47) was divided by the pretest and showed a 19.34% improvement with the participation in physical activity prior to reading class. The control group's pretest's mean score ( $M = 23.52, SD = 8.953$ ) was subtracted from the posttest's mean score ( $M = 22.59, SD = 10.199$ ) and the difference (-.93) was divided by the pretest mean score which resulted in a -3.95% between the pretest and posttest scores. The results of the data indicated a decline in the control group's scores on the Gates-MacGinitie Reading Tests subtest of comprehension as suggested by Table 2.

Table 2

*Results of Repeated Measure ANOVA Group Differences of Gates-MacGinitie Reading Tests: Comprehension for Participants in Experimental and Control Groups*

	<i>Group</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>Percent</i>
Pretest	Experimental Group	64	17.94	6.749	
	Control Group	44	23.52	8.953	
Posttest	Experimental Group	64	21.41	8.188	19.34%
	Control Group	44	22.59	10.199	-3.95%

The experimental and control groups' comprehension scores was demonstrated with the line graph in Figure 2. The line graph (Figure 2) showed an improvement in comprehension for the experimental group, while the control group showed a decline in comprehension. The change from the pretest to posttest in score of the Gates-MacGinitie Reading Tests comprehension was tested with Repeated Measure ANOVA. The result showed that the interaction between time (i.e., pretest and posttest) and group (i.e., experimental and control) was statistically significant,  $F(1, 106) = 16.63, p < .01, \eta^2 = 0.14$ . The Eta-squared had a moderate to strong effect size. Therefore, the null hypothesis is rejected, indicating there was a measurable effect between physical activity and comprehension.



*Figure 2.* Comprehension score of Gates-MacGinitie Reading Tests level 4.

**Null hypothesis 2.** There will be no significant difference between the experimental group's Gates-MacGinitie Reading Tests vocabulary pretest and posttest mean scores as compared to the control group's vocabulary pretest and posttest mean scores at the end of the fall semester.

The mean of the vocabulary pretest for the experimental group was 19.50 with a standard deviation of 6.419. The vocabulary posttest mean was 21.78, with a standard deviation of 7.599. The mean of the pretest was subtracted from the posttest and the difference was divided by the pretest to determine the improvement between the two

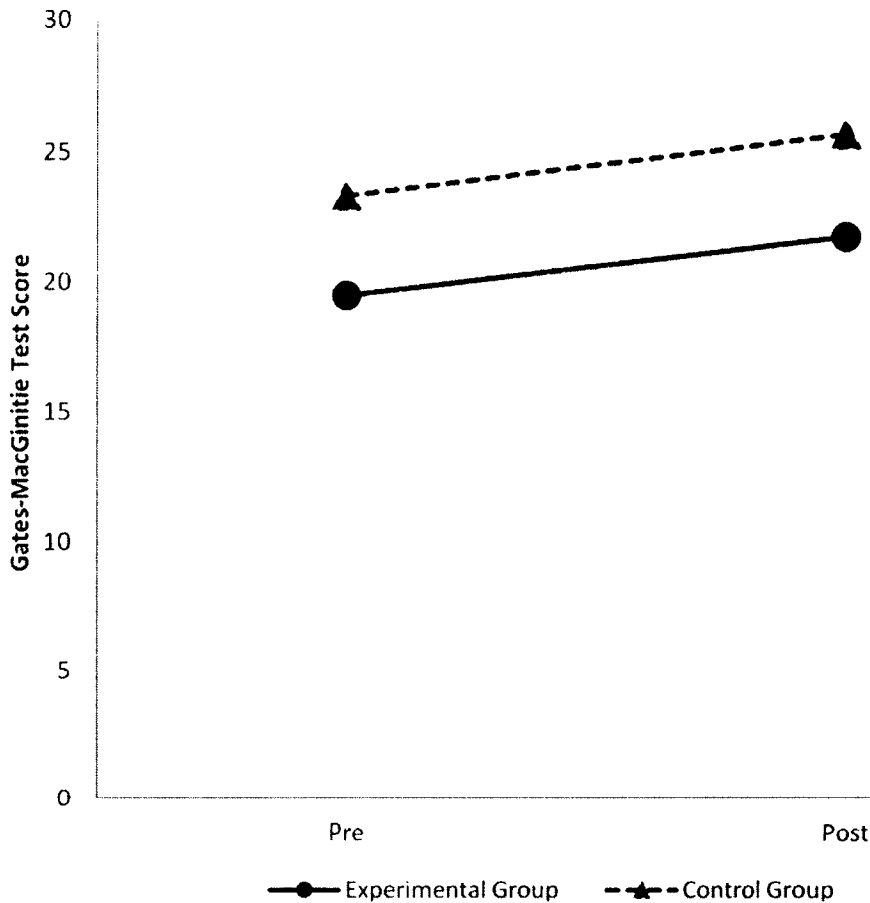
groups. The experimental group was found to have a slightly improved difference between the pretest and posttest mean scores (1.169) than the control group (1.02). The data from the Gates-MacGinitie Reading Tests vocabulary test was demonstrated in Table 3.

Table 3

*Results of Repeated Measure ANOVA Group Differences of Gates-MacGinitie Reading Tests: Vocabulary for Participants in Experimental and Control Groups*

	<i>Group</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>Percent</i>
Pretest	Experimental Group	64	19.50	6.419	
	Control Group	44	23.32	8.158	
Posttest	Experimental Group	64	21.78	7.041	1.169%
	Control Group	44	25.70	7.599	1.02%

The line graph demonstrated in Figure 3 indicated a slight difference between the Gates-MacGinitie vocabulary pretest and posttests. The Repeated Measure ANOVA result showed that experimental and control groups did not have a statistically significant difference between the vocabulary pretest and posttests,  $F(1, 106) = .02, p = .89$ . Therefore, the null hypothesis was accepted, indicating that physical activity did not have an effect on vocabulary.



*Figure 3.* Vocabulary score of Gates-MacGinitie Reading Tests level 4.

**Null hypothesis 3.** There will be no significant difference between experimental and control groups' daily class attendance at the end of the fall semester.

The attendance for both, the experimental and control groups were inputted into the SPSS program. The daily attendance for each participant for the 12-week period of the study was calculated by using the JPAMS program for the school district. There was a maximum of 48 days possible attendance during the timeframe. The participants' attendance for the previous school year at the same 12 week period (48 days) was also calculated using the JPAMS program for the school district. During the 2011-2012 school year, the experimental group's attendance mean score was 46.42, with a standard

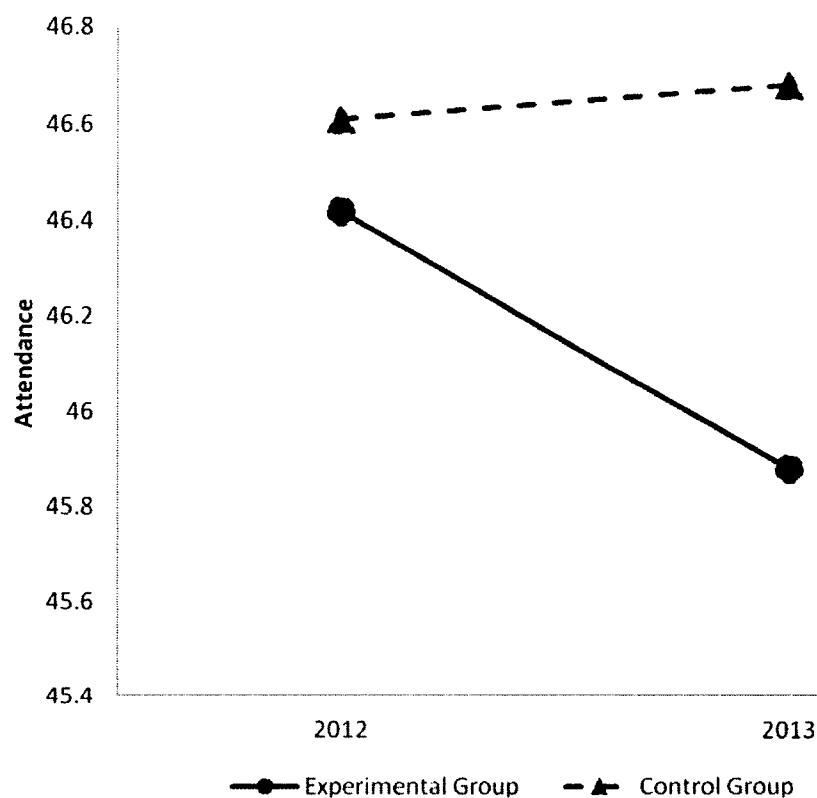
deviation of 1.850. The control group's attendance was slightly more ( $M = 46.61$ ;  $SD = 1.728$ ) during the same school year. The 2012-2013 school year, the experimental group's attendance was slightly less than the previous year ( $M = 45.88$ ;  $SD = 1.728$ ). The control group's attendance was slightly better during the 2012-2013 school year ( $M = 46.68$ ;  $SD = 1.360$ ). The experimental and control groups' means for the two school years were divided to find the percent. The experimental group attended -1.011% less during the 2012-2013 school year, while the control group attended .988% more as compared to the previous school year. The data indicated the control group had a slightly better attendance for the same 12-week period of school years 2011-2012 and 2012-2013, while the experimental group had slightly less attendance for the same period. However, the Repeated Measure ANOVA result showed that there is no statistical significance in the attendance change between the experimental and the control group,  $F(1, 106) = 1.96$ ,  $p = .17$ , as demonstrated in Table 4. Therefore, the null hypothesis was accepted.

Table 4

*Results of Repeated Measure ANOVA Group Differences of Gates-MacGinitie Reading Tests: Attendance for Participants in Experimental and Control Groups for School Years 2011-2012 and 2012-2013*

	<i>Group</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>Percent</i>
2011-2012	Experimental Group	64	46.42	1.850	
	Control Group	44	46.61	1.728	
2012-2013	Experimental Group	64	45.88	2.746	-1.011%
	Control Group	44	46.68	1.360	.988%

The results for the experimental and control groups can be shown in Figure 4.



*Figure 4.* Attendance for participants during school years 2011-2012 and 2012-2013.

In conclusion, null hypothesis 1 was not accepted, while null hypotheses 2 and 3 were accepted. The use of physical activity before reading class made a significant difference with the fourth-grade students' comprehension score on the Gates-MacGinitie Reading Tests. However, there was no difference in the students' vocabulary score. The use of physical activity did not have an effect on the students' attendance.

**Fidelity measure.** The fidelity of the study was measured using a checklist (see Appendix Q) each day. The checklist included each of the steps for the physical activity and the time entered each class each day as the retired teacher visited each of the classes



in the experimental group. The items on the list were checked by the researcher each day. The results of the measure were 100% fidelity obtained.

## CHAPTER 5

### DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

#### Discussion of the Findings

**Summary of the study.** Learning to read is one of the critical and necessary components of childhood. Yet, many students, by the time they reach third grade cannot read grade-level material. Frustration sets in and the student is on the path of academic defeat (Blaunstein & Lyon, 2006). The below average fourth-grade student struggles to read the texts required to continue moving toward the goal of graduating high school, due to “85% or more of our curriculum is thereafter delivered by reading” (The Children’s Reading Foundation, 2012, *The Economics of Reading*, para. 3). However, the use of physical activity can help students improve their academic skills and the level of frustration may decrease considerably. Physical activity has been linked to students’ academic success in such studies by Caterino & Polak (1999); Ahamed et al. (2007); and Carlson et al. (2008).

The purpose of this study was to examine the effect of physical activity performed daily with fourth-grade students on student achievement in reading as evidenced by the Gates-MacGinitie Reading Tests. This 12-week study was completed during the fall of 2012 to find if physical activity had an effect on fourth-grade students’ comprehension and vocabulary. The Gates-MacGinitie Reading Tests pretest and posttest data were collected and analyzed. The students’ attendance data were also collected to determine if

physical activity had an effect on students' attending class more regularly. A Repeated Measure ANOVA was used to measure the interaction between time and group.

**Research questions.** The Gates-MacGinitie Reading Tests Level 4 was used to measure the effect of vocabulary and comprehension of the fourth-grade students. The students' attendance data were also collected to determine if students attended class more frequently with physical activity. Each of the three research questions were addressed and answered with this study.

**Research question 1.** Does structured physical activity or exercise prior to the teaching of reading have an effect on fourth-grade students' scores on the comprehension test of the Gates-MacGinitie Reading Tests? As Taras (2005) found, "Physical activity improves general circulation, increases blood flow to the brain, and raises levels of norepinephrine and endorphins – all of which may reduce stress, improve mood, induce a calming effect after exercise, and perhaps as a result improve achievement" (p. 214). Physical activity increases the cognitive abilities of the brain, therefore, lending brain power that can be applied to academics. The use of physical activity "cues the building blocks of learning in the brain" (Ratey & Hagerman, 2008, p. 4). Likewise, this researcher found the data indicated that structured physical activity did have an effect on fourth-grade students' comprehension. The Gates-MacGinitie comprehension test indicated an improved score between the experimental and control groups pretest and posttest.

**Research question 2.** Does structured physical activity or exercise prior to the teaching of reading have an effect on fourth-grade students' scores on the vocabulary test of the Gates-MacGinitie Reading Tests? The experimental group had a slight difference

between the pretest and posttest (1.169%), while the control group's difference between the pretest and posttest was 1.02%. Therefore, the researcher did not find any statistically significant difference between the experimental and control groups vocabulary pretest and posttests.

**Research question 3.** Does structured physical activity or exercise prior to the teaching of reading have an effect on fourth-grade students' daily class attendance? The experimental group had a lower class attendance between the 2011-2012 and 2012-2013 school years (-1.011%), while the control group had a .988% improvement. Hence, the data indicated physical activity did not impact the fourth-grade students' attendance during the time of the study.

### **Conclusions**

The researcher found the data indicated the inclusion of physical activity in the classroom had a positive effect on students' comprehension test score, while there was not a difference between the students' vocabulary pretest and posttest and the students' class attendance. The data indicated that when students were given as little as 15 minutes of physical activity everyday prior to reading class (as opposed to 30-40 minutes in a physical education class every fifth week) had a direct impact on their reading achievement. The significance of these 15 minutes of structured physical activity provided enough of a brain break for students to become focused again, which had an immediate effect on their learning of comprehension skills.

Previous research found that physical activity studied through a variety of methods did impact the students' academic achievement. One such study by Blanchette, Ramocki, O'del, and Casey (2005) found the data indicated that "exercise significantly

impacted the creative processes of the participants and these effects were shown to endure over a two hour period” (p. 12). Physical activity whether through a physical education class or simply providing aerobic exercise has been found to impact students’ test scores. As studied and found by Tremarche, Robinson, and Graham (2007), students who received more hours of a quality physical education class throughout the school year, performed better in ELA on the MCAS. Coe, Pivarnik, Womack, Reeves, and Malina (2006) found “students who performed vigorous physical activity at a level that met or exceeded the Healthy People 2010 guidelines achieved higher academic scores compared with the other students in both first and second semesters” (p. 1517). The effect that physical activity has on students’ academic achievement has been documented over the years, yet some school districts and administrators still choose not to see the powerful impact of providing time daily for physical activity.

The results found in this study were consistent with research by Castelli, Hillman, Buck, and Erwin (2007), who studied the relationship between physical fitness and academic achievement of third- and fifth-grade students in Illinois. An analysis was conducted of the relationship between the components of physical fitness, which included aerobic capacity, muscle fitness, and body composition and the academic achievement of mathematics and reading. The findings indicated that physical health was related to academic performance.

In addition, the findings in this study were consistent with the research by Norlander, Moas, and Archer (2005), which found that students achieved a higher concentration level after stretching exercises. Teachers’ observations of students concluded the stretching exercises were very beneficial to focus and increase duration of

concentration during core subjects. Furthermore, research by Della Valle, Dunn, Geisert, Sinatra, & Zenhausern (1986); Tremblay, Inman, & Willms (2000); Cottrell, Northrup, & Wittberg (2007); and Caterino & Polak (1999) supported physical activity positively effecting the students' academic success. In conclusion, this study contributed to the body of work about physical activity affecting students' academic success in reading.

The results on the Gates-MacGinitie Reading Tests vocabulary pretest and posttest did not find a significant difference. Most researchers, including Beck, McKewon, & Kucan (2002) found a more knowledgeable vocabulary improved reading comprehension. As for the results of this study and why vocabulary was not affected by the physical activity, vocabulary instruction occurred while reading and used the context to assist in word understanding. There was very little direct instruction of vocabulary with the fourth-grade reading series used at the research site. Explicit instruction of vocabulary is critical, yet not all words can be directly taught during the school year. As found by Beck, McKewon, and Kucan (2002) students can be explicitly taught about 400 key words during the school year, while 2,000 to 3,000 are needed each year.

Sometimes students need more background knowledge to gain word knowledge. Consequently, some students do not have any experiences to attach to the understanding of the word. Hart and Risley (1995) found that high-performing first-grade students know about twice as many words as low-performing students, which resulted in high-performing twelfth-grade students knowing four-times as many words as low-performing twelfth-grade students. The Texas Reading Initiative (2002) found the amount of time reading outside the classroom was critically important to improve vocabulary. For example, a student who reads 21 minutes a day reads about two million words per year,

while the student who reads less than a minute outside the classroom only reads 8,000 to 21,000 words per year. Also, children need multiple exposures to words in order to improve vocabulary over time (Hirsch, 2003; Stahl, 2003). Words and their meanings are learned over time. First encounters with a word may only leave a small imprint on the student's brain.

In addition, the vocabulary section of the Gates-MacGinitie Reading Tests was presented in three or four word sentences or phrases. There was not enough text to gather meaning about the word or the way it was being used in the sentence or phrase. Many students are taught to use the context around the word to help with understanding the word. Consequently, some students scored lower on the vocabulary posttest than on their vocabulary pretest. Since the vocabulary portion of the Gates-MacGinitie is multiple choice answers, some students may have guessed correctly on the pretest and not on the posttest.

**Implications for practice.** Current research on the effect of physical activity with students' academic achievement does indicate a connection. The use of physical activity with students can only help students achieve more academic success throughout their school years. Subjects, such as reading and mathematics are complex for some students and the lack of physical stamina to endure the long class period without a break can be excruciatingly difficult.

Many administrators and educators may need to ensure that daily physical activity is provided for students rather than the current practice of reducing physical activity time or taking away all physical activity, including recess. The school in which the researcher studied found that third-, fourth-, and fifth-grade students were not allowed to have

recess. Other school districts are also reducing or eliminating physical activity or recess in order to increase academic instruction time (Jarrett & Waite-Stupiansky, 2009; Pellegrini, 1995). Also, Zygmunt-Fillwalk and Bilello (2005) found that 40% of school districts had eliminated or reduced recess time. In addition, many school districts, primary schools are being built without any playground space or equipment (Schools becoming all work and no play, 2001).

Ratey and Hagerman (2008) stated, “What’s even more disturbing, and what virtually no one recognizes, is that inactivity is killing our brains too – physically shriveling them” (p. 4). Physical activity provides much more than just adding strength to the body. Daily physical movement of the body can help the brain perform much better on learning tasks and testing. The act of processing information and test taking is less difficult when the body has the opportunity for physical activity. Students are more likely to put more effort into an assignment when there has been a break between cognitive tasks. Many times children are less efficient at processing information, inhibiting task irrelevant thoughts, and reducing cognitive interference. As a result, some children have to use more cognitive effort to complete the tasks, making constant attention a challenge (Pellegrini & Bohn-Gettler, 2013; Bjorklund, 2004; Bjorklund & Green, 1992). The end result is that many children struggle with focusing on cognitive tasks for long periods of time without a physical activity break. Unfortunately, many students are required to wait for the scheduled physical activity time, therefore, the students become less focused and not able to complete the assignment. “The longer students must wait for recess, the less attentive, productive, and efficient they become” (Holmes, Pellegrini, & Schmidt, 2006, p. 736). Therefore, the need for physical



movement between cognitive activities is necessary in order for children to focus and effectively produce the higher academic achievement school districts are advocating.

**Recommendations for further research.** This study suggested several recommendations for further research in the area of physical activity and academic success. The current study limited the research to using one public elementary school. Future research might lend itself to adding additional schools with a similar population to have a better sample size. A larger population would strengthen the study and may have more of an effect on students' academic success. The research by Tremarche, Robinson, and Graham (2007) used 311 fourth-grade students and found a significant difference with the use of physical activity and students' ELA score on the Massachusetts state test.

In the current study, physical activity was integrated with reading only. Expanding the number of academic subjects could impact the research and find a greater difference between the experimental and control groups. In addition to reading, studying the effects of physical activity in all of English Language Arts to include vocabulary, language, and spelling, as well as the other academic subjects of mathematics, science, and social studies may provide more conclusive evidence of the need for daily physical activity. Several researchers (Cottrell, Northrup, & Wittberg, 2007; Chomitz et al., 2009) studied physical activity with more than one subject area. Cottrell, Northrup, and Wittberg (2007) studied physical activity with reading, mathematics, science, and social studies, while Chomitz et al., (2009) studied physical activity with English and mathematics. Studying the effects of physical activity with more than one subject may ultimately change the outcome of the students' achievement in academics, as well as their test scores.

Using a test other than the Gates-MacGinitie Reading Tests may affect the outcome of the study. A test that measures more subjects in depth may help researchers find a stronger connection between physical activity and academic achievement. Additionally, collecting data during more than one semester could have a greater validity on the study. Finally, extending the duration of the study to more than 12 weeks may provide added insight as to the effect of physical activity on students' academic success.

## REFERENCES

- Aaron, P. G., Joshi, R.M., & Quatroche, D. (2008). *Becoming a Professional Reading Teacher*. Baltimore, MD: Paul. H. Brookes Publishing.
- Abadie, B. R., & Brown, S. P. (2010, December). Physical activity promotes academic achievement and a healthy lifestyle when incorporated into early childhood education. *Forum on Public Policy Online: A Journal of the Oxford Round Table*, 2010(5). Retrieved from <http://forumonpublicpolicy.com/vol2010no5/earlychildhood2010no5.html>
- Ahamed, Y., Macdonald, K. R., Reed, K., Naylor, P., Liu-Ambrose, T., & Mckay, H. (2007). School-based physical activity does not compromise children's academic performance. *Medicine and Science in Sports and Exercise* 39(1), 371-376.
- Allensworth, D., Lawson, E., Nicholson, L., & Wyche, J. (Eds.). (1997). *Schools and health: Our nation's investment*. Washington, DC: National Academy Press.
- Alliance for a Healthier Generation. (n.d). *Health consequences of childhood obesity*. Retrieved from <http://www.healthiergeneration.org/about.aspx?id=316>
- Anderson, R. C., Hiebert, E. H., Scott, J. A., & Wilkinson, I. A. (1985). *Becoming a nation of readers: The report of the commission on reading*. Washington, D.C.: National Institute of Education.
- Beck, I. L., McKeown, M. G., & Kucan, L. (2002). *Bringing words to life: Robust vocabulary instruction*. New York: Guilford Press.

- Biemiller, A. (2003). Vocabulary: Needed if more children are to read well. *Reading Psychology, 24*, 323-335.
- Bjorklund, D. F. (2004). *Children's thinking: Developmental function and individual differences* (4th ed.). Belmont, CA: Wadsworth.
- Bjorklund, D. F. & Green, B. L. (1992). The adaptive nature of cognitive immaturity. *American Psychologist, 47*, 46-54.
- Blanchette, D. M., Ramocki, S. P., O'del, J. N., & Casey, M. S. (2005). Aerobic exercise and cognitive creativity: Immediate and residual effects. *Creativity Research Journal, 17*, 257-264. Retrieved from <http://www.ric.edu/faculty/dblanchette/ExerciseArticle.htm>
- Blaunstein, P. A., & Lyon, G. R. (Eds.). (2006). *Why kids can't read*. Lanham, MD: Rowman & Littlefield Education.
- Blom, L. C., Alvarez, J., Zhang, L., & Kolbo, J. (2011). Associations between health-related physical fitness, academic achievement and selected academic behaviors of elementary and middle school students in the state of Mississippi. *Journal of Research, 6*(1), p. 13-19.
- Bush, G. H. W. (1990). Proclamation 6158 - Decade of the Brain, 1990-1999. Online by Gerhard Peters and John T. Woolley, *The American Presidency Project*. Retrieved from <http://www.presidency.ucsb.edu/ws/?pid=1869>.
- Carlson, S. A., Fulton, J. E., Lee, S. M., Maynard, L. M., Brown, D. R., Kohl III, H. W., & Dietz, W. H. (2008). Physical education and academic achievement in elementary school: Data from the early childhood longitudinal study. *American Journal of Public Health, 98*(4), 721-727.

- Castelli, D. M., Hillman, C. H., Buck, S. M., & Erwin, H. E. (2007). Physical fitness and academic achievement in third and fifth grade students. *Journal of Sport & Exercise Psychology, 29*, 239-252.
- Caterino, M. C., & Polak, E. D. (1999). Effects of 2 types of activity on the performance of 2nd, 3rd, and 4th grade students on a test of concentration. *Perceptual Motor Skills, 89*, 245-248.
- Center for Disease Control and Prevention. (2010). *The association between school based physical activity, including physical education, and academic performance*. Atlanta, GA: U.S. Department of Health and Human Services.
- Center for Labor Market Studies. (2009, April). *Left behind in America: The nation's dropout crisis*. Boston: Northeastern University and Chicago Alternative Schools Network. Retrieved from [http://www.clms.neu.edu/publication/documents/CLMS\\_2009\\_Dropout.Report.pdf](http://www.clms.neu.edu/publication/documents/CLMS_2009_Dropout.Report.pdf)
- Chaddock, L., Erickson, K., Prakash, R.S., Kim, J. S., Voss, M. W., VanPatter, M., Pontifex, M. B., Raine, L. B., Konkel, A., & Hillman, C. H. (2010). A neuroimaging investigation of the association between aerobic fitness, hippocampal volume and memory performance in preadolescent children. *Brain Research 1358*(28), 172-183.
- Chomitz, V. R., Slining, M. M., McGowan, R. J., Mitchell, S. E., Dawson, G. F., & Hacker, K. A. (2009). Is there a relationship between physical fitness and academic achievement? Positive results from public school children in the northeastern United States. *Journal of School Health, 79*(1), 30-37.

- Christeson, W., Taggart, A. D., & Messner-Zidell, S. (2010). *Ready, willing, and unable to serve*. Report by Mission: Readiness. Retrieved from <http://cdn.missionreadiness.org/NATEE1109.pdf>
- Coe, D. P., Pivarnik, J. M., Womack, C. J., Reeves, M. J., & Malina, R. M. (2006). Effect of physical education and activity levels on academic achievement in children. *Medicine & Science in Sports & Exercise*, 38(8), 1515-1519.
- Cognition. (n.d.). In *Merriam-Webster's online dictionary*. Retrieved from <http://www.merriam-webster.com/dictionary/cognition>
- Cottrell, L. A., Northrup, K., & Wittberg, R. (2007). The extended relationship between child cardiovascular risks and academic performance measures. *Obesity* 15(12), 3170-3177.
- Daley, A. J., & Ryan, J. (2000). Academic performance and participation in physical activity by secondary school adolescents. *Perceptual and Motor Skills*, 91(2), 531-534.
- Darling-Hammond, L. (1996). What matters most: A competent teacher for every child. *Phi Delta Kappa*, 78(3), 193-220.
- Davis, M. M., Clark, S. J., Singer, D. C., & Butchart, A. T. (2011, April, 18). Gym gone but not forgotten: Parents want more physical activity at school for kids. *C. S. Mott Children's Hospital National Poll on Children's Health* 12(3). Retrieved from <http://www.mottnpch.org/reports-surveys/gym-gone-not-forgotten-parents-want-more-physical-activity-school-kids>

- Della Valle, J., Dunn, R., Geisert, G., Sinatra, R., & Zenhausern, R. (1986). The effects of matching and mismatching students mobility preferences on recognition and memory tasks. *Journal of Educational Research*, 79(5), 267-272.
- Dunkle, M.C., & Nash, M. A. (1991). *Beyond the health room*. Washington, DC: Council of Chief State School Officers, Resource Center on Educational Equity.
- Francis, D. J., Shaywitz, S. E., Stuebing, K. K., Shaywitz, B. A., & Fletcher, J. M. (1996). Developmental lag versus deficit models of reading disability: A longitudinal, individual growth curves analysis. *Journal of Educational Psychology*, 88(1), 3-17.
- Fredericks, C., Kokot, S., & Krog, S. (2006). Using a developmental movement programme to enhance academic skills in grade 1 learners. *South African Journal for Sport, Physical Education and Recreation*, 28(1), 29-42.
- Fiester, L., & Smith, R. (2010). *Early warning! Why reading by the end of third grade matters*. A Kids Count Special Report. Retrieved from [www.kidscount.org](http://www.kidscount.org)
- Functional illiteracy. (2012). In *Wikipedia the free encyclopedia's online dictionary*. Retrieved from [http://en.wikipedia.org/wiki/Functional\\_illiteracy#cite\\_note-0](http://en.wikipedia.org/wiki/Functional_illiteracy#cite_note-0)
- Gewertz, C. (2010, March 24). NAEP reading results deemed disappointing. *Education Week*. Retrieved from <http://www.edweek.org>
- Grabe, W. (2008). Reading in a second language: Moving from theory to practice. *Vocabulary and reading comprehension* (pp. 265-286). Cambridge England: Cambridge University Press.

Greenough, W. T., & Volkmar, F. R. (1973). Pattern of dendritic branching in occipital cortex of rats reared in complex environments. *Experimental Neurology*, 40(2), 491-504.

Hart, B., & Risley, T. R. (1995). *Meaningful differences*. Baltimore, MD: Paul H. Brookes Publishing Co.

Hearing on hearing on Title I of the Elementary and Secondary Education Act before the House Committee on Education and the Workforce: United States House of Representatives, 106<sup>th</sup> Cong. (1999, July 27) (testimony of G. Reid Lyon). Retrieved from <http://archives.republicans.edlabor.house.gov/archive/hearings/106th/fc/esea72799/lyon.htm>

Hearing on measuring success: Using assessments and accountability to raise student achievement before the House Committee on Education and the Workforce, Subcommittee on Education Reform, 107<sup>th</sup> Cong. (2001, March 8) (testimony of G. Reid Lyon). Retrieved from <http://edworkforce.house.gov/hearings/107th/edr/account3801/lyon.htm>

Hedley, A. A., Ogden, C. L., Johnson, C. L., Carroll, M. D., Curtin, L. R., & Flegal, K. M. (2004). Prevalence of overweight and obesity among US children, adolescence, and adults. *The Journal of the American Medical Association*, 291(23), 2847-2850.

Hirsch, E. D. (2003). Reading comprehension requires knowledge – of words and the world: Scientific insights into the fourth-grade slump and the nation's stagnant comprehension scores. *American Educator*, 27(1), 10-29.



- Holmes, R. M., Pellegrini, A. D., & Schmidt, S. L. (2006). The effects of different recess timing regimens on preschoolers' classroom attention. *Early Child Development and Care, 176*, 735-743.
- Jarrett, O. S., & Waite-Stupiansky, S. (2009). Recess: It's indispensable! *Young Children, 64*, 64-69.
- Johnson, K. (2010). Test review of the Gates-MacGinitie Reading Tests. From W. H. MacGinitie, R. K. MacGinitie, K. Maria, & L. G. Dreyer (Eds.), *The sixteenth mental measurements yearbook* [Electronic version]. Retrieved January 30, 2001, from the Buros Institute's *Test Reviews Online* website: <http://www.unl.edu/buros>
- Joseph, M. (2006). When a whole state fails to measure up: One grandmother's fight for phonics. In P.A. Blaunstein & G. R. Lyon (Eds.), *Why kids can't read*. Lanham, ML: Rowman & Littlefield Education.
- Jjjjnnn, C. (1988). Learning to read and write: A longitudinal study of 54 children from first through fifth grades. *Journal of Educational Psychology, 80*, 437-447.
- Laske, C., Stransky, E., Eschweiler, G. W., Klein, R., Wittorf, A., Leyhe, T., Richartz, E., Köhler, N., Bartels, M., Buchkremer, G., & Schott, K. (2007). Increased BDNF serum concentration in fibromyalgia with or without depression or antidepressants. *Journal of Psychiatric Research 41(7)*, 600-605.
- Literacy. (2012). In *Wikipedia the free encyclopedia's online dictionary*. Retrieved from <http://en.wikipedia.org/wiki/Literacy>
- Louisiana Department of Education. (2011). *School Report Cards*. Retrieved from <http://www.louisianaschools.net/reportcards/>

- Louisiana Department of Education. (2012). *School Report Cards*. Retrieved from <http://www.louisianaschools.net/reportcards/>
- Maeda, J. K., & Randall, L. M. (2003). Can academic success come from five minutes of physical activity? *Brock Education*, 13(1), 13-22.
- Mahar, M. T., Murphy, S. K., Rowe, D. A., Golden, J., Shields, A. T., & Raedeke, T. D. (2006). Effects of a classroom-based program on physical activity and on-task behavior. *Medicine and Science in Sports and Exercise*, 38(12), 2086-2094.
- Malina, R. M. (1986). Physical growth and maturation. In V. Seefeldt, & P. Vogel (Eds.), *The Value of Physical Activity* (pp. 1-2). Retrieved from <http://www.eric.ed.gov/PDFS/ED289866.pdf>
- Marx, E., Wooley, S.F., & Northrop, D. (1998). *Health is academic: A guide to coordinated school health programs*. New York, NY: Teacher's College Press.
- Mathes, P. (2012, January 5). A literate nation for 2012. [Web log post]. Retrieved from [http://www.huffingtonpost.com/patricia-g-mathes/a-literate-nation-for-201\\_b\\_1185912.html](http://www.huffingtonpost.com/patricia-g-mathes/a-literate-nation-for-201_b_1185912.html)
- Maxwell, L. A. (2008). Louisiana chief plans math, reading initiative. *Education Week*. Retrieved from <http://www.edweek.org>
- McCardle, P., & Chhabra, V. (2004). *The voice of evidence in reading research*. Baltimore, MD: Paul H. Brooks Publishing.
- McCutchen, D., Abbott, R., Green, L., Beretvas, N., Cox, S., Potter, N., Quiroga, T., & Gray, A. (2002). Beginning literacy: Links among teacher knowledge, teacher practice, and student learning. *Journal of Learning Disabilities* 35(1), 69-71.

- Ministere de l'education national, de la jeunesse et des sports. (1957). The experience of Lyon, Vanves, Tour, Montauban and classes in the snow. Paris: Imprimerie National, 1-77.
- Moats, L. C. (1999). Teaching reading is rocket science: What expert teachers of reading should know and be able to do. *American Federation of Teachers*. Retrieved from <http://www.aft.org/pubs-reports/downloads/teachers/rocketsci.pdf>
- Molloy, G. N. (1989). Chemical, exercise and hyperactivity: A short report. *International Journal of Disability, Development Education* 36(1), 57-61.
- Nagy, W. E. (1988). *Teaching vocabulary to improve reading comprehension* (Report No. ISBN-0-8141-5238-6). Washington, DC: Office of Educational Research and Improvement.
- National Assessment of Educational Progress. (2007). Retrieved from <http://nces.ed.gov/nationsreportcard/states/>
- National Assessment of Educational Progress. (2011). Retrieved from [http://nationsreportcard.gov/reading\\_2011/summary.asp](http://nationsreportcard.gov/reading_2011/summary.asp)
- National Center for Educational Statistics. (2013). The national assessment of literacy survey. Retrieved from [https://nces.ed.gov/NAAL/kf\\_demographics.asp](https://nces.ed.gov/NAAL/kf_demographics.asp)
- National Commission on Excellence in Education. (1983). *A nation at risk: The imperative for educational reform*. Retrieved from <http://reagan.procon.org/sourcefiles/a-nation-at-risk-reagan-april-1983.pdf>

- National Institute of Child Health and Human Development. (2000). *Report of the National Reading Panel. Teaching children to read: An evidenced-based assessment of the scientific research literature on reading and its implications for reading instruction*. (NIH Publication No. 00-4769). Washington, DC: U.S. Government Printing Office.
- National Reading Panel. (1997). *About the NRP - Charge*. Retrieved September 23, 2013, from <http://www.nationalreadingpanel.org/NRPAbout/Charge.htm>.
- Nevills, P., & Wolfe, P. (2009). *Building the reading brain: PreK-3*. Thousand Oaks, California: Corwin Press.
- Norlander, T., Moas, L., & Archer, T. (2005). Noise and stress in primary and secondary school children: Noise reduction and increased concentration ability through a short but regular exercise and relaxation program. *School Effectiveness and School Improvement* 16(1), 91-99.
- Oliff, H. S., Berchtold, N. C., Isackson, P., & Cotman, C. W. (1998). Exercise-induced regulation of brain-derived neurotrophic factor (BDNF) transcripts in the rat hippocampus. *Molecular Brain Research*, 61(1-2), 147-153.
- Ouellette, G. P. (2006). What's meaning got to do with it: The role of vocabulary in word reading and reading comprehension. *Journal of Educational Psychology*, 98(3), 554-566.
- Pellegrini, A. D. (1995). *School recess and playground behavior: Educational and developmental roles*. Albany, NY: State University of New York Press.
- Pellegrini, A. D., & Bohn-Gettler, C. M. (2013). The benefits of recess in primary school. *Scholarpedia*, 8(2), 30448.

- Perfetti, C. (2010). Decoding, vocabulary, and comprehension: The golden triangle of reading skill. In M. G. McKeown & L. Kucan (Eds.), *Bringing Reading Research to Life* (pp. 291-303). New York, NY: The Guilford Press.
- RAND Reading Study Group. (2002). Reading for understanding toward an R & D program in reading comprehension. Retrieved from <http://www.rand.org>
- Ratey, J. J. (1998). *Brain power and exercise: How to improve memory and learning*. ADDitudeMag.com. Retrieved from <http://www.additudemag.com/adhd/article/print/7972.html>
- Ratey, J. J., & Hagerman, E. (2008). *Spark the revolutionary new science of exercise and the brain*. New York: Little, Brown and Company.
- Riley, R. W. (2006). Preface. In P. A. Blaunstein, & G. R. Lyon (Eds.). *Why kids can't read*. Lanham, MD: Rowman & Littlefield Education.
- Riley, R. W., & Peterson, T. K. (2008, September 19). Before the either-or' era: Reviving bipartisanship to improve America's schools. *Education Week*. Retrieved from <http://www.edweek.org/ew/articles/2008/09/24/05riley.h28.html>
- Sallis, J., McKenzie, T., Kolody, B., Lewis, M., Marshall, S., & Rosengard, P. (1999). Effects of health-related physical education on academic achievement: Project SPARK. *Research Quarterly for Exercise and Sport*, 70(2), 127-134.
- Schneider, W., & Chein, J. M. (2003). Controlled and automatic processing: Behavior, theory, and biological mechanisms. *Cognitive Science*, 27(3), 525-559.
- Schools Becoming All Work and No Play. (2001). *The Journal of Physical Education, Recreation & Dance*, 72, 11.

- Sedita, J. (2005). Effective vocabulary instruction. *Insights on Learning Disabilities*, 2(1), 33-45.
- Seefeldt, V., & Vogel, P. (Eds). (1986). *The value of physical education*. Retrieved from <http://www.eric.ed.gov/PDFS/ED289866.pdf>
- Shanahan, T. (2010). Developing early literacy report. *Phonic for Kids*. Retrieved from <http://phonicsforkids.net>
- Shaywitz, S. E. (2003). *Overcoming dyslexia: A new and complete science-based program for reading problems at any level*. New York: Alfred A. Knopf.
- Shaywitz, S. E., Fletcher, J. M., Holahan, J. M., Schneider, A. E., Marchione, K. E., Stuebing, K.K., Francis, D. J., Pugh, K. R., & Shaywitz, B. A. (1999). Persistence of dyslexia: The Connecticut longitudinal study at adolescence. *Pediatrics*, 104, 1351-1359.
- Shaywitz, S. E., & Shaywitz, B. A. (2006). Armed with the facts: The science of reading and its implications for teaching. In P. Blaunstein R. Lyon (Eds.). *Why Kids Can't Read* (pp. 9-30). Lanham, MD: Rowman & Littlefield Education.
- Shephard, R. J., Volle, M., Lavallée, H., LaBarre, R., Jéquier, J. C., & Rajic, M. (1984). Required physical activity and academic grades: a controlled longitudinal study. In J. Ilmarinen & I. Valimaki (Eds) *Children and Sport* (pp. 58-63). Berlin: Springer Verlag.
- Singh, A., Uijtdewilligen, L., Twisk, J., van Mechelen, W., & Chinapaw, M. (2012). Physical activity and performance at school: A systematic review of the literature including a methodological quality assessment. *Archives of Pediatrics & Adolescent Medicine*, 166(1), 49-55.

- Slavin, R. E. (1994). *Preventing early school failure: Research, policy, and practice*. Needham Heights, MA: Allyn & Bacon.
- Snow, C.E., Burns, M.S., & Griffin, P. (Eds.). (1998). *Preventing reading difficulties in young children*. Washington, DC: National Academy Press.
- Stahl, S. A. (2003). How words are learned incrementally over multiple exposures. *American Educator*, 27(1), 18-19.
- Strong, W. B., Mauna, R. M., Blimkie, C. J., Daniels, S. R., Dishman, R. K., Gutin, B., Hergenroeder, A. C., Must, A., Nixon, P. A., Pivarnik, J. M., Rowland, T., Trost, S., & Trudeau, F. (2005). Evidence based physical activity for school-age youth. *Journal of Pediatrics*, 146(6), 732-737.
- Symons, C., Cinelli, B., James, T., & Groff, P. (1997). Bridging student health risks and academic achievement through comprehensive school health programs. *Journal of School Health*, 67(6), 220-227.
- Taras, H. (2005). Physical activity and student performance at school. *Journal of School Health*, 75(6), 214-218.
- Texas Reading Initiative. (2002). *Promoting vocabulary development: Components of effective vocabulary instruction* (Revised edition). Austin, TX: Texas Education Agency.
- The Children's Reading Foundation. (2012, February 25). *Research*. Retrieved from [http://www.readingfoundation.org/reading\\_research.jsp](http://www.readingfoundation.org/reading_research.jsp)
- Toporek, B. (2011, November 21). Students' fitness linked to higher tests scores. *Education Week*. Retrieved from <http://blogs.edweek.org/>

- Torgesen, J. K. (2004). Preventing early reading failure. *American Educator*. Retrieved from [http://www.aft.org/pubs-reports/american\\_educator/issues/fall04/reading.htm](http://www.aft.org/pubs-reports/american_educator/issues/fall04/reading.htm)
- Torgesen, J. K., & Burgess, S. R. (1998). Consistency of reading-related phonological processes throughout early childhood: Evidence from longitudinal-correlational and instructional studies. In J. Metsala & L. Ehri (Eds.). *Word Recognition in Beginning Literacy* (pp. 148-172). Mahwah, NJ: Lawrence Erlbaum Associates, Publishers.
- Tremarche, P. V., Robinson, E. M., & Graham, L. B. (2007). Physical education and its effect on elementary testing results. *The Physical Educator*, 64(2), 58-64.
- Tremblay, M. S., Inman, J. W., & Willms, J. D. (2000). The relationship between physical activity, self-esteem, and academic achievement in 12-year-old children. *Pediatric Exercise Science*, 12, 312-323.
- Uhrich, T. A., & Swalm, R. L. (2007). A pilot study of a possible effect from a motor task on reading performance. *Perceptual and Motor Skills*, 104(3), 1035-1041.
- University of California-Los Angeles Center for Health Policy Research. (2011, May 31). *More than one-third of California teens do not participate in school physical education*. Retrieved from <http://www.healthpolicy.ucla.edu/NewsReleaseDetails.aspx?id=84>
- University of Missouri-Columbia (2010, May 19). Active and healthy schools get kids moving, *ScienceDaily*. Retrieved from <http://www.sciencedaily.com/releases/2010/05/100519143411.html>



- U.S. Department of Education. (1999). *Start early, finish strong: How to help every child become a reader*. Retrieved from [www2.ed.gov/pubs](http://www2.ed.gov/pubs)
- U.S. Department of Health and Human Services. (2010). *The association between school-based physical activity, including physical education, and academic performance*. Retrieved from [www.Cdc.gov/HealthyYouth](http://www.Cdc.gov/HealthyYouth)
- Vail, K. (2006). Is physical fitness raising grades? *American School Board Journal*, 193, 30-33.
- Van Dusen, A. (2008). Eight reasons why you can't pay attention. *Forbes*. Retrieved from: [http://www.forbes.com/2008/10/15/short-attention-span-forbeslife-cx\\_avd\\_1015health\\_slide\\_7.html?thisSpeed=15000](http://www.forbes.com/2008/10/15/short-attention-span-forbeslife-cx_avd_1015health_slide_7.html?thisSpeed=15000)
- Wiley-Blackwell (2009, January 23). School-based physical activity has benefits even if it doesn't help lose weight. *ScienceDaily*. Retrieved from <http://www.sciencedaily.com/releases/2009/01/0901204919.htm>
- Williams, H. G. (1986). Physical activity and the prevention of premature aging. In V. Seefeldt, & P. Vogel (Eds.), *The Value of Physical Activity* (pp. 1-2). Retrieved from <http://www.eric.ed.gov/PDFS/ED289866.pdf>
- Willis, J. (2008). *Teaching the brain to read: Strategies for improving fluency, vocabulary, and comprehension*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Zygmunt-Fillwalk, E., & Bilello, T. (2005). Parent's victory in reclaiming recess for their children. *Childhood Education*, 82, 19-23.

## **APPENDIX A**

### **Letter to Teachers**

June 25, 2012

Dear Teacher,

As a doctoral student, I am currently working on my dissertation which will investigate the effects of physical activity prior to reading instruction in fourth-grade classrooms. The study is focused on a comparison between classrooms that are receiving physical activity and those which are not receiving physical activity. It is my intent to use the data for research purposes only. The name of the school district, elementary school, and participants will not be identified in my dissertation.

The study will be conducted for 12 weeks in the fall of 2012 (September–December). The 15-minutes of physical activity will be presented each school day by a retired, certified teacher prior to reading instruction. Students must have a signed permission form from their parent or guardian in order to participate in the study. If you agree to grant me permission to conduct this study, please sign the statement below and return this letter to me.

Again, I assure you of the highest level of confidence. If you have any questions or need further information, you may contact me through e-mail or phone. You may also contact my major professor, Dr. Pauline Leonard at 318-257-4609. I look forward to working with you in the fall semester.

Sincerely,

Donna Bush  
Doctoral Candidate, Louisiana Tech University

---

I grant Donna Bush permission to conduct the study she has described in this letter.

---

Teacher's signature

---

Date

**APPENDIX B**

**Letter to Principal**

June 25, 2012

Dear Principal,

As a doctoral student, I am currently working on my dissertation which will investigate the effects of physical activity prior to reading instruction in fourth-grade classrooms. The study is focused on a comparison between classrooms that are receiving physical activity and those which are not receiving physical activity. It is my intent to use the data for research purposes only. The name of the school district, elementary school, and participants will not be identified in my dissertation.

With your permission, I am requesting access to the classrooms and participants. The study will be conducted for 12 weeks in the fall of 2012 (September–December). The 15-minutes of physical activity will be presented each school day by a retired, certified teacher. Students must have a signed permission form from their parent or guardian in order to participate in the study. If you agree to grant me permission to conduct this study, please sign the statement below and return this letter to me.

Again, I assure you of the highest level of confidence. If you have any questions or need further information, you may contact me through e-mail or phone. You may also contact my major professor, Dr. Pauline Leonard at 318-257-4609. I look forward to hearing from you soon and thank you for considering my request.

Sincerely,

Donna Bush  
Doctoral Candidate, Louisiana Tech University

---

I grant Donna Bush permission to conduct the study she has described in this letter.

---

Principal's signature

---

Date

**APPENDIX C**

**Letter to Superintendent**

June 25, 2012

Dear Superintendent,

As a doctoral student, I am currently working on my dissertation which will investigate the effects of physical activity prior to reading instruction in fourth-grade classrooms. The study is focused on a comparison between classrooms that are receiving physical activity and those which are not receiving physical activity. It is my intent to use the data for research purposes only. The name of the school district, elementary school, and participants will not be identified in my dissertation.

With your permission, I am requesting access to one elementary school. The study will be conducted for 12 weeks in the fall of 2012 (September–December). The 15-minutes of physical activity will be presented each school day by a retired, certified teacher. Students must have a signed permission form from their parent or guardian in order to participate in the study. If you agree to grant me permission to conduct this study, please sign the statement below and return this letter in the enclosed self-addressed, stamped envelope.

Again, I assure you of the highest level of confidence. If you have any questions or need further information, you may contact me through e-mail or phone. You may also contact my major professor, Dr. Pauline Leonard at 318-257-4609. I look forward to hearing from you soon and thank you for considering my request.

Sincerely,

Donna Bush  
Doctoral Candidate, Louisiana Tech University

---

I grant Donna Bush permission to conduct the study she has described in this letter.

---

Superintendent's signature

---

Date

**APPENDIX D**

**Letter from Superintendent**



POST OFFICE BOX • STREET • LOUISIANA  
AREA CODE 318 • TELEPHONE • FAX

# SCHOOL BOARD

Superintendent

July 24, 2012

Donna Bush

LA

Dear Ms. Bush:

I commend you on your efforts to pursue an advanced degree. Your request focusing on a comparison between classrooms that are receiving physical activity and those which are not receiving physical activity to be conducted at Elementary School (in the fall of 2012 -September- December), has been approved. Your project will be coordinated through the office of Director of Assessment and School Support, via e-mail at @ .

Thank you.

Sincerely,

Superintendent

c: Director  
Area Director  
Principal

## **APPENDIX E**

### **Request Permission to Use Gates-MacGinitie**

#### **Reading Tests**

Donna Bush

                    , LA  
318-            hm  
318-            cell  
donna.bush99@t

July 27, 2012

Dear Riverside Publishing,

I am a doctoral student at Louisiana Tech University. Currently, I am preparing to conduct a study in the fall with fourth-grade students at using the Gates-MacGinitie Reading Tests, Fourth Edition, Level 4. I am requesting permission to use the test results in research and publications.

The title of my study is *The Effect of Physical Activity on Fourth-Grade Students' Reading Achievement in One Elementary School*. It is a quantitative quasi-experimental design which will be conducted September to December, 2012 for 12 weeks. The study is focused on a comparison between classrooms that are receiving physical activity and those which are not receiving physical activity. The randomly chosen experimental group of fourth-grade students will receive 15-minutes of structured physical activity prior to reading class each school day. The control group will have a book read to them by the same teacher who is providing the physical activity. The Gates-MacGinitie Reading Tests will be given as a pre- and post- test to all students. The mean of the posttest from the experimental and control groups will be analyzed. Student attendance will be documented daily. Additionally, the fourth grade teachers will be interviewed using open-ended questions pertaining to their opinions about physical activity prior to reading instruction.

Thank you for considering my request. If you have any questions or need further information, you may contact me through e-mail or phone. You may also contact my major professor, Dr. Pauline Leonard at 318-257-4609. I look forward to hearing from you soon.

Sincerely,



Donna Bush  
Doctoral Candidate, Louisiana Tech University

**APPENDIX F**

**Riverside Publishing Approval Letter**

## RIVERSIDE

 HOUGHTON MIFFLIN HARCOURT

September 24, 2012

#G1220072195

Donna Bush  
 Doctoral Candidate  
 Louisiana Tech University  
 PO Box 3161  
 Ruston, LA 71272-0001

Dear Ms. Bush:

Thank you for your interest in the *Gates-MacGinitie Reading Tests® (GMRT®)*, Fourth Edition. This letter is in response to your recent request for use of the materials described below in your research project, *The Effect of Physical Activity on Fourth-Grade Students' Reading Achievement in One Elementary School*, which you anticipate will be conducted by December 2012.

Riverside Publishing will be happy to offer a 40% research discount for the following:

Qty.	Description
1	940336 - GMRT4 Forms S&T Self-Scorable Answer Sheet Level 4 Package of 250
1	940447 - GMRT4 Manual for Scoring & Interpretation Levels 4, 5, & 6 Form S
1	940296 - GMRT4 Booklet Scoring Key Level 4 Form S
1	940429 - GMRT4 Class & Group Summary Record Forms Levels 3-10/12, Form S Package of 25

Attach a copy of this letter to your order, along with a fully completed current test purchaser qualification form from the Riverside Publishing catalog, and mail or fax to:

Riverside Publishing,  
 Attn: Customer Service Department  
 3800 Golf Road, Suite 200  
 Rolling Meadows, IL 60008-4015  
 Fax: 630.467.7192

The permission granted to use the material in your research is non-exclusive and is not transferable to other persons or institutions. Credit for use of the material will be given as follows:

"Copyright © 2000 by the Riverside Publishing Company. *Gates-MacGinitie Reading Tests® (GMRT®)*, Fourth Edition reproduced with permission of the publisher. All rights reserved."

It is requested, that upon completion, two (2) copies of your research results shall be forwarded to my attention at Riverside Publishing.

If you have any questions, please contact Customer Service at 800.323.9540.

Sincerely,



Janet A. Wiedemann  
 Manager, Contracts & Permissions

sm

**APPENDIX G**

**Human Use Consent Form Committee**

Do you plan to publish this study? <input type="checkbox"/> NO	X YES
Will this study be published by a national organization? X NO	<input type="checkbox"/> YES
Are copyrighted materials involved? <input type="checkbox"/> NO	X YES
Do you have written permission to use copyrighted materials? <input type="checkbox"/> NO	X YES
<b>COMMENTS:</b>	

### STUDY/PROJECT INFORMATION FOR HUMAN SUBJECTS COMMITTEE

Describe your study/project in detail for the Human Subjects Committee. Please include the following information.

**TITLE:** The Effect of Physical Activity on Fourth-Grade Students' Reading Achievement in One Elementary School

**PROJECT DIRECTOR(S):** Donna Bush

**EMAIL:** donna.bush99@[REDACTED]

**PHONE:** 318-[REDACTED] or 318-[REDACTED]

**DEPARTMENT(S):** College of Education: Curriculum, Instruction, and Leadership

**PURPOSE OF STUDY/PROJECT:** To investigate the effect of 15-minutes of aerobic type physical activity prior to the beginning of fourth-grade students' reading class.

**SUBJECTS:** Fourth-grade students from one elementary school in Northwest Louisiana.

**PROCEDURE:** The fourth-grade classes randomly chosen for the experimental group will participate in 15-minutes of physical activity prior to reading class each school day for 12 weeks. A trained teacher will provide the aerobic activity to each of the classes in the experimental group. The same teacher, providing physical activity for the experimental group, will only read a book to each fourth-grade class in the control group. The Gates-MacGinitie Reading Tests Level 4 will be given as a pre- and post- test to measure students' reading achievement.

**INSTRUMENTS AND MEASURES TO INSURE PROTECTION OF CONFIDENTIALITY, ANONYMITY:** The Gates-MacGinitie Reading Tests Level 4 will be given to each fourth-grade participant. Each student will be assigned a number to place on the pre- and post- test answer sheets. All collected data will be confidential and only used by the researcher for this study.

**RISKS/ALTERNATIVE TREATMENTS:** The participant understands that Louisiana Tech is not able to offer financial compensation nor to absorb the costs

of medical treatment should you be injured as a result of participating in this research.

**BENEFITS/COMPENSATION:** None

**SAFEGUARDS OF PHYSICAL AND EMOTIONAL WELL-BEING:** The physical activity teacher is a retired teacher who has 34 years of successful teaching to ensure students are safe and respected.

**Note: Use the Human Subjects Consent form to briefly summarize information about the study/project to participants and obtain their permission to participate.**



**APPENDIX H**

**Human Use Consent Form Parents/Guardians**

## HUMAN SUBJECTS CONSENT FORM (Parents/Guardians)

**The following is a brief summary of the project in which you are asked to participate. Please read this information before signing the statement below.**

**TITLE OF PROJECT:** The Effect of Physical Activity on Fourth-Grade Students' Reading Achievement in One Elementary School

**PURPOSE OF STUDY/PROJECT:** To investigate the effect of 15-minutes of physical activity prior to the beginning of reading class.

**PROCEDURE:** The fourth-grade classes randomly chosen for the experimental group will participate in 15-minutes of physical activity prior to reading class each school day for 12 weeks. A trained teacher will provide the aerobic activity to each class. The same teacher, providing physical activity for the experimental group, will only read a book to the randomly chosen classes in the control group. Each fourth-grade student will take the Gates-MacGinitie Reading Test before the study begins and again at the end of the study.

**INSTRUMENTS:** The Gates-MacGinitie Reading Tests Fourth Edition Level 4

**RISKS/ALTERNATIVE TREATMENTS:** The participant understands that Louisiana Tech is not able to offer financial compensation nor to absorb the costs of medical treatment should your child be injured as a result of participating in this research.

**EXTRA CREDIT:** If extra credit is offered to students participating in research, an alternative extra credit that requires a similar investment of time and energy will also be offered to those students who do not choose to volunteer as research subjects.

**BENEFITS/COMPENSATION:** None

I, \_\_\_\_\_, attest with my signature that I have read and  
Please Print Parent's Name

understood the following description of the study, "The Effect of Physical Activity on Fourth-Grade Students' Reading Achievement in One Elementary School", and its purposes and methods. I understand that my child's participation in this research is strictly voluntary and my participation or refusal to participate in this study will not affect my relationship with Louisiana Tech University or my grades in any way. Further, I understand that my child may withdraw at any time or refuse to answer any questions without penalty. Upon completion of the study, I understand that the results will be freely available to me upon request. I understand that the results of my child's test will be confidential, accessible only to the principal investigators, myself, or a legally appointed representative. I have not been requested to waive nor do I waive any of my rights related to participating in this study.

---

**Signature of Participant or Guardian**

---

**Date**

**CONTACT INFORMATION:** The principal experimenters listed below may be reached to answer questions about the research, subjects' rights, or related matters.

**Donna Bush**

318- [REDACTED]

dlbush@[REDACTED]

**Members of the Human Use Committee of Louisiana Tech University may also be contacted if a problem cannot be discussed with the experimenters:**

**Dr. Les Guice (257-3056)**

**Dr. Mary M. Livingston (257-2292 or 257-4315)**

## **APPENDIX I**

### **Human Use Consent Form Students**

## HUMAN SUBJECTS CONSENT FORM (Students)

**The following is a brief summary of the project in which you are asked to participate. Please read this information before signing the statement below.**

**TITLE OF PROJECT:** The Effect of Physical Activity on Fourth-Grade Students' Reading Achievement in One Elementary School

**PURPOSE OF STUDY/PROJECT:** To investigate the effect of 15-minutes of physical activity prior to the beginning of reading class.

**PROCEDURE:** One-half of the fourth-grade classes will participate in 15-minutes of physical activity prior to reading class each school day for 12 weeks. A trained teacher will provide the aerobic activity to each of those classes. The same teacher providing physical activity will only read a book to the other half of the fourth grade classes. Each student in fourth-grade will take the Gates-MacGinitie Reading Test before the study begins and again at the end of the study.

**INSTRUMENTS:** The Gates-MacGinitie Reading Tests Fourth Edition Level 4

**RISKS/ALTERNATIVE TREATMENTS:** The participant understands that Louisiana Tech is not able to offer financial compensation nor to absorb the costs of medical treatment should your child be injured as a result of participating in this research.

**EXTRA CREDIT:** If extra credit is offered to students participating in research, an alternative extra credit that requires a similar investment of time and energy will also be offered to those students who do not choose to volunteer as research subjects.

**BENEFITS/COMPENSATION:** None

I, \_\_\_\_\_, attest with my signature that I have

Please Print Child's Name

read and understood the following description of the study, "The Effect of Physical Activity on Fourth-Grade Students' Reading Achievement in One Elementary School", and its purposes and methods. I understand that my participation in this research is strictly voluntary and my participation or refusal to participate in this study will not affect my relationship with Louisiana Tech University or my grades in any way. Further, I understand that I may withdraw at any time or refuse to answer any questions without penalty. Upon completion of the study, I understand that the results will be freely available to me upon request. I understand that the results of the test will be confidential, accessible only to the principal investigators, myself, or a legally appointed representative. I have not been requested to waive nor do I waive any of my rights related to participating in this study.

\_\_\_\_\_  
Signature of Student

\_\_\_\_\_  
Date

**CONTACT INFORMATION:** The principal experimenters listed below may be reached to answer questions about the research, subjects' rights, or related matters.

**Donna Bush**

318- [REDACTED]

dlbush@[REDACTED]

**Members of the Human Use Committee of Louisiana Tech University may also be contacted if a problem cannot be discussed with the experimenters:**

**Dr. Les Guice (257-3056)**

**Dr. Mary M. Livingston (257-2292 or 257-4315)**

## **APPENDIX J**

### **Human Use Consent Form Teachers**

## HUMAN SUBJECTS CONSENT FORM (Teachers)

**The following is a brief summary of the project in which you are asked to participate. Please read this information before signing the statement below.**

**TITLE OF PROJECT:** The Effect of Physical Activity on Fourth-Grade Students' Reading Achievement in One Elementary School

**PURPOSE OF STUDY/PROJECT:** To investigate the effect of 15-minutes of physical activity prior to the beginning of reading class.

**PROCEDURE:** The fourth-grade classes randomly chosen for the experimental group will participate in 15-minutes of physical activity prior to reading class each school day for 12 weeks. A trained teacher will provide the aerobic activity to each class. The same teacher, providing the physical activity for the experimental group, will only read a story to the classes in the control group. Each student in fourth-grade will complete the Gates-MacGinitie Reading Tests prior to the study beginning and again at the end of the study.

**INSTRUMENTS:** The Gates-MacGinitie Reading Tests Fourth Edition Level 4

**RISKS/ALTERNATIVE TREATMENTS:** The participant understands that Louisiana Tech is not able to offer financial compensation nor to absorb the costs of medical treatment should you be injured as a result of participating in this research.

**EXTRA CREDIT:** If extra credit is offered to students participating in research, an alternative extra credit that requires a similar investment of time and energy will also be offered to those students who do not choose to volunteer as research subjects.

**BENEFITS/COMPENSATION:** None

I, \_\_\_\_\_, attest with my signature that I have read and understood the following description of the study, "The Effect of Physical Activity on Fourth-Grade Students' Reading Achievement in One Elementary School", and its purposes and methods. I understand that my participation in this research is strictly voluntary and my participation or refusal to participate in this study will not affect my relationship with Louisiana Tech University or my grades in any way. Further, I understand that I may withdraw at any time or refuse to answer any questions without penalty. Upon completion of the study, I understand that the results will be freely available to me upon request. I understand that the results of my survey will be confidential, accessible only to the principal investigators, myself, or a legally appointed representative. I have not been requested to waive nor do I waive any of my rights related to participating in this study.



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**Signature of Teacher**

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**Date**

**CONTACT INFORMATION:** The principal experimenters listed below may be reached to answer questions about the research, subjects' rights, or related matters.

**Donna Bush**

318- [REDACTED] or 318- [REDACTED]  
dlbush@[REDACTED]

**Members of the Human Use Committee of Louisiana Tech University may also be contacted if a problem cannot be discussed with the experimenters:**

**Dr. Les Guice (257-3056)**

**Dr. Mary M. Livingston (257-2292 or 257-4315)**

**APPENDIX K**

**Human Use Consent Form Principal**

## HUMAN SUBJECTS CONSENT FORM (Principal)

**The following is a brief summary of the project in which you are asked to participate. Please read this information before signing the statement below.**

**TITLE OF PROJECT:** The Effect of Physical Activity on Fourth-Grade Students' Reading Achievement in One Elementary School

**PURPOSE OF STUDY/PROJECT:** To investigate the effect of 15-minutes of physical activity prior to the beginning of reading class.

**PROCEDURE:** The fourth-grade classes randomly chosen for the experimental group will participate in 15-minutes of physical activity prior to reading class each school day for 12 weeks. A trained certified teacher will provide the aerobic activity to each class in the experimental group. The same trained teacher will only read a book each day to the classes in the control group. Data will be collected from students' attendance and the pre- and post- tests.

**INSTRUMENTS:** The Gates-MacGinitie Reading Tests Fourth Edition Level 4

**RISKS/ALTERNATIVE TREATMENTS:** The participant understands that Louisiana Tech is not able to offer financial compensation nor to absorb the costs of medical treatment should you be injured as a result of participating in this research.

The following disclosure applies to all participants using online survey tools: This server may collect information and your IP address indirectly and automatically via "cookies".

**EXTRA CREDIT:** If extra credit is offered to students participating in research, an alternative extra credit that requires a similar investment of time and energy will also be offered to those students who do not choose to volunteer as research subjects.

**BENEFITS/COMPENSATION:** None

I, \_\_\_\_\_, attest with my signature that I have read and understood the following description of the study, "The Effect of Physical Activity on Fourth-Grade Students' Reading Achievement in One Elementary School", and its purposes and methods. I understand that my participation in this research is strictly voluntary and my participation or refusal to participate in this study will not affect my relationship with Louisiana Tech University or my grades in any way. Further, I understand that I may withdraw at any time or refuse to answer any questions without penalty. Upon completion of the study, I understand that the results will be

freely available to me upon request. I understand that the results of my survey will be confidential, accessible only to the principal investigators, myself, or a legally appointed representative. I have not been requested to waive nor do I waive any of my rights related to participating in this study.

\_\_\_\_\_  
Signature of Principal

\_\_\_\_\_  
Date

**CONTACT INFORMATION:** The principal experimenters listed below may be reached to answer questions about the research, subjects' rights, or related matters.

**Donna Bush**

318-██████████ or 318-██████████  
dlbush@██████████

**Members of the Human Use Committee of Louisiana Tech University may also be contacted if a problem cannot be discussed with the experimenters:**

**Dr. Les Guice (257-3056)**

**Dr. Mary M. Livingston (257-2292 or 257-4315)**

**APPENDIX L**

**Human Use Consent Form Superintendent**

## HUMAN SUBJECTS CONSENT FORM (Superintendent)

**The following is a brief summary of the project in which you are asked to participate. Please read this information before signing the statement below.**

**TITLE OF PROJECT:** The Effect of Physical Activity on Fourth-Grade Students' Reading Achievement in One Elementary School

**PURPOSE OF STUDY/PROJECT:** To investigate the effect of 15-minutes of physical activity prior to the beginning of reading class.

**PROCEDURE:** The fourth-grade classes at [REDACTED] Elementary randomly chosen for the experimental group will participate in 15-minutes of physical activity prior to reading class each school day for 12 weeks. A certified trained teacher will provide the aerobic activity to the experimental group. The same trained teacher, providing the physical activity, will only read a book each day to the fourth-grade classes in the control group. Data will be collected from students' attendance and the pre- and post- tests.

**INSTRUMENTS:** The Gates-MacGinitie Reading Tests Fourth Edition Level 4

**RISKS/ALTERNATIVE TREATMENTS:** The participant understands that Louisiana Tech is not able to offer financial compensation nor to absorb the costs of medical treatment should you be injured as a result of participating in this research.

The following disclosure applies to all participants using online survey tools: This server may collect information and your IP address indirectly and automatically via "cookies".

**EXTRA CREDIT:** If extra credit is offered to students participating in research, an alternative extra credit that requires a similar investment of time and energy will also be offered to those students who do not choose to volunteer as research subjects.

**BENEFITS/COMPENSATION:** None

I, \_\_\_\_\_, attest with my signature that I have read and understood the following description of the study, "The Effect of Physical Activity on Fourth-Grade Students' Reading Achievement in One Elementary School", and its purposes and methods. I understand that my participation in this research is strictly voluntary and my participation or refusal to participate in this study will not affect my relationship with Louisiana Tech University or my grades in any way. Further, I understand that I may withdraw at any time or refuse to answer

any questions without penalty. Upon completion of the study, I understand that the results will be freely available to me upon request. I understand that the results of my survey will be confidential, accessible only to the principal investigators, myself, or a legally appointed representative. I have not been requested to waive nor do I waive any of my rights related to participating in this study.

---

Signature of Superintendent

---

Date

**CONTACT INFORMATION:** The principal experimenters listed below may be reached to answer questions about the research, subjects' rights, or related matters.

**Donna Bush**

318-██████████ or 318-██████████  
dlbush@██████████

Members of the Human Use Committee of Louisiana Tech University may also be contacted if a problem cannot be discussed with the experimenters:

Dr. Les Guice (257-3056)

Dr. Mary M. Livingston (257-2292 or 257-4315)

**APPENDIX M**

**Human Use Committee Approval Letter**





LOUISIANA TECH  
UNIVERSITY

OFFICE OF UNIVERSITY RESEARCH

MEMORANDUM

TO: Ms. Donna Bush and Dr. Pauline Leonard  
 FROM: Barbara Talbot, University Research  
 SUBJECT: HUMAN USE COMMITTEE REVIEW  
 DATE: October 9, 2012

In order to facilitate your project, an EXPEDITED REVIEW has been done for your proposed study entitled:

**“The Effect of Physical Activity on Fourth-Grade Students’  
 Reading Achievement in One Elementary School”**

**HUC 1008**

The proposed study’s revised procedures were found to provide reasonable and adequate safeguards against possible risks involving human subjects. The information to be collected may be personal in nature or implication. Therefore, diligent care needs to be taken to protect the privacy of the participants and to assure that the data are kept confidential. Informed consent is a critical part of the research process. The subjects must be informed that their participation is voluntary. It is important that consent materials be presented in a language understandable to every participant. If you have participants in your study whose first language is not English, be sure that informed consent materials are adequately explained or translated. Since your reviewed project appears to do no damage to the participants, the Human Use Committee grants approval of the involvement of human subjects as outlined.

Projects should be renewed annually. *This approval was finalized on October 9, 2012 and this project will need to receive a continuation review by the IRB if the project, including data analysis, continues beyond October 9, 2013.* Any discrepancies in procedure or changes that have been made including approved changes should be noted in the review application. Projects involving NIH funds require annual education training to be documented. For more information regarding this, contact the Office of University Research.

You are requested to maintain written records of your procedures, data collected, and subjects involved. These records will need to be available upon request during the conduct of the study and retained by the university for three years after the conclusion of the study. If changes occur in recruiting of subjects, informed consent process or in your research protocol, or if unanticipated problems should arise it is the Researchers responsibility to notify the Office of Research or IRB in writing. The project should be discontinued until modifications can be reviewed and approved.

If you have any questions, please contact Dr. Mary Livingston at 257-4315.

A MEMBER OF THE UNIVERSITY OF LOUISIANA SYSTEM

P.O. BOX 3092 • RUSTON, LA 71272 • TELEPHONE (318) 257-5075 • FAX (318) 257-9079  
 AN EQUAL OPPORTUNITY UNIVERSITY

## **APPENDIX N**

### **Cover Letter for Human Use Forms**

██████████ Elementary School  
██████████, Louisiana

October 16, 2012

Dear Parents,

I am Donna Bush, Discoveries Teacher at ██████████ Elementary School. Also, I am a doctoral candidate at Louisiana Tech University. Part of the doctoral program at Louisiana Tech is to conduct research in order to complete the Doctor of Education degree.

The purpose of my study is to investigate the effect of 15-minutes of physical activity prior to the beginning of reading class on fourth-grade students' comprehension. The students will take the Gates-MacGinitie Reading Tests at the beginning and again at the end of the study. Students in three of fourth-grade rooms will have 15 minutes of exercise before reading class begins for 12 weeks. The other classes will have a book read to them. Participation in the study is voluntary. I am asking that you and your child please consider signing the attached form, so that your child may be included in the study.

Thank you for your help and support,

Donna Bush  
Doctoral Candidate  
Louisiana Tech University

**APPENDIX O**

**Schedule Approval from Principal**

Approved \_\_\_\_\_  
 Date 10/24/12

**Donna Bush**  
**Doctoral Research**  
**Fall 2012**

**Proposed physical activity with 4<sup>th</sup> grade students**

Monday through Friday (each day school is open – excluding holidays or any unforeseen weather or issues that school is closed by superintendent)

Purpose is to move the body so that students become more alert and ready to be attentive to learn.

Exercise can include traditional exercise but not limited to exercise such as jumping jacks, touching toes, running in place, etc.

Physical movement will include teaching aerobic-style steps /movements.

Physical activity should be fun and engaging.

15 minutes in each of 3 classrooms

Warm-up 2-3 minutes

Activity 8-10 minutes

Cool-down 2-3 minutes

Schedule of rooms will come as soon as I get approval. Start as soon as morning announcements are finished.

8:20-8:35 Teacher A G-1

8:40-8:55 Teacher B G-19

9:00-9:15 Teacher C G-18

Read a book to the two control groups – can be chapter book that is continued daily.

9:20-9:25 Teacher D G-3

9:30-9:35 Teacher E G-20

**APPENDIX P**

**Schedule for Retired Teacher**

**Doctoral Research  
Fall 2012**

**Proposed physical activity with 4<sup>th</sup> grade students**

Monday through Friday (each day school is open – excluding holidays or any unforeseen weather or issues that school is closed by superintendent)

Purpose is to move the body so that students become more alert and ready to be attentive to learn.

Exercise can include traditional exercise but not limited to exercise such as jumping jacks, touching toes, running in place, etc.

Physical movement will include teaching aerobic-style steps /movements.

Physical activity should be fun and engaging.

15 minutes in each of 3 classrooms

Warm-up	2-3 minutes
Activity	8-10 minutes
Cool-down	2-3 minutes

Schedule of rooms will come as soon as I get approval. Start as soon as morning announcements are finished.

8:20-8:35	Teacher A	G-1
8:40-8:55	Teacher B	G-19
9:00-9:15	Teacher C	G-18

Read a book to the two control groups – can be chapter book that is continued daily.

9:20-9:25	Teacher D	G-3
9:30-9:35	Teacher E	G-20

## **APPENDIX Q**

### **Fidelity Measure Checklist**



Checklist of Fidelity  
for  
Experimental Group

	Monday	Tuesday	Wednesday	Thursday	Friday
<b>Time</b>					
<b>Steps:</b>					
<b>Warm up</b> (stretching, bending)					
Slowly walking in place					
Faster walking in place – include arms					
Step out bending knee (5 each)					
Moderate walking in place					
High step kicking leg forward (8 each)					
Twirl arms out stretched (10 each)					
Bending at waist –forward, right, back, left					
Running in place					
Slow down to walking					
<b>Cool down</b> (stretching, bending)					

**VITA**

**Donna L. Bush**

**Donna L. Bush****Home Address**

1051 Barron Road  
 Keithville, LA 71047  
 (318) 925-4537 home  
 (318) 286-7849 cell  
 Email: donna.bush99@yahoo.com

**Work Address**

Southern Hills Elementary School  
 9075 Kingston Road  
 Shreveport, LA 71108  
 (318) 686-1974  
 Email: dlbush@caddo.k12.la.us

***Academic Preparation:***

Ed.D.	Louisiana Tech University	2014	Curriculum & Instruction Concentration: Reading
Ed.S.	Northwestern State University	2004	Educational Leadership and Instruction Concentration: Educational Technology
M.S.	Louisiana Tech University	1995	Curriculum and Instruction
B.S.	University of Southern Mississippi	1985	Elementary Education

**Professional Experience: Higher Education**

2003 – 2004	Northwestern State University – Natchitoches, LA PASS-PORT Coordinator
2002 – 2003	Louisiana State University – Shreveport, LA Teacher In Residence
2003 – Summer	Louisiana State University – Shreveport, LA Adjunct Faculty

**Professional Experiences: Public Education**

2011 – Present	Caddo Parish Schools – Shreveport, LA Southern Hills Elementary – Discoveries Teacher
2004 – 2011	Caddo Parish Schools – Shreveport, LA Caddo Heights Elementary – Literacy Coach

2001 – 2002	Caddo Parish Schools – Shreveport, LA Northside Elementary - Direct Instruction Facilitator
1988 – 2001	Caddo Parish Schools – Shreveport, LA Northside Elementary – Teacher
1986 – 1988	Concordia Parish Schools – Vidalia, LA Ferriday Upper Elementary –Reading Teacher

***Professional and Academic Association Memberships:***

Association of Doctoral Students  
Phi Delta Kappa  
Pi Lambda Theta  
International Reading Association

***Grants:***

- Bush, D. (2011). Phonics Boost! Kinsey Interest, Inc. Grant submitted to support phonics in second and third grade. (\$2500.00). Funded project.
- Bush, D. (2008). ClickNRead. KTBS One Class At A Time. Grant submitted for phonics support of first through third grade students (1000.00). Funded project.
- Ray, R., Manges, C., Bush, D., Kendrick, T., & Wilson, C. (2002). LSUS/ Region VII Teacher Leader Institute. Grant submitted for the development of teachers as leaders within their schools (\$25,000.00). Funded project.
- Bush, D. (2000). 1+1 = Successful Readers. LEARN Grant submitted for development of reading skills for third grade students (\$999.08). Funded project.

***Conferences:***

***National/State/Regional:***

- Bush, D. (October, 2008). Oral language: A critical need. Louisiana Reading Association Conference, Shreveport, LA.
- Manges, C., Knight, D., Ray, R., Bush, D. (February, 2003). Inclusion: How Has It Worked? Three Perspectives. Council for Exceptional Children Super Conference, Baton Rouge, LA.

- Bush, D., Mainiero, M., & Williams, D. (October, 2003). Blackboard: A Three Tiered Approach. Blackboard Southeast Users Group Conference, Winter Park, FL.
- Bush, D., Gillan, R., Fuller, F., McBride, R., McFerrin, K. (April, 2004). PASS-PORT: Professional Accountability Support System. Northwestern State University Research Day, Natchitoches, LA.
- Bush, D. (April, 2004). PASS-PORT: Field Experiences. PASS-PORT Assessment Coordinators Institute. Northwestern State University, Natchitoches, LA.
- Dent, C., Cook, D., Bush, D. (October, 2006). Catch the Wave of Explicit Instruction. Southeast IRA Regional Conference, Mobile, Alabama. (Not Accepted)

***Committee/Service:***

- Reading First District Leadership Team (2004-2006)
- PASS-PORT Assessment Coordinators Institute Panel member (2004)
- LSUS College of Education NCATE Technical Support (2002-2003)
- LSUS NCATE Standard 3: Field Experiences and Clinical Practice Committee  
(2002-2003)
- Professional Development School Liaison (2002-2003)
- Professional Development School Advisory Board Member (2002-2003)
- PreK-16+ Council Member (2002-2003)
- Technology Consortium for Teacher Education Member (2002-2003)
- Redesign of Non Masters Alternative Certification Program (State team) (2002)
- School Improvement Plan Chairperson (1999-2002)
- Title I School Improvement Plan Chairperson (1999-2002)
- Caddo Parish Summer School Test Writer (1999-2000)
- LSUS Alternative Certification Academy Mentor (1999)
- Louisiana Teacher Assistance and Assessment Assessor and Mentor (1999-2002)
- Direct Instruction Facilitator (2001-2002)
- 504 Coordinator (1999-2002)
- Green Oaks Teaching Magnet/Northside Coordinator (1999-2000)

Caddo Parish English Language Arts Curriculum Design and Revision Team  
(1997-1999)

Caddo Parish Social Studies and Science Curriculum Representative (1998-1999)

School Building Level Committee Member (2000-2002)

Grade Level Test Development Chairperson (1998-1999)

Inventory Specialist (1998-2002)

K-3 Reading Initiative After School Instructor (1997-1998)

Willis-Knighton After School Program Instructor (1998-1999)

After School Program Instructor (1992-1993)

***Awards:***

*The National Dean's List* (2006-2007)

*The Chancellors' List* (2005-2006)

Teacher of the Year (2001-2002)

Direct Instruction Facilitator Spotlight (February, 2002)

T.E.A.M. Award (October, 2001)

Caught Doing Something Good Award (March, 2001)

Teacher of the Month (September, 2000)

***Training:***

Language Essentials for Teachers of Reading and Spelling (LETRS Foundations);  
TOT

Dynamic Indicators of Basic Early Literacy Skills (DIBELS); DIBELS Next TOT

Language Essentials for Teachers of Reading and Spelling (LETRS)

Read Well

Phonics Boost and Phonics Blitz

Project READ – Phonology

Project READ – Linguistics

Lindamood Phoneme Sequencing Program (LiPS)

Lindamood Phoneme Sequencing Program (PreKindergarten LiPS)

Seeing Stars (LiPS Part 2)

Visualizing and Verbalizing (LiPS Part 3)  
Elements of Reading – Vocabulary, Fluency, Comprehension  
Earobics  
Quick Reads  
Start Up/Build Up Benchmark  
Benchmark Book Collection  
MONDO Fluency  
Peabody Picture Vocabulary Test (PPVT)  
Gray Oral Reading Test (GORT)  
Comprehension Test of Phonological Processing (CTOPP)  
Professional Accountability Support System (PASS-PORT)  
Blackboard  
Direct Instruction  
Louisiana Teacher Assistance and Assessment (LaTAAP)  
District Assistance Team (DAT)  
School Improvement Plan  
Directed Reading Assessment (DRA)  
Curriculum Based Assessment (CBA)  
LSUS National Writing Project  
LASIP Science  
Project Wild

***Professional Development Presentations:***

Reading First Professional Development:  
    Phonological Awareness, Phonics, Vocabulary, Fluency, Comprehension  
DIBELS Day 1  
DIBELS Next  
DIBELS Data Analysis  
Syllable Connections (Caddo Public Schools Professional Development)  
Reading First Study Groups (Reading First K-3 Teachers)  
PASS-PORT (university faculty and students)

Blackboard Training (university students)  
 Microsoft Word / Excel / PowerPoint (university faculty)  
 Whole Faculty Study Groups (university students)  
 School Improvement Plan  
 Reading with Direct Instruction  
 Direct Instruction: Training Teachers  
 LEAP Into Writing (Parish-wide)  
 LEAP for Parents  
 Learning Centers for All Ages  
 English Language Arts Curriculum  
 Social Studies Curriculum  
 Science Curriculum

***Computer Skills:***

Blackboard  
 PASS-PORT  
 Microsoft Word, PowerPoint, Excel, Publisher

***Courses Taught:***

Louisiana State University – Shreveport, LA  
     Introduction to the Foundations of Education (ED 201)  
     Practicum in Diagnostic and Corrective Reading for Elementary (ED 318)  
 Northside Elementary School – Shreveport, LA  
     All Subjects – 3<sup>rd</sup> Grade  
     Reading/Language Arts Block – 4<sup>th</sup> and 5<sup>th</sup> Grade  
 Ferriday Upper Elementary School – Ferriday, LA  
     Chapter I Reading – 5<sup>th</sup> Grade



***Certification:***

Type A: Lifetime

Elementary Grades 1-8

Kindergarten

Supervisor of Student Teaching

Reading Specialist