Evaluating the Impact of Missouri Senate Bill 291 on Fifth and Ninth Grade State Physical Fitness Standards

by

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Dr. Paul Wright, Dissertation Chair	12-5-14 Date
Dr. Graham Weir, Committee Member	12-5-14 Date
Dr. Alex Tripamer, Committee Member	12/5/14 Date

Declaration of Originality

I do hereby declare and attest to the fact that this is an original study based solely upon my own scholarly work here at Lindenwood University and that I have not submitted it for any other college or university course or degree here or elsewhere.

Full Legal Name: Robert Scott Johnston

Signature:  Date: 12/5/2014

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Abstract

The current obesity rates of our nation's youth continue to escalate at an alarming rate due to inactivity, poor nutrition, and lifestyle changes. The purpose of this research study was conducted to determine the effects of Missouri Senate Bill 291 on Missouri physical fitness scores as assessed by the *Missouri Physical Fitness Assessment*.

The state of Missouri adopted new physical activity requirements starting in the 2010-2011 school year. This study evaluated the impact of Missouri Senate Bill 291 on fifth and ninth grade physical fitness assessments. Eleven years of statewide data, were examined to determine the impact of the physical activity mandate. Quantitative data analysis revealed a significant improvement for all four fitness assessments for grades 5 and 9 since the passage of Missouri Senate Bill 291. Grade 9 indicated a statistical significant change in the flexibility assessment. Results suggested that Missouri Senate Bill 291 has had a positive impact on statewide physical fitness assessments. Despite this positive improvement, overall fitness of Missouri fifth and ninth graders is still a major concern due to approximately three out of ten students failing the *Missouri Physical Fitness Assessment*.

This study provided for the value of fitness data collection moving forward with improving youth health and wellness. Further research and recommendations are advised in order to study trends related to youth physical fitness. In conclusion, state education departments and school districts should consider the value of collecting and examining fitness scores to develop curriculum that promotes healthy lifestyles which can improve academic success.

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Chapter One: Introduction

Overview

At the time of this study, obesity levels continued to dramatically rise in the United States (Lytle, 2012). The traditional teaching of physical education in the United States consisted of instruction in the areas of individual sports, team sports, cooperative games, and basic locomotor skill development (Capel, 2007). This traditional pedagogy left students without a purpose for improving and developing a commitment towards a healthy lifestyle. The traditional method limited students' opportunities to improve their fitness levels. Students often began to see their fitness levels decline.

Research has shown an increase in obesity levels among youth in the United States. Research by Grossklaus and Marvicsin (2014) found that obesity rates doubled in the 1980's. "Childhood obesity is now one of the most frequently seen chronic diseases in children and is considered an epidemic with serious financial implications" (p. 69).

The use of incorporating fitness activities was not a new idea in physical education. Teachers were looking for programs that improve students' fitness levels. Many teachers added programs to promote healthy lifestyles with the belief that fitness levels would improve. These programs were often units that were incorporated with the curriculum for three to four weeks. The majority of teachers did not study the effects of the fitness program (Culpepper, Tarr, & Killion, 2011).

Background of Missouri Senate Bill 291

Missouri Senate Bill 291 (2009), with regard to physical education in 2009, was legislation that went into effect during the 2010-2011 school year. Section 167.720.2(1)

of Missouri Senate Bill 291 mandated that school districts across the state of Missouri should:

> ensure that elementary school students participate in moderate physical activity for the entire school year. Students in the elementary schools shall participate in moderate physical activity for an average of 150 minutes per five day school week, or an average of 30 minutes per day. Students with disabilities shall participate in moderate physical activity to the extent appropriate as determined by the provisions of the Individuals with Disabilities Education Act, or Section 504 of the Rehabilitation Act. (Missouri Senate Bill 291, 2009, p. 66)

To address the physical activity requirements of Missouri Senate Bill 291, the Missouri Department of Elementary and Secondary Education (MODESE) developed an *Interpretation of Law Relating to Physical Activity* (2010), included in Appendix B, which went into effect with the 2010-2011 school year and interpreted:

> This section refers to physical activity rather than physical education. There is no change in the current elementary requirement of 50 minutes per week taught by a certified teacher. Therefore, the currently required 50 minutes can count towards the 150 minute minimum. If a school also provides one 20-minute recess period per day, then those additional 100 minutes can count towards the minimum requirement as well. Other than that, additional minutes of physical activity must be provided. The additional activity may be supervised by any certificated teacher, not just one certificated in physical education. (para. 3)

Section 167.720.2(4) of Missouri Senate Bill 291 stipulated that school districts were to give students in elementary schools one 20-minute recess per day. MODESE's

(2010) *Interpretation of Law Relating to Physical Activity* clarified this piece of the bill by explaining:

> Currently there is no state mandate for recess, so this will necessitate a change in some school districts. The language 'incorporated into the lunch period' is unclear. On the face it appears that lunch and recess can be combined for a minimum of 20 minutes. Clearly eating lunch does not satisfy the definition of recess, so the Department supports a daily 20-minute recess that should not be interrupted by the regularly scheduled time. (para. 10)

According to the *Missouri Physical Fitness Assessment Manual* (2000), Fifth and ninth grade students in the Missouri public school district were tested yearly by using the *Missouri Physical Fitness Assessment*. Students were determined by their individualized scores to be in one of three categories: Number Tested, Number Not Tested and Number Meeting or Exceeding the Healthy Fitness Range. The fitness data was sent to MODESE at part of the June core data cycle. MODESE has kept records for school district physical education standards, at the fifth and ninth grade levels, since 2002.

Purpose of the Study

The purpose of this research study was to ascertain the extent to which Missouri Senate Bill 291, in 2009, impacted physical fitness standards of fifth and ninth grade students in the state of Missouri.

Rationale

The rise in obesity levels was a national area of concern for youth (Roman & Reay, 2009). Instructional programs needed to be incorporated to give students opportunities to improve their fitness levels. A historical review of the bill's passage in

the state of Missouri generated a number of questions for the researcher. (1) Did Missouri Senate Bill's 291 section relating to physical activity contribute to, and continue to contribute to, improvement in youths' fitness levels?; (2) Does a minimum of 150 minutes per week of physical activity contribute to improvement in students' fitness achievement levels?; (3) What are the legal mandates relating to physical activity of Missouri Senate Bill 291 of 2009, with regard to physical education?; (4) Does the research examined in this study indicate improvement in student's fitness achievement levels regarding the passage of Missouri Senate Bill 291 in 2009? Many characteristics of a quality life depend on health and physical fitness. A good health and fitness habit started at an early age supports a life-long commitment to a healthy lifestyle Reiner, Niermann, Jekauc, & Woll, 2013). Appropriate physical activity time needs to be researched and developed to improve the nations' youth physical fitness. Research-based fitness programs should be implemented in the nation's physical education curricula. It is important that a healthy lifestyle towards America's youth is promoted. Healthy lifestyles depend upon effective research-based physical education practices. Research needs to be conducted to find solutions to curtail epidemic obesity levels. Intuitively, the passing of Missouri Senate Bill 291 was an important step in promoting physical fitness for Missouri youth. However, it is important to document and validate the potential legislative impact.

Hypotheses

The following hypothesis was proposed for this study, divided into nine individual statistical tests for purposes of analysis:

Hypothesis: Fifth and ninth grade physical fitness student scores for aerobic capacity, abdominal strength/endurance, upper body strength/endurance, and flexibility will improve following the passing of Missouri Senate Bill 291.

Hypothesis #1: Fifth grade physical fitness scores for aerobic capacity have improved following the passing of Missouri Senate Bill 291.

Hypothesis #2: Fifth grade physical fitness scores for abdominal strength/endurance have improved following the passing of Missouri Senate Bill 291.

Hypothesis #3: Fifth grade physical fitness scores for upper body strength/endurance have improved following the passing of Missouri Senate Bill 291.

Hypothesis #4: Fifth grade physical fitness scores for flexibility have improved following the passing of Missouri Senate Bill 291.

Hypothesis #5: Ninth grade physical fitness scores for aerobic capacity have improved following the passing of Missouri Senate Bill 291.

Hypothesis #6: Ninth grade physical fitness scores for abdominal strength/endurance have improved following the passing of Missouri Senate Bill 291.

Hypothesis #7: Ninth grade physical fitness scores for upper body strength/endurance have improved following the passing of Missouri Senate Bill 291.

Hypothesis #8: Ninth grade physical fitness scores for flexibility have improved following the passing of Missouri Senate Bill 291.

Hypothesis #9: Overall physical fitness scores for fifth and ninth grade students have improved following the passing of Missouri Senate Bill 291.

Additionally, the following hypothesis was proposed, divided into four cases for statistical analysis:

Hypothesis: For fifth and ninth grade physical fitness students there will be a relationship between the dimensions of physical fitness of aerobic capacity, abdominal strength/endurance, upper body strength/endurance, and flexibility before passing of Missouri Senate Bill 291 or after passing of Missouri Senate Bill 291

Hypothesis #10: For fifth grade physical fitness students there will be a relationship between the dimensions of physical fitness of aerobic capacity, abdominal strength/endurance, upper body strength/endurance, and flexibility before passing of Missouri Senate Bill 291.

Hypothesis #11: For fifth grade physical fitness students there will be a relationship between the dimensions of physical fitness of aerobic capacity, abdominal strength/endurance, upper body strength/endurance, and flexibility after passing of Missouri Senate Bill 291.

Hypothesis #12: For ninth grade physical fitness students there will be a relationship between the dimensions of physical fitness of aerobic capacity, abdominal strength/endurance, upper body strength/endurance, and flexibility before passing of Missouri Senate Bill 291.

Hypothesis #13: For ninth grade physical fitness students there will be a relationship between the dimensions of physical fitness of aerobic capacity, abdominal strength/endurance, upper body strength/endurance, and flexibility after passing of Missouri Senate Bill 291.

Limitations of the Study

In this quantitative study, as with any research, there are potential limitations to generalizability of results that should be addressed. The first is the uniformity of the

Missouri Physical Fitness Assessment. Different instructors administer the fitness assessments to students throughout the state of Missouri. A difference in testing administration poses a potential threat to the validity of this study. A second limitation is implementation. Since data was generated from fifth and ninth grade students throughout the state, different educators were teaching students for the physical education activities. Diverse teaching of physical fitness occurred in different settings across the state. Personality differences or differences in teaching style could potentially affect assessment results. An additional variable could be the varying minutes of physical activity offered in each school district. Some schools met, while some schools exceeded, the mandate of required minutes as outlined in Missouri Senate Bill 291, passed in 2009 and implemented in 2010. A third potential limitation to the study was represented in varying curricula across the state of Missouri School Districts. Various curriculums were utilized, therefore a uniform curriculum was not implemented statewide throughout the timeline of data gathering for this study.

Definition of Terms

The *Missouri Physical Fitness Assessment* measures student fitness levels in fifth and ninth grade. The assessment includes four criteria that measure aerobic capacity, abdominal strength/endurance, upper body strength/endurance, and flexibility.

Aerobic capacity. According to the *Missouri Physical Fitness Assessment Manual* (2000):

> Aerobic capacity is perhaps the most important area of any fitness program. Research clearly indicates that acceptable levels of aerobic capacity are associated

> with a reduced risk of high blood pressure, coronary heart disease, obesity, diabetes, some forms of cancer, and other health problems in adults. (p. 5)
>
> Aerobic capacity, relative to body weight was considered to be the best indicator of a person's overall cardiorespiratory capacity. Many terms have been used to describe this dimension of physical fitness, including cardiovascular fitness, cardiorespiratory fitness, cardiorespiratory endurance, aerobic fitness, aerobic work capacity, and physical working capacity. A laboratory measure of maximal oxygen uptake is generally considered to be the most accurate measure of aerobic capacity. (p. 5)

Aerobic capacity as defined by the Cooper Institute (2014a) is "evaluated using estimates of VO2max (also known as maximal oxygen uptake). VO2max reflects the maximum rate that the respiratory, cardiovascular, and muscular systems can take in, transport, and use oxygen during exercise" (para. 1).

Abdominal strength. According to the *Missouri Physical Fitness Assessment Manual* (2000) abdominal strength/endurance is defined:

> Strength and endurance of the abdominal muscles are important in promoting good posture and correct pelvic alignment. The latter is particularly important in the maintenance of low back health. In testing and training the muscles of this region, it is difficult to isolate the abdominal muscles. It is important to note that the new partial (abdominal) curl-ups and curl-ups with a cadence, done slowly with the knees bent and feet are not held, are a better indicator of the strength and endurance of the abdominal muscles than the timed curl-ups. Furthermore,

> compression of the spine and assistance of hip flexor muscles are minimized in these tests. (p. 7)

Upper body strength. According to the *Missouri Physical Fitness Assessment Manual* (2000):

> The benefits of upper body strength/endurance: Upper body strength is important for maintaining functional health and correct posture, thereby reducing possibilities of lower-back pain and restrictions in independent living. It is important to educate students regarding the prevention of problems that can affect them as adults. (p. 8)

Flexibility. According to the *Missouri Physical Fitness Manual* (2000): "Maintaining adequate joint flexibility is important to functional health. Decreased flexibility is generally not a significant health problem for young people. However, students need to understand the importance of maintaining flexibility and range of motion as they age" (p. 11).

Muscular strength. Muscular strength, endurance and flexibility is defined by the Cooper Institute (2014b) as "Muscular strength is the maximal force your muscles can exert in a single effort. Muscular endurance is the ability to sustain, or repeat muscular activity, over time. Flexibility describes the range of motion of muscles at the joint" (para. 1).

Summary

If the results of this quantitative study support significant improvement in physical fitness test scores of fifth and ninth grade students since the passage of Missouri Senate Bill 291, then the study supports the mandating of a minimum of 150 minutes of

physical activity per week for elementary aged children, as a contribution to physical fitness. If the results from this study show no difference in fitness scores of fifth and ninth grade students, then more research needs to be done as to what fitness programs and minutes required for physical activity will raise the fitness achievement levels. New fitness programs, instruction, curricula, and time may be needed to ameliorate many negative health indicators for grade-school children.

Chapter Two: Literature Review

Blair and Powell indicated (2014) Students of the past, previous to this study, were more physically active and less exposed to fast foods than those at the time of this writing. The technology era and explosion of fast food restaurants changed the environment in which children physically developed. Improving school districts' physical education curricula with increased time and fitness-based programs was vital to correcting children's health. This research study was conducted to determine the possible effects of Missouri Senate Bill 291 on Missouri physical fitness performance, measured by scores as assessed by the *Missouri Physical Fitness Assessment* (2010).

Historical Perspective

Physical education has evolved over the course of time since its early origination from the Greeks. According to Siedentop (2014) physical education got underway with the Greeks in approximately 700 B.C. Siedentop reported that physical education served to prepare soldiers for wars. The Greeks also held physical competitions in the Olympic Games.

The 1800's evidenced physical education in European schools, with physical education spreading to the United States in the mid 1800's. The National Association for Sport and Physical Education (NASPE, 2010) reported the United States curricula was heavily influenced by implementing gymnastics from Germany and Sweden during the 1800 time period. Dewey began the idea of restructuring customary education and advocated for the educational system to incorporate physical education towards the end of the 19th century ("Physical education," 2013).

The 1900's included females and handicapped students in physical education, as a result of federal legislation. The passage of Title IX in 1972, in the United States, allowed for females to equally participate in athletics, alongside male athletes. VanSickle (2013) noted this impactful mandate improved the opportunities for females to take part in sports, and to be considered for duties in sports that were previously only exclusively for males. Tarr (2011) described federal legislation that was enacted in 1975 as Public Law 94-142. The law, named the Education for All Handicapped Children Act, was created to assist students with challenging disabilities to gain an enjoyable physical education experience and minimize difficult physical education skills.

The 2000's brought new technology and an urgency to increase educational knowledge for children by implementing standards-based curricula. According to Blair and Powell (2014), increases in technology reduced the amount of physical activity in everyday life activities, which decreased human energy expenditure. France, Moosburger, and Brockmeyer (2011) concluded that physical education programs and teachers were held to national standards constructed by NASPE that matched up with state standards to specify curricula content that produced accountability for students and physical education teachers.

Physical education in the current era, at the time of this writing, was focused on educating all students through a national and state standards-based curriculum with properly trained educators. Promoting life-long healthy habits in conjunction with life-long learning was also a prevalent theme among education. Findings by the Centers for Disease Control and Prevention (CDC, 2014) in the Policy and Environmental Indicators section of the *State Indicator Report on Physical Activity*, established guidelines on

physical activity requirements for 28 states and the District of Columbia. The same report indicated that mandates, such as Missouri Senate Bill 291, were enacted to ensure students were getting a stated minimum amount of physical activity, as society became more reliant on technology, which may reduce physical activity levels for all ages (CDC).

Missouri Senate Bill 291

According to Alexander, in "Be a Good Sport" (2009), the Missouri Senate Bill 291 mandate required a minimum of 150 minutes of physical activity per week for students, to be provided through school districts. The law also ensured students received 20 minutes of recess activity per day. Recess minutes were included in the 150 minutes physical activity requirement per week. Missouri Senate Bill 291 also included stipulations mandating awards to schools and districts that improved physical fitness assessment scores.

Trailnet (2009) reported Missouri Senate Bill 291 passed the Missouri State Legislature in 2009. Missouri Senate Bill 291 contained guidelines outlined in the House Bill 509 that was defeated by the Senate Ways and Means Committee. Missouri Senate Bill 291 became active in the 2010-2011 school year. The bill included a mandate that middle school students must participate in 225 minutes of physical activity per week.

Missouri Physical Fitness Assessment Manual

The *Missouri Physical Fitness Assessment Manual* (2000) was developed as part of the Missouri Outstanding Schools Act of 1993 in conjunction with the Missouri Assessment Program (MAP). The fitness test was voluntary starting in the year 2000 and became mandatory in the year 2001. The goals of the assessment were to collect data, promote lifetime fitness and to assess student's healthy indicators.

The *Missouri Physical Fitness Assessment* was administered to fifth and ninth grades. The test assessed aerobic capacity, abdominal strength/endurance, upper body strength/endurance and flexibility. According to the *Missouri Physical Fitness Assessment Manual* (2000), "the components to be assessed are based on the *President's Challenge* and the *Fitnessgram®"* (p. 4).

The *Missouri Physical Fitness Assessment Manual* (2000) outlined testing procedures for Missouri School Districts. The *Missouri Physical Fitness Assessment* measured aerobic capacity, abdominal strength/endurance, upper body strength/endurance, and flexibility. School districts should establish policies related to safety procedures when fitness tests are conducted, as recommended by the Missouri Department of Elementary and Secondary Education (2000).

Aerobic capacity was assessed on a marked, one mile course. The starting signal was 'ready, go', with the student objective of completing the course in the fastest time possible. Aerobic capacity was measured with the one-mile run/walk or the Progressive Aerobic Capacity Endurance Run (PACER) (*Missouri Physical Fitness Assessment Manual,* 2000). The assessment was conducted on a flat track, or marked course, with a stop watch used by the test administrator. The PACER was measured by requiring students to run back and forth between 20 meters with an increasing pace, accelerated each minute. The test administrator used a pre-recorded cassette or CD with timed intervals. The test was started with a five second count down, with the student required to run to the 20 meter line before the time expired. A sound occurred and the student returned to the original mark before the next sound occurred; this was repeated until the student did not reach the mark before the time expired. Each minute the pace was

increased by a half second. It was recommended that students be allowed the opportunity of practice sessions before the assessment was administered (*Missouri Physical Fitness Assessment Manual*, 2000).

Abdominal strength/endurance was assessed by students performing timed curl-ups, curl-ups to a cadence, or partial curl-ups to a cadence and were administered on mat or soft, protected surfaces. The curl-up procedure utilized a stop watch to time one minute. The students laid on their backs with their knees flexed while a partner held their feet. The students' arms were crossed on their chests. One curl-up was complete when a student raised up and touched the elbows to the thighs and was completed when the shoulder blades returned to the mat. The testing began with the starting cue of 'ready, go,' and was completed with the word 'stop,' The number of correct curl-ups completed in a minute was scored. The curl-up test could be administered with a cadence, with the curl-up cadence test performed by the number of curl-ups completed every three seconds, with a maximum of 75 seconds (*Missouri Physical Fitness Assessment Manual,* 2000). The testing procedure required a mark, four and a half inches wide, placed on the mat. A partner was selected to watch for errors and to protect the partner's head. The student laid on the mat with his or her feet flat and knees at a 140 degree angle, with arms extended, touching the mark. The feet were not held; the student instead raised up and slid the fingertips down to the mark at a pace of one curl-up every three seconds. The test administrator used a cadence of up and down to keep the student in a rhythm. The test was complete when a student was not able to maintain the cadence, had two formed corrections, or reached a maximum of 75 curl-ups (*Missouri Physical Fitness Assessment Manual,* 2000). Partial curl-ups were another way to assess abdominal strength and

endurance. The student laid on a mat or soft surface with his or her knees flexed and the feet flat on the floor but not held. Arms are extended forward with the fingers resting on the legs and pointing forward, as the students raised they slid their fingers up to the knees. When the students' fingers reached the knees they returned to a laying position. Partial curl-ups responded to a command of up and down, with one curl-up every three seconds and continued until the student did not keep the rhythm of three in a row (*Missouri Physical Fitness Assessment Manual*, 2000).

Upper body strength/endurance was assessed by push-ups, pull-ups, modified pull-ups, or the flexed arm hang. The push-up test was administered on a mat or soft, protected surface. The testing began with the student in a horizontal position, with hands directly under the shoulders and hands flat against the surface. The student's legs were straight, slightly separated and on the toes. The student pushed himself or herself off of the mat until the arms were straight, maintaining good form by keeping the body straight. The student completed the repetition by lowering himself or herself to the floor until the elbows were bent at a ninety degree angle (*Missouri Physical Fitness Assessment Manual*, 2000). The test administrator used a cue of 'up and down,' with a rhythm of one completed push-up every three seconds. The student continued the repetitions until not able to perform a correct push-up. The pull-up test was administered from a horizontal bar, an inch and a half in diameter at a height that would allow the student to hang from the arms without the feet touching the floor. A student used an over-hand or under-hand grip. The student pulled himself or herself until the chin reached the bar and then descended to the hanging position. The student repeated this procedure until he or she was no longer able to pull up to the bar, clearing the bar with the chin. The modified pull-

up was administered by the students laying on their backs with a horizontal bar that was two inches above student reach (*Missouri Physical Fitness Assessment Manual*, 2000). An elastic band, seven to eight inches, was placed under and parallel to the bar. The student used an overhand grip and pulled up until his or her chin cleared the elastic band. The student must maintain a rhythm and keep the body straight. The repetitions were continued until the student was not able to complete the modified pull-up and maintain the correct form. The flexed arm hang was administered with a horizontal bar of two and a half inches in diameter, at a height that allowed the student to hang without the feet touching the floor. The student may use an over-hand or under-hand grip with the chin above the bar. The student's legs were straight and the test administrator used a stop watch to time the student's strength and endurance in maintaining his or her chin above the bar. The test result was recorded in minutes and seconds (*Missouri Physical Fitness Assessment Manual*, 2000).

Flexibility was assessed by utilizing the sit and reach, back-saver sit and reach and, or the v-sit and reach test. The sit and reach was administered by using a box 12 inches high with a measuring scale on top of the box, with 23 centimeters marking the beginning of the feet. The testing began with the student removing the shoes with the feet inside the box and touching the back of the box. The student's hands were facing palms down. The student reached out as far as possible three times, and with the fourth time held while the score in centimeters was recorded. The back-saver sit and reach was administered by using a box 12 inches high with a measuring scale on top of the box, with a nine inch mark at the beginning of the feet (*Missouri Physical Fitness Assessment Manual*, 2000). The testing began with the student removing the shoes, one leg was fully

extended with the sole of the foot touching the back of the box. The other knee was bent with the foot flat on the floor placed by the knee of the straight leg. The student's hands were facing palms down. The student reached out as far as possible three times, and with the fourth time held while the score in inches was recorded, with a maximum score of 12 inches. This procedure was completed with the left leg and right leg independently and scored with a right side score and a left side score. The v sit and reach was administered on a flat surface (*Missouri Physical Fitness Assessment Manual*, 2000). The student removed the shoes and sat flat on floor with feet eight to twelve inches apart. A straight two foot line was marked as a baseline on the floor, and a second line used for measuring was perpendicular to the middle of the baseline, extended two feet on each side and was sectioned off in half inch intervals. Where the two lines crossed was considered the zero mark. The testing involved students removing the shoes, sitting on the floor with the measuring line between the legs, and the feet behind the baseline eight to twelve inches apart. The students placed their thumbs together with their palms down and put their hands on the measuring line. A partner held the legs, and the student reached toward the measuring line. The student was provided three practice tries, and the fourth was held and recorded in inches to the nearest half inch (*Missouri Physical Fitness Assessment Manual*, 2000).

Missouri Physical Fitness Assessment Results for the Year 2010

Table 1 represents the statewide Missouri Physical Fitness Data for 2010. The purpose of this table is to allow examination of passing scores for all fifth and ninth grade students that took the fitness test in 2010. The number tested represents all the students in Missouri that completed the specific fitness test listed. The percent greater than Healthy

Fitness Range (% > HFR) is the percentage of students that met or exceeded the Healthy Fitness Range Scores, as determined by the *Missouri Physical Fitness Manual* (2000).

Table 1.

Fifth and Ninth Grade Missouri Physical Fitness Percentages: 2010

Grade	Fitness Test	N Tested	% > HFR
5	Aerobic Capacity	54,124	66.00
5	Abdominal Strength	54,754	74.66
5	Flexibility	54,467	68.60
5	Upper Body Strength	54,708	64.71
9	Aerobic Capacity	47,090	64.60
9	Abdominal Strength	47,338	73.53
9	Flexibility	46,587	70.64
9	Upper Body Strength	47,065	70.22

Note: Source: Missouri Department of Elementary and Secondary Education (MODESE, 2003-2010)

Physical Health Indicators

Obesity. One of the major health concerns that faced our society was the increase in the nation's obesity rates. The American Medical Association framed obesity as a disease. Apovian (2014) found that obesity had evolved to the extent that it was one of the leading preventable causes of death in the United States. “Obesity prevalence has risen over the past 30 years, purportedly due to excessive calorie intake and lack of physical activity” (Apovian, p. 147).

Childhood obesity was increasing at an alarming rate. Studies indicated that obesity rates continued to rise in youth. Lytle (2012) found that United States’ rates of childhood obesity had become a critical and desperate issue in the public health and

medical fields. Obesity problems had increased three times over the 30 years previous to his writings, creating increased medical cost due to increased health concerns.

At this time of this writing, America's youth were facing an obesity crisis. The trend in rising obesity rates with youth continued at an alarming pace. Park (2014) stated the following, "This is the American Nightmare - that for the first time ever, a generation of children may have a shorter life expectancy at birth than their parents" (p. 42). Obesity increased the risk of cardiovascular diseases, including risk to cancer, with a higher mortality rate (Park). Eilerman et al. (2014) confirmed the drastic increase in childhood obesity since 1970 had multiplied by three times; "Globally, approximately 1.4 billion adults were overweight, 0.5 billion were obese, and 40 million preschool children were overweight in 2008" (p. 462).

Roman and Reay (2009) summarized that obesity rates attained a new high, with serious health concerns, stating that "between one third and one-half of adults in the United States are substantially overweight to the point of representing identifiable health risks" (p. 655). They went on to suggest obesity was a major health issue in the United States consisting of "diabetes, kidney dysfunction, liver damage, pulmonary and cardiovascular dysfunction, joint problems, and increased risks for certain careers" (Roman & Reay, p. 655). The researchers concluded that if obesity continued at its then current pace, the average life expectancy would decrease in the United States. Overeating and various levels of obesity had reached alarming levels and posed serious health concerns. Fontana, Furtado, Marston, Mazzardo, and Gallagher (2013) reported findings which included that "obesity is also on the rise among children and adolescents, more than tripling in the last four decades" (p. 16).

Obesity was a worldwide health concern that imposed health risks for those diagnosed as obese. Hochstetler's (2014) study supported that obesity was a medical threat that the American Medical Association (AMA) wanted to combat. Hochstetler went on to state, "obesity rates have skyrocketed over the past 20 years" (p. 7). The obesity disease was not just confined to a specific income or educated level of society. Obesity rates were increasing across all economic sectors. According to a 2010 CDC report, obesity did not discriminate by generation or socioeconomic class. The report specifically stated "that by 2008 more than a third of American adults were obese, as well as nearly 17 percent of children and adolescents aged 2 to 19 years" (para. 3).

Type II diabetes. In the early 21st century, there was a high correlation between obesity and type II diabetes. Reinberg (2014) documented that childhood obesity created lifelong health concerns and increased healthcare costs. It was expected that obese children would become obese adults. Reinberg reported, "Severely obese children are the ones most likely to have type II diabetes as teens and other problems such as heart disease later in life" (para. 4).

Quilliam, Simeone, Ozbay, and Kogut (2011) found that 10% of the United States' mature population had diabetes and the Centers for Disease Control and Prevention calculated that 33% would develop diabetes within approximately 40 years (p. 673). The increase in type II diabetes and obesity may have provided a link between the two diseases. Many people with type II diabetes were also diagnosed as obese. Prusak et al. (2011) concluded at the time of their writings that the past 20 years revealed teenagers had seen a 10 times surge in Type II diabetes. The real concern was that obesity led to other serious health problems (Prusak et al.)

Cardiorespiratory disease/problems. Evidence suggested that it was probable obesity would lead to cardiorespiratory diseases. Martins' et al.'s (2010) research indicated, "The results of several studies have shown that there is an inverse correlation between obesity and cardiorespiratory fitness in children and adolescents" (p. 1). The risk of cardiovascular disease in children and adolescents was correlated to obesity when cardiorespiratory fitness was minimal.

Maggio's et al.'s (2010) study provided, "the prevalence of childhood overweight is increasing rapidly worldwide, reaching 30% of children in some industrialized countries and resulting in increased risk of chronic diseases, such as cardiovascular diseases" (p. 1187). The crisis of childhood obesity was a global health concern that continued to increase. Research findings by Yon and SoJung (2009) supported facts that obesity levels in youth were increasing, even though an emphasis existed on curtailing the upward inclination of obesity. Their research suggested "overweight–obese youth suffer from comorbidities such as type II diabetes mellitus, nonalcoholic fatty liver disease, metabolic syndrome, and cardiovascular disease" (p. 571).

Poor nutrition. Nutritional deficiencies also contributed to the rising obesity rates for youth. Youth that had poor nutritional habits were at risk for obesity. According to Galson (2008) children were more exposed to poor nutritional choices than those of the past. The increased accessibility to fast food restaurants, processed food and beverages, shopping the inside aisles of grocery stores, and larger portions were a concern with youths' nutrition in conjunction with lack of physical activity and increased time using household electronics. Galson advised, "Sedentary behaviors such as television viewing, computer use, and video game playing often replace vigorous physical activity in

children. At the same time, more fast foods, convenience store snacks, and sweetened beverages are available now than in past generations" (p. 258).

Poor nutritional or physical activity habits established in childhood could lead to the same poor habits in adulthood. Prevention, education, and awareness were key components to combating the concern of childhood obesity. Zapata, Bryant, McDermott, and Hefelfinger (2008) found unhealthy behaviors that were reinforced in childhood led to obesity. Obesity could be combated by increasing dietary guidelines, and physical activity was necessary in obesity prevention. Zapata et al. recommended no less than 60 minutes, seven days a week of physical activity for children and adolescents (p. 10).

Proper nutritional habits and physical activity were vital to reversing the epidemic of obesity, reducing the risk of long-term financial burdens caused by healthcare costs. It was important to establish appropriate nutritional habits in children, so that those good habits could be maintained into adulthood. Muhlhausler, Gugusheff, Ong, and Vithayathil (2013) stated the increasing rates of obesity and other health conditions associated added a significant financial hardship on administrations in charge of countries. Muhlhausler et al. continued with a statement of the need to create operative plans to prevent obesity, such as developing initial nutritional programs targeted for deterrence of obesity.

One key to preventing obesity was developing quality nutritional programs for youth. Early intervention could help prevent obesity, which in turn reduced healthcare costs associated with treating obesity issues later in life. Parental involvement and support was paramount for a successful plan in treating obesity. Odum, McKyer, Tisone, and Outley (2013) pointed out the control children had over their dietary choices at home and at school was a primary problem. The home environment was a significant factor in

identifying childhood obesity. Parents were encouraged to become involved in the school-based prevention program for continued education to assist children in improving and maintaining appropriate dietary habits. Schools and parents needed to work together to prevent obesity for youth (Odum et al.).

Research conducted by Zapata et al. (2008) identified slogans, such as '5-A-Day for Better Health' and '3-A-Day of Dairy' to promote an increased use of fruits and vegetables, along with a calcium rich diet reduced the risk of childhood obesity and increased the opportunity for better habits. Typically, middle-school-aged youth did not maintain the daily recommendations of fruit, vegetables and calcium. Fruits, vegetables and calcium were rich in nutrients and identified in the preventions of cancer, cardiovascular disease, and obesity. Fresh produce and milk were typically located on the outside aisles of the grocery stores, while prepackaged and processed foods were located on the inside aisles. It was recommended when grocery shopping to shop the outside aisles, avoiding the inside aisles. It was important that parents took the initiative to encourage their children to make healthy nutritional choices. Learning to make healthy nutritional choices at an early age promoted continued healthy habits in adulthood and encouraged obesity prevention (Zapata et al.).

Mental Health Disorders

Obesity was also found to be a contributor to mental health diseases. Ells et al.'s (2006) review suggested that psychological diagnoses such as sociopathic, aggressive personality traits, anxiety, and major depressive disorders had been linked to obesity. Ells et al. went on to add that children who suffered from obesity tended to struggle with low self-esteem, a lack of social interaction, and offered little to no athletic ability. Obesity

hindered one's feeling of being able to fit into social settings and situations, increasing the feeling of social isolation. Ells' et al. research stated, "It has been reported that obese individuals are more likely to present a number of psychological problems such as sociopathy and aggressive personality traits, anxiety disorder and major depressive disorder" (p. 343).

Obesity was linked to depression, which could have an impact on one's mental health, increasing the possibility of depression, social isolation and low self-esteem (DeWit et al., 2010). Obesity complicated the mental and physical health and well-being of an individual as the result of unhealthy lifestyle choices. Health complications could contribute to mental health diagnoses in the general population. DeWit et al. explained there were parallel observations that obesity played a role in cardiovascular disease, type II diabetes and the possibility of premature death, which in turn may result in a mental health diagnosis.

Obesity was intertwined with depression, which could complicate someone's mental health. Smith, White, Hadden, Young, and Marriott's (2014) analysis suggested that depression may increase the possibility of obesity, as obesity increased the potential for depression. Collins and Bentz (2010) found eating disorders were generally associated with psychosocial, environmental, and genetic factors. A diagnosis of depression, anxiety, or eating disorders complicated the ability for one to control dietary consumption and maintain physical activity to sustain a healthy body weight (Collins & Bentz). Obesity was not just a physical problem, but could also lead to mental health issues. The mental health disorders could become severe and dramatically affect a person's quality of life. The mental health diagnosis may also prevent or delay treatment of obesity, as

depression may impede the desire to become active and make healthy dietary choices. Individuals may not reach out socially for support and may become socially isolated, potentially hampering recovery (Collins & Bentz).

Behavioral Health Disorders

It was challenging for those with obesity to balance work, school, or life activities when coupled with behavioral health disorders. Poor behavioral health could pose difficulties, such as concentration or the ability to focus on everyday tasks in adults, as well as in youth. Wilfrey, Vannucci, and White (2010) stated, "overweight and obese status can also have detrimental effects in psychosocial and psychological domains, including depression, anxiety, disordered eating, poor body image, discrimination and social exclusion, low self-esteem, and a reduced overall quality of life" (p. 285).

Research showed that those with obesity had an increased susceptibility to behavioral health disorders. The disorders caused by obesity had a negative impact on those afflicted with the obesity crisis. Pauli-Pott, Becker, Albayrak, Hebebrand and Pott's (2013) research offered that youth diagnosed with depression, anxiety disorders, oppositional defiant disorder, conduct disorders, and attention deficit hyperactivity disorder had increased and were identified with general psychiatric concerns typically related to child and adolescent obesity.

Our society should not underestimate the severe impact obesity had on public health. Obesity should be addressed as one of the most important issues for the public health agenda. Roman and Reay (2009) stated, "given the prevalence and serious consequences of eating disorders, effective and efficient treatment for eating disorders should be one of the most important public health agendas for behavioral health" (p.

655). Melnyk et al. (2009) explained, "Despite the adverse health outcomes associated with both overweight and mental health problems, very few theory-based intervention studies have been conducted with adolescents to improve both their healthy lifestyle behaviors and mental health outcomes" (p. 576). Recognizing the detrimental effects of obesity was an important first step towards implementing proper treatment and allocating resources needed to combat the obesity epidemic. Society needed to understand the full impact obesity could have on communities. Obesity negatively impacted physical health, mental health and created significant healthcare costs. It was vital to our public health to research and develop effective treatment programs aimed at ending the obesity epidemic. Research suggested reactive measures to obesity may prove more costly than a proactive approach (Melnyk et al.).

Traditional Physical Education Curricula

Capel (2007) indicated traditional physical education has been thought of as teaching sports, such as basketball, football, soccer, volleyball, and baseball. The fundamental skills acquired through the instruction of these sports included: catching, throwing, kicking, running, and striking. Traditional physical education also consisted of group games that included tag, kickball, and dodgeball. Traditional physical education placed limitations on students that were not proficient in sports. The students that did not excel at sports would have a reduced amount of activity due to a lack of participation in some of the activities.

According to Capel (2007), traditionally physical education did not prepare youth for long-term physical activity. The targeted youth demonstrated athletic promise resulting in athletic and social isolation of those who were less athletically gifted.

Traditional physical education was not geared toward meeting the physical activity needs of all students, especially in a time of increased obesity rates (Capel).

Gallotta, Marchetti, Baldari, Guidetti, and Pesce (2009) added that the older methods of teaching physical education included teaching health, social skills, loco-motor skills, and health concepts related to strength, endurance, and flexibility. Gallotta et al. (2009) went on to add that the more traditional physical education included teaching of sports, for example, volleyball, basketball, and baseball. Traditional physical education was better suited for students who were active in sports and had a base knowledge of the sports taught.

Due to the rising obesity rates, physical education curricula should include instruction for all students to improve their levels of fitness and to provide skills to lead a healthy lifestyle. Tzouvelekas and Gramatopol (2010) added that traditional physical education was outdated, due to the curricula consisting mainly of team sports and basic movement skills that did not focus on fitness activities for all students. Their research stressed that, when sports are incorporated in the physical education curricula with appropriate instructional strategies, this can become a valuable part of the physical education program.

Capel (2007) summarized traditional physical education did not provide benefits to all students to improve their levels of fitness. Schools needed to adjust their curricula to ensure all students were receiving an opportunity to value and learn life-time fitness skills. Education providers needed to also assess students and program needs to provide a quality curricula and resources for students to develop an understanding of a healthy lifestyle.

Non-Traditional Physical Education Curricula

Non-traditional physical education curricula was programmed toward encompassing all students towards physical literacy by improving fitness levels, physical skills, knowledge, and developing lifetime healthy habits. Collaboration was vital for physical education specialists when devising curricula and instruction. Non-traditional physical education curricula also included enrichment activities such as: clubs, youth sports, and extracurricular activities. Docheff (2000) explained implementing non-traditional lessons could have a constructive involvement for students that allowed for enthusiasm geared towards learning.

Non-traditional physical education consisted of assessments that were student-centered and assessed the physical education program. Mercier and Iacovelli (2014) summarized their school district's summative assessments to be geared to each student's ability to learn, instead of a blanket assessment for the entire class. Students developed goals as part of an assessment to tailor learning to the individual student.

Culpepper et al. (2011) suggested developing a physical education fitness model to improve the quality of life by encouraging knowledge, positive attitudes, and maintaining physical activity. Their report included "findings from researchers studying the effectiveness of the fitness approach in physical education overwhelmingly recommend a fitness curricula (fitness instruction and fitness activities) over other models" (p. 163).

Physical education programs faced an important era due to increasing obesity and health care costs to society. Professional learning communities were also an avenue of exploration for physical education programs. Physical educators should collaborate to

formulate quality curricula and instruction. Beddoes, Prusak, and Hall (2014) inferred effective physical education instruction hinged on collaboration between physicians and physical education teachers to provide effective curricula tools for student success. Beddoes et al. (2014) suggested "reports on collaboration lend support to Henninger and Karlson's (2011) assertions" (p. 22) that included four areas to cultivating the position of physical education in the schools: (1) a well-developed curricula and instructional strategies, (2) precise assessments for student learning results, (3) the establishment of and partaking in continual professional development, and (4) operative support with all stakeholders in the community (Beddoes et al., p. 22). A teacher was unlikely to be able to accomplish these goals without a team approach with professional colleagues. Professional learning communities provided the instructors an opportunity to improve teaching techniques and keep the curricula current, at the time, for best practices on physical education instruction. Professional learning communities ensured a continual approach to improving instructional techniques for the betterment of student learning.

Extra-Curricular Activities

Physical education was limited in time-on-task for students in many schools, but many schools offered extra-curricular physical activity opportunities. DeMeester, Aelterman, Cardon, De Bourdeaudhuij, and Haerens (2014) added that many children took part in before-and-after school based activities. Their research suggested that events outside of the regular school day gave students the opportunity to join in areas they might not otherwise be able to join, and these events encompassed approximately 66% of youth that did not otherwise participate in local physical activities (DeMeester et al., p. 3).

Recess time in many schools was reduced in an attempt to increase time for other academic areas. The pressure to meet state standards contributed to a reduction in recess and physical activity time for many students. Foshay and Patterson (2010) reported that many schools reduced recess time to focus on meeting state academic standards, although it had not been proven that physical activity interfered with a student's ability to learn. "Forty percent of schools have reportedly eliminated some recess time to concentrate on academics" (Forshay & Patterson, p. 197). Their research indicated that physical education instructors might not have the time or facilities to fully implement standards-based curricula that assisted youth in fighting obesity and learning life-long health habits.

Clubs

Many schools attempted to provide children with more physical activity time by implementing clubs, such as physical education clubs, walking, or running clubs. Foshay and Patterson (2010) indicated that studies reported evidence of diligence on the overall improvement in the mile-run performance times at the end of the year-long program. It was essential to provide exercise opportunities to students to motivate them to increase physical endurance and allow the opportunity for learning more about living a healthy lifestyle. Foshay and Patterson concluded that the National Association for Sport and Physical Education (NASPE) endorsed that youth devoted at least 60 minutes per day to physical movement (p. 197).

Physical educators faced the challenges of obesity, decreased physical education time, reduced recess, and a lack of physical education curricula resources. Physical education instructors should implement effective curricula, monitor fitness assessment, grow through professional development, and create extra-curricular activities/clubs to

promote lifelong healthy habits. Huberty, Balluff, Beighle, Berg, and Junfeng (2009) commented that children spent several hours a day watching television and not engaged in an hour worth of activities that raised their heart rate significantly, during a minimum period of five days a week. Many children did not engage in physical activity at all. Implementing clubs providing opportunity for students was a necessary step to promote endurance and life-long habits of making healthy choices (Huberty et al.).

Huberty et al. (2009) commented, "According to the Youth Risk Behavior Survey, 34.7% of children in 2007 did not participate in at least 60 minutes of activity that made their heart rate increase or made them breathe heavily at least five times per week" (p. 98). It was paramount to provide additional opportunities for physical activity. The school day did not allow enough time to devote to physical activity for youth. Many youth were spending their time watching television, playing video games, or using electronics, taking place of physical activities. Clubs could offer youth a structured opportunity to engage in safe physical activities that allowed the opportunity for everyone to participate. Physical activity clubs also provided opportunities for dissemination of appropriate nutritional snacks, which children may not otherwise be able to access.

Youth Sports

The *Journal of Physical Education, Recreation & Dance* (JOPERD) published a position statement from the American Alliance for Health, Physical Education, Recreation and Dance (AAHPERD) regarding youth sports ("Maximizing the benefits," 2013). "Maximizing the Benefits of Youth Sport" (2013) emphasized there were many advantages to participating in youth sports, such as improved health, managed weight, lifetime habits of physical activity, enhanced skills and mobility, social interaction,

decreased risk to heart disease, diabetes, and overweight. The position statement stipulated that athletics afforded an area for youth to be physically involved and to decrease the amount of time consumed in inactive quests, “such as watching TV and playing video games” (p. 9).

Jacobs and Wright (2014) found that youth athletics could play an important role to help youth to appreciate activity and to grow in their management abilities. Youth learned how to work with others through teamwork and solving problems together. Youth may also enhance their abilities to set goals as part of an athletic team.

Model programs. Schools have an opportunity to ensure students are getting the appropriate amount of physical activity through physical education classes, recess, and implementing model programs. An article in *Curriculum Review* (“Action for healthy kids,” 2008) urged that continued improvements needed to be made to nutrition and in the time students were engaged in physical activities. The authors indicated that children demonstrated better academic performance when they engaged in physical activity. *Curriculum Review* (“Action for healthy kids,” 2008) reported:

> The National Association for Sport and Physical Education (NASPE) recommends that children take part in 60 minutes of physical activity conducive to youth’s age on just about every day of the week. However, 1 of 3 elementary schools does not offer daily recess, and just 4% offer daily P.E classes. And, physical education actually declines as students go through school (p. 11).

The article suggested that improvements were needed and identified that "schools need to raise physical activity to a higher priority, said Judith Young, PhD, vice president for programs at the American Alliance for Health, Physical Education, Recreation, and

Dance (AAHPERD) and Chair of Action for Healthy Kids" ("Action for healthy kids,", 2008, p. 11).

Model programs provided opportunities for professionals to provide quality physical activity for youth. Model programs attempted to increase and engage children's physical activity time. Corbin et al. (2014) stated, the goal of the Comprehensive School Physical Activity Programs (CSPAP) was to motivate schools to implement challenging and interesting environments in which the students would participate in a total of 60 minutes of activity daily through activities established by school districts. Corbin et al. (2014) added, the CDC and the AAHPERD released guidelines and strategies for establishing Comprehensive School Physical Activity Programs (CSPAP). The goal of the CSPAP movement was to advance youth through physical activity by taking part in at least 60 minutes of activity everyday which would lead to a lifetime of understanding, abilities, and self-assurance for an active lifestyle (Corbin et al.).

First Lady Michelle Obama, the National Football League, and the National Dairy Council became involved in promoting healthy eating, combined with physical activity, to encourage a healthy lifestyle. The programs reached into schools and could be viewed in commercials, with athletes encouraging the audience to become active. Michelle Obama started a program in February 2010, called Let's Move, targeted at reducing youth obesity. Lustig (2010) summarized, "The initiative has four pillars: more nutrition information, increased physical activity, easier access to healthful foods and personal responsibility" (p. 8). The Let's Move program provided resources for schools to provide quality physical activity with a focus of 60 minutes of daily physical activity (Lustig, 2010).

A model program created by the Alliance for a Healthier Generation, founded by the American Heart Association and Clinton Foundation, was called The Healthy Schools Program. The organization was concerned about the obesity epidemic and wanted to provide healthy alternatives. According to *Our Story (*2014) the Healthy Schools Program which was started in 2006, was a nationwide instrument designed to address the youth obesity crisis. The Healthy Schools Program was a six-step process that encompassed building a team, assessing the school's health related programs, putting together a plan, developing resources, taking action, and rewarding achievements.

Programs endorsed by the American Heart Association (2014) that were also used in schools included the Jump Rope for Heart and the National Football League's Play 60 Challenge. These model programs were used as supplements to the school's curricula. The Jump Rope for Heart program emphasized cardiovascular activity to promote the importance of maintaining cardiovascular health. Students typically took part in jump rope activities in school or after school. Participants collected donations for the American Heart Association (AHA) to use for research in combating cardiovascular disease. The AHA provided resources for educating the students about cardiovascular diseases and materials to conduct the program. According to Hernandez, Gober, Boatwright, and Strickland (2009) Jump Rope for Heart was a combined program with the AAHPERD and the AHA.

The AHA teamed up with the National Football League (NFL) with a program called NFL Play 60 Challenge. Bartram (2014) researched this program and found it has been in existence since 2007, while the NFL has provided around $200 million to fund this program. The NFL Play 60 Challenge was geared towards schools with the goal of

getting students engaged in physical activity for at least 60 minutes a day, for a six week challenge. The school was provided resources, such as guides, planners, a classroom scoreboard for tracking progress, and certificates for students meeting the program's goal (Bartram, 2014).

Schools had opportunities to put into place model programs that were effective at promoting healthy lifestyles. Schools could assist in setting the foundation for youth to make healthy choices. Model programs provided valuable education and application towards an active healthy lifestyle.

Fitness testing. Fitness testing evolved in the United States through the founding of the President's Council on Youth Fitness by President Eisenhower in 1956. Domangue and Solmon (2009) found the initial adolescence fitness assessment in the United States inaugurated in 1957. They conveyed that youth in the United State recorded lower scores than youth from Europe on the Kraus–Weber minimum fitness examination. They stated, "Almost 58% of children from the USA failed the minimum fitness test, compared to only 8.7% of children from Europe" (Domangue & Solmon, p. 584). Fitness assessments were introduced as a means to advance fitness ranks for youth.

School districts in the United States were facing a time of standards-based education that involved mandated student assessments. The Presidential Youth Fitness Program (PYFP, 2014) found that 13 states and the District of Columbia conducted and reported fitness assessment data to their state education or health departments. The PYFP also suggested using fitness data with making curricula changes, examining long-term data tendencies, and detecting youth's fitness stages. The National Association for Sport and Physical Education (NASPE, 2010) indicated the purpose of fitness assessments

should be to provide information to students and parents about the importance of fitness. The individualized fitness report allowed the students and parents to develop a program to enhance their level of fitness. NASPE (2010) went on to add that fitness testing results should not be used to determine a student's grade or to determine effectiveness of an instructor due to a wide range of variables involved with fitness assessments.

The President's Challenge (2014b) fitness test was used prior to the new Presidential Youth Fitness Program. Students were tested in five events: mile run or half mile run, curl-ups, push-ups or pull-ups, shuttle run and v-sit or sit, and reach test. The President's Challenge was a norm-referenced assessment. The test had three levels of achievement: Presidential, National and Participant. Students that scored at 85% or better met the Presidential standard, scoring at 50% or better met the National standard and completing all five events qualified students for the Participant level (President's Challenge, 2014a, p. 16).

The President's Challenge (2014) information included the Presidential Youth Fitness Program. This program served as a guideline for fitness instruction within a complete, excellent physical education program. The Presidential Youth Fitness Program afforded resources and tools for physical education instructors to enrich their fitness training method. This included: *Fitnessgram*® fitness assessment, teaching schemes to encourage youth physical activity and fitness, announcement tools to support physical education instructors to increase cognizance about their work in the classroom and choices to distinguish fitness and physical activity attainments. The Presidential Youth Fitness Program supplanted the President's Challenge Youth Fitness Test to accentuate the school's part in endorsing the health and welfare of all schoolchildren.

The *Missouri Physical Fitness Assessment Manual* (2000) Missouri required that fifth and ninth grade were given the *Missouri Physical Fitness Assessment*. The mandate for the fitness assessment began in the spring of 2001. The assessment was voluntary in 2000. Starting with the 2014 - 2015 school year, seventh grade was included in Missouri. The activities that were assessed with the *Missouri Physical Fitness Assessment* are derived from the President's Challenge and *Fitnessgram*®

According to the *Missouri Physical Fitness Assessment Manual* (2000), the *Missouri Physical Fitness Assessment* was designed to meet three distinct purposes. First, the assessment delivered students, teachers, and parents/guardians with data concerning the student's present fitness standing. Second, the assessment offered evidence for program valuation. Third, the assessment afforded data for statewide observing of fitness scores of Missouri's grade five and nine students. Students in Missouri were assessed in four areas of fitness: aerobic capacity, abdominal strength/endurance, upper body strength/endurance and flexibility.

The *Fitnessgram*® assessment goal was to engage students in the testing process and for students to be able to evaluate their personal levels of fitness. Graser, Sampson, Pennington, and Prusak (2011) added *Fitnessgram*® was not comparing students to other students of the same criteria, *Fitnessgram*® was instead comparing the results to gauges related to one's individual fitness levels. Students were provided the opportunity to see their results, as opposed to being compared to the same aged students (Graser et al.).

Fitness Awards

MODESE devised an awards system for students, schools, and school districts. Students could qualify for a certificate by at least meeting each physical fitness standard.

Schools could attain the school improvement award if at least 95% of students took the assessment in Fifth or ninth grade, show 1% improvement in each of the four separate assessments in the year before, or 90% of students tested at least meet all four of the physical fitness standards two years in a row (Department Physical Fitness Awards Criteria, 2012, para. 3). School districts could qualify for the champion award if 95% of students in grades five and nine in physical education courses take the physical fitness assessment and the district improves at least 1% in each of the four fitness components. A district may also receive the award if a minimum of 90% of fifth and ninth grade students meet the physical fitness standards in all four areas for two years in succession (Department Physical Fitness Awards Criteria, para. 4).

A total of 69 schools out of 1844 in Missouri qualified for the school award in 2012 and 56 schools out of 1845 met the marks for 2013. The percentage of schools that qualified for the award in 2012 was 3.7% and a decrease by 0.7% to 3.0% of schools met the criteria for the award in 2013. Figure 1 presents the number of schools that received the Missouri Physical Fitness School Award (Department Physical Fitness Awards Criteria, 2012, p. 1).

Figure 1 illustrates the total number of schools that met the measures for the Missouri Physical Fitness School Award. The total receiving the award in 2012 was 69 schools out of 1844 schools and the total earning the award in 2013 was 56 schools out of 1845 (Department Physical Fitness Awards Criteria, 2012, p. 1).

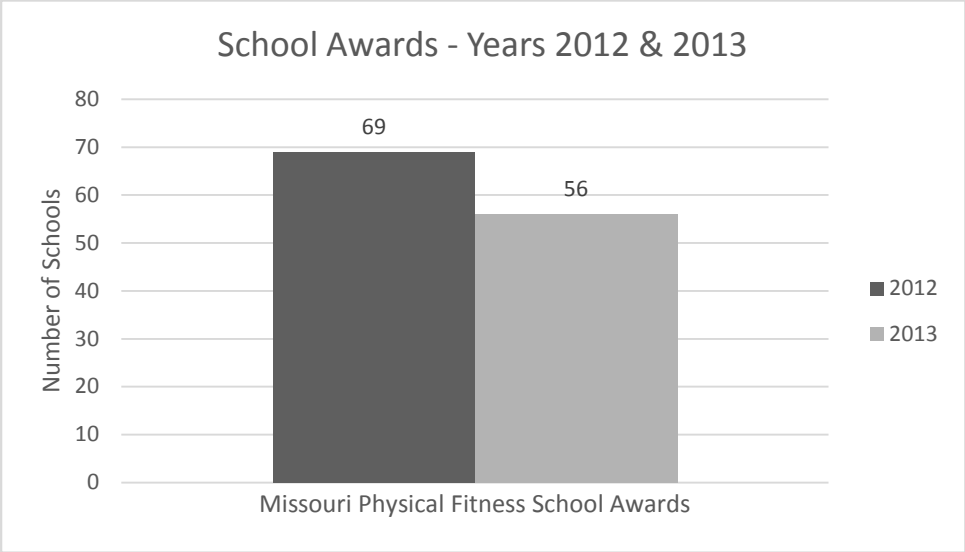

Figure 1. Missouri physical fitness school awards

Table 2 represents the schools that received the Missouri Physical Fitness School Award for 2012. The 2012 list of school awards was a total of 24 schools at the fifth grade level, four schools at the ninth grade level and 41 division of youth services centers (Department Physical Fitness Awards Criteria, 2012, p. 1).

Table 2.

List of School Physical Fitness Awards 2012.

School Name	Grade Level	School District
Alexander Doniphon	5	Liberty 53
Altenburg Elementary	5	Altenburg 48
Alternative Resources	9	Division of Youth Services
Babler Lodge	9	Division of Youth Services
Bissell Hall	9	Division of Youth Services
Boncl Elementary	5	Boncl R-X
Cainsville Elementary	5	Cainsville R-1

Table 2. (continued)

List of School Physical Fitness Awards 2012.

School Name	Grade Level	School District
Camp Avery Park	9	Division of Youth Services
Centralia Intermediate	5	Centralia R-VI
Community Learning Center	9	Division of Youth Services
Cordill-Mason Elementary	5	Blue Springs R-IV
Cornerstone	9	Division of Youth Services
Cowgill Elementary	5	Cowgill R-VI
Daniel Young Elementary	5	Blue Springs R-IV
Datema House	9	Division of Youth Services
Delmina Woods Youth	9	Division of Youth Services
Discovery Hall	9	Division of Youth Services
Drexel Elementary	5	Drexel R-IV
Don Bosco Education Center	9	Don Bosco Education Center
Echo Day Treatment Center	9	Division of Youth Services
Excel School	9	Division of Youth Services
Fort Bellefontaine	9	Division of Youth Services
Franklin Smith Elementary	5	Blue Springs R-IV
Freshman Center	9	Blue Springs R-IV
Frontier School of Innovation	5	Frontier School of Innovation
Fulton Treatment Center	9	Division of Youth Services
Gateway School	9	Division of Youth Services
Gentry Residential Center	9	Division of Youth Services
Girardot Center	9	Division of Youth Services
Green Gables Lodge	9	Division of Youth Services
Hillsboro Treatment Center	9	Division of Youth Services
Hogan St. Regional Center	9	Division of Youth Services
James Lewis Elementary	5	Blue Springs R-IV

Table 2. (continued)

List of School Physical Fitness Awards 2012.

School Name	Grade Level	School District
James Walker Elementary	5	Blue Springs R-IV
Lafayette Senior High	9	Rockwood R-VI
Langsford House	9	Division of Youth Services
La Plata Elementary	5	La Plata R-II
Lewis and Clark	9	Division of Youth Service
Licking Elementary	5	Licking R-VIII
Manes Elementary	5	Manes R-V
Montgomery City	9	Division of Youth Services
Mt. Vernon Treatment Center	9	Division of Youth Services
N.E. Community Treatment Center	9	Division of Youth Services
New Day-Day Treatment Center	9	Division of Youth Services
New Madrid Bend	9	Division of Youth Services
Northwest Regional Youth	9	Division of Youth Services
Pleasant View Elementary	5	Pleasant View R-VI
Point Elementary	5	Mehlville R-IX
Quest Day Treatment Center	9	Division of Youth Services
Reach St. Louis	9	Division of Youth Services
Rich Hill Youth	9	Division of Youth Services
Riverbend Treatment Center	9	Division of Youth Services
Rosa Parks Center	9	Division of Youth Services
Shoal Creek Elementary	5	Liberty 53
Sierra-Osage	9	Division of Youth Services
Sikeston Hope Center	9	Division of Youth Services
South Fork Elementary	5	West Plains R-VII
Spanish Lake	9	Division of Youth Services
Stanberry Elementary	5	Stanberry R-II

Table 2. (continued)

List of School Physical Fitness Awards 2012.

School Name	Grade Level	School District
S.T.A.R. Day Treatment Center	9	Division of Youth Services
Sturgeon High School	9	Sturgeon R-V
Truman Elementary	5	Lindbergh School District
Twin Rivers	9	Division of Youth Services
Watkins Mill Park	9	Division of Youth Services
Waverly Regional	9	Division of Youth Services
W.E. Sears Youth	9	Division of Youth Services
Westran Elementary	5	Westran R-1
Wilson Creek Group	9	Division of Youth Services
Worth Elementary	5	Worth County R-III

Note: Source: MODESE, 2003-2010

Table 3 represents the schools that received the Missouri Physical Fitness School Award for 2013. The 2013 list of school awards was a total of 16 schools at the fifth grade level, four schools at the ninth grade level and 36 division of youth services centers.

Table 3.

List of School Physical Fitness Awards 2013.

School Name	Grade Level	School District
Academie Lafayette	5	Academie Lafayette
Altenburg Elementary	5	Altenburg 48
Alternative Resources	9	Division of Youth Services
Atlanta High School	9	Atlanta C-3
Babler Lodge	9	Division of Youth Services

Table 3. (continued)

List of School Physical Fitness Awards 2013.

School Name	Grade Level	School District
Benton High School	9	St. Joseph
Bissell Hall	9	Division of Youth Services
Boncl Elementary	5	Boncl R-X
Camp Avery Park	9	Division of Youth Services
Community Learning Center	9	Division of Youth Services
Conerstone	9	Division of Youth Services
Cowgill Elementary	5	Cowgill R-VI
Datema House	9	Division of Youth Services
Delmina Woods Youth	9	Division of Youth Services
Discovery Hall	9	Division of Youth Services
Echo Day Treatment Center	9	Division of Youth Services
Fort Bellefontaine	9	Division of Youth Services
Freshman Center	9	Blue Springs R-IV
Fulton Treatment Center	9	Division of Youth Services
Gateway School	9	Division of Youth Services
Gentry Residential Center	9	Division of Youth Services
Girardot Center	9	Division of Youth Services
Green Gables Lodge	9	Division of Youth Services
Helena Elementary	5	Savannah R-III
Hogan St. Regional Center	9	Division of Youth Services
Hope Academy	9	Hope Academy
James Lewis Elementary	5	Blue Springs R-IV
James Walker Elementary	9	Blue Springs R-IV
Kellybrook Elementary	5	Liberty 53
Langsford House	9	Division of Youth Services
Lewis and Clark	9	Division of Youth Services

Table 3. (continued)

List of School Physical Fitness Awards 2013.

School Name	Grade Level	School District
Manes Elementary	5	Manes R-V
Met Day Treatment Center	9	Division of Youth Services
Miami Elementary	5	Miami R-I
Missouri City Elementary	5	Missouri City 56
Montgomery City	9	Division of Youth Services
Mt. Vernon Treatment Center	9	Division of Youth Services
New Day-Day Treatment Center	9	Division of Youth Services
New Madrid Bend	9	Division of Youth Services
New York Elementary	5	New York R-IV
N. E. Community Treatment Center	9	Division of Youth Services
North Glendale Elementary	5	Kirkwood R-VII
Northwest Regional Youth	9	Division of Youth Services
Park Hill Day School	5	Park Hill
Pond Elementary	5	Rockwood R-VI
Quest Day Treatment Center	9	Division of Youth Services
Rich Hill Youth	9	Division of Youth Services
Rosa Parks Center	9	Division of Youth Services
Sierra-Osage	9	Division of Youth Services
Sikeston Hope Center	9	Division of Youth Services
Twin Rivers	9	Division of Youth Services
Watkins Mill Park	9	Division of Youth Services
Waverly Regional	9	Division of Youth Services
W.E. Sears Youth	9	Division of Youth Services
Westchester Elementary	5	Kirkwood R-VII
Wilson Creek Group	9	Division of Youth Services

Note: DYS – Division of Youth Services. Source: MODESE, 2003-2010

Figure 2 illustrates the total school districts that met the measures for the Missouri Physical Fitness District Award. The total receiving the award in 2012 was six school districts out of 524 and the total earning the award was six school districts out of 524 for 2013.

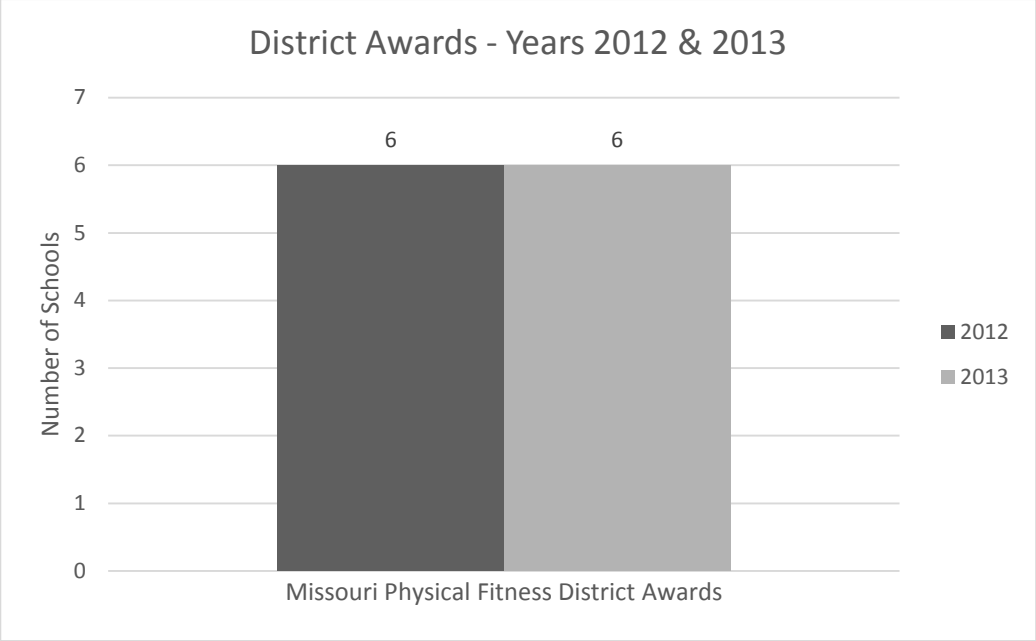

Figure 2. Missouri physical fitness district awards

Table 4 lists the districts that received the 2012 Missouri Physical Fitness Award.

Table 4.

List of School District Physical Fitness Awards 2012.

School District	Grade Level Served
Altenburg 48	K - 8
Blue Springs R-VI	K - 12
Boncl R-X	K - 8
Cowgill R-VI	K - 8
Manes R-V	K - 8
Pleasant View R-VI	K - 8

Note: Source: MODESE, 2003-2010

Table 5 represents the school districts that received the Missouri Physical Fitness District Award for 2013.

Table 5.

List of School District Physical Fitness Awards 2013.

School District	Grade Level Served
Altenburg 48	K - 8
Boncl R-X	K - 8
Cowgill R-VI	K - 8
Manes R-V	K - 8
Miami R-1	K - 8
Missouri City	K - 8

Note: Source: MODESE, 2003-2010

School Districts Receiving the District Award in 2012 and 2013

Four school districts were able to repeat the award from 2012 to 2013 (Table 6). The 2012 list of school districts, according to MODESE (2014), receiving the district award included five K – 8 school districts and one K – 12 school district. The 2013 list included six K – 8 school districts with no K – 12 school districts receiving the school district award. The total percentage of school districts receiving the district award was 1% for both 2012 and 2013. 2012 was the first year schools or school districts were eligible to receive a fitness award from MODESE.

Table 6.

List of School District Physical Fitness Awards 2012 and 2013.

School District	
Altenburg 48	Cowgill R-VI
Boncl R-X	Manes R-V

Note: Source: MODESE, 2003-2010.

Presidential Youth Fitness Program (2014) suggested the fitness testing trend was to move away from norm-referenced comparisons to testing that indicated an individual's level of health. Children could utilize the assessment information to create individualized fitness plans to improve their health. The individualized data could also serve as a valuable tool to assist children on improving their health. Goal setting and analyzing an individual's level of fitness was a trend that was becoming more conventional.

Physical Benefits of Physical Activity

Physical activity provided health benefits, such as maintaining proper weight, controlling blood pressure, reducing risk for diseases, and improving strength and flexibility. Parrish, Okely, Stanley, and Ridgers' (2013) research indicated a lack of exercise played a primary role in the diagnoses of cardiovascular diseases, diabetes, weakening of bone density, various cancers, mental health concerns, and being overweight. They specifically stated "the benefits of physical activity (PA) in maintaining optimal health and well-being in children and adolescents are undisputed" (p. 288). The researchers also recommended no less than 60 minutes per day of conducive exercise. Alves (2014) supported physical activity as having numerous helpful properties on reducing heart disease hazards. Belton, O'Brien, Meegan, Woods, and Issartel (2014) found exercise to be a proactive approach in controlling weight, obesity issues, and for youth an avenue to minimize further medical problems later in life. Their research also supported youth managing at least 60 minutes of daily physical activity.

Reiner et al. (2013) indicated that regular physical activity may prevent and slow down dementia and Alzheimer's. "There is some evidence which indicates that physical activity has a positive effect against the development and progress of these two diseases"

(p. 2). Reiner et al. (2013) went on to add "the reviewed studies have shown that physical activity could help in the prevention of non-communicable and age-related diseases" (p. 7).

Research by Reiner et al. (2013) suggested research placed physical activity as one of the most important things someone could do to improve their overall health and wellness. Physical activity was a proactive solution to maintaining and improving one's health.

Mental and Emotional Benefits of Physical Activity

Physical activity was known to improve someone's overall health and contribute to a productive lifestyle. Physical activity has been specifically linked to mental benefits. Depression is a mental health disorder that has been prevalent throughout the nation. According to Stanton, Happell, and Reaburn (2014) "Mental illnesses are estimated to contribute to 13% of the total global burden of disease" (p. 46). People with mental health illnesses experience loss of work and financial burdens. A positive correlation exists between physical activity and mental health. Individuals are often encouraged to participate in physical exercise to reduce symptoms of mental illness (Stanton et al., 2014). According to Faulkner (2007) a recommended daily physical exercise of 30 minutes could be an effective treatment in the fight against depression. "A recent study found that this amount of exercise was an effective treatment for mild to moderate depression" (Faulkner, p. 3).

Griffiths, Dowda, Dezateux, and Pate's (2010) findings provided evidence that "boys and girls who participated in sport had fewer mental health problems, and more prosocial behaviors irrespective of the duration of their daily screen-entertainment use"

(p. 5). This report placed a tremendous amount of importance on implementing physical activity into youth lifestyles in order to have good mental and emotional health. Griffiths' et al.'s (2010) conclusion from their research indicated, "The findings of this study suggest an association between sport and better mental health" (p. 10).

Bassuk, Church, and Manson (2013) found that there was an abundance of studies providing evidence of benefits extending beyond the physical aspects. Benefits of exercise included, but are not limited to, the ability to focus, which lessened the manifestation of anxiety and depression. Dohle and Wansink (2013) pointed out exercise had benefits mentally and was a successful action in handling medical depression. The physical benefits of exercise were obvious in society and the mental rewards were not too far behind, considering the amount of research available for review, at the time.

Social Benefits of Physical Activity

Research suggested that physical activities, such as, team sports, physical education classes and family activities provided social opportunities, benefits and motivation for physical exercise. Research by Ommundsen, Gundersen, and Mjaavatn (2010) revealed physical activity played a role in peer social engagement by affirming discoveries which showed that physical activity also involved a social aspect, offering chances for social communication, approval, and social growth. The environment of team sports encouraged social skills and communication with peers and adults. Eime, Young, Harvey, Charity, and Payne (2013) found, "Furthermore, there is a general consensus that participation in sport for children and adolescence is associated with improved psychological and social health, above and beyond other forms of leisure-time PA" (p. 19).

Social physical activities could also provide value by gaining youth's interest to engage in physical activities. According to Brockman, Jago, and Fox (2011) research indicated a qualitative research study in the United States with youth, which discovered the crucial factors for physical activity amid adolescence to include social time with friends, acquisition of healthy habits, and for the girls to avoid monotony.

Research by Fedewa, Candelaria, Erwin, and Clark, (2013) implied that several pieces of academic work showed advances in social skills and also cut down on hostile conduct for younger students involved in organized free play. Research indicated social activities, such as recess could provide valuable opportunities to meet the demands of physical activity recommendations. Efrat (2013) suggested recess in schools allowed the best occasion for all youth to get exercise. Efrat went on to add that recess was a more effective approach than physical education for engaging youth in physical activities.

Academic Benefits of Physical Activity

Daily physical activity not only improved physical, mental and social health, but also, according to research could enhance cognition. A study on 400 adolescents by Negi and John (2012) to see if physical activity improved academic production concluded that youth improved their academic learning, as well as their physical health. Research by Smith and Lounsbery (2009) suggested mental performance was dramatically better after youth engaged in physical exercise. After participating in 30 minutes of physical activity it was found that students' ability to focus increases.

Torlakson and Ross (2012) confirmed active students performed better on assessments than their peers who did not participate in physical activity. They stated research published by the Archives of *Pediatric and Adolescent Medicine* report, "After a

systematic review of more than 800 studies, a highly respected team of researchers reported that students who are physically active earn higher grades and score better on achievement tests than their inactive peers" (p. 1).

Valenti (2014) reported that physical activity could benefit students with attention deficit hyperactivity disorder (ADHD). Valenti added that ADHD improved with consistent physical activity and increased mental, physical, and social skills. An article produced by the Centers for Disease Control and Prevention titled, "Health and Academic Achievement" (2014) attributed improved academic performance, enhanced memory, and good manners to youth that were active physically. In essence physical activity not only supported mental and physical health, it promoted cognitive abilities.

Research conducted by Van, Kelder, Kohl III, Ranjit, and Perry (2011) revealed physical activity had a positive influence on academic performance. Their findings concluded "an association exists between physical fitness and academic performance in schoolchildren" (p. 737). The research supported physical activity does not inhibit academic performance. Their research also confirmed the most significant relationship between academics and physical fitness was cardiovascular fitness.

Bass, Brown, Laurson, and Coleman (2013) conducted research that linked physical fitness to academic performance at the middle school level. The findings suggested a connection of aerobic capacity with academic achievement. The research supported physical fitness as a key component to improving academic achievement scores.

Conclusion

The review of the literature confirmed that rising obesity rates in youth were a bi-product of a lack of physical activity. This research consistently documented a recommended minimum of 60 minutes of physical activity per day. Activity and physical fitness programs reduced symptoms of mental health illnesses, reduced risk of cardiovascular disease and diabetes, increasing overall health and well-being as well as improving concentration and ability to complete tasks. It was imperative that youth have the opportunity to maximize their potential as demonstrated by continued physical activity and exercise.

Research also substantiated physical education courses should be taught by qualified instructors that have the appropriate qualifications. The 2014 United States Report Card (National Activity Plan, 2014) on Physical Activity for Children and Youth offered, "P.E. classes should be taught by trained teachers or P.E. specialist and designed to produce maximal physical activity benefits" (p. 26). Instructors also needed to stay current on training and implement best practices in order to get the best results.

The old way of teaching traditional physical education consisted of team sports and motor skill development. Physical education was moving toward fitness-based activities, assessments, and included students forming lifelong health skills. Research offered the advantages of youth sports and clubs by providing our youth with the opportunity to participate in physical activities. Model programs, such as the National Football League's play 60 Challenge, Jump Rope for Heart, and Let's Move, provided creative assistance to our schools and communities in developing effective activities promoting physical and mental well-being.

Due to the increased focus on academic achievement, many schools have reduced physical activity time and physical educators. This literature review has substantiated the importance of physical activity by validating improvements in the academic realm. The literature reviewed for this study provided background for the Missouri physical fitness testing to determine the impact Missouri Senate Bill 291 has had on the passing rate of the Missouri physical fitness scores.

In conclusion, it seems that the importance of incorporating strategies targeted towards fighting obesity was evident. It was paramount that our youth were provided physical activity opportunities in order to ward off obesity and other health risks. Physical activity may also, according to research, be linked with higher academic achievement scores.

Missouri took an initiative towards protecting physical activity in public schools with the passing of Missouri Senate Bill 291 in the year 2009. The mandate was a positive step towards proactively improving the future of our youth. The passing of Missouri Senate Bill 291 provided an avenue for researchers to continue to monitor physical activity time and physical fitness scores.

Chapter Three: Methodology

Overview

The intent of this study was to assess the potential impact of the 2009 passage of Missouri Senate Bill 291 on fifth and ninth grade Missouri state physical fitness, as measured by performance on the *Missouri Physical Fitness Assessment*. The Missouri Department of Elementary and Secondary Education (MODESE) collected fitness data for fifth and ninth grade. The data has been collected for the years 2002 through 2012. This secondary data set had not been analyzed at the time of this writing. In 2010, Missouri Senate Bill 291, included in Appendix B, was implemented. MODESE's (2014) *Interpretation of Law Relating to Physical Activity* explained this piece of legislation by stating that school districts in the state of Missouri would enforce moderate physical activity for students, including those in alternative education programs. Elementary schools were required to provide an average of 150 minutes of activity in a five day school week. The moderate physical activity was to be appropriate for individuals protected under the Disabilities Education Act, or Section 504 of the Rehabilitation Act (para. 2).

The purpose of this study was, in part, to assess whether the passing of Missouri Senate Bill 291 contributed to a significant impact on physical fitness standards, as indicated by comparing physical fitness assessment scores for the years 2002 to 2009 against fifth and ninth grade results from 2010 to 2012.

This study builds upon existing research by Mears (2010) and Sanchez-Vaznaugh, Sánchez, Rosas, Baek, and Egerter, (2012) in the physical education field and may provide an opportunity to open discussion on effective physical education curricula

within grade schools in the state of Missouri. Study procedures were approved by the Lindenwood University Institutional Review Board. Due to the secondary nature of the data, this study had exempt status. This chapter will introduce research hypotheses, sampling strategy, methods of data collection, details on fitness assessment used, and data analysis procedures.

Purpose of the Dissertation

The purpose of this research study was to ascertain the extent to which Missouri Senate Bill 291 may have impacted physical fitness standards of fifth and ninth grade students in the state of Missouri, indicated by performance on physical fitness assessments.

Null Hypotheses

The following null hypothesis was proposed for this study, divided into nine individual hypotheses for purposes of statistical analysis:

Null Hypothesis: Fifth and ninth grade physical fitness student scores for aerobic capacity, abdominal strength/endurance, upper body strength/endurance, and flexibility will not improve following the passing of Missouri Senate Bill 291.

Null Hypothesis #1: Fifth grade physical fitness scores for aerobic capacity have not improved following the passing of Missouri Senate Bill 291.

Null Hypothesis #2: Fifth grade physical fitness scores for abdominal strength/endurance have not improved following the passing of Missouri Senate Bill 291.

Null Hypothesis #3: Fifth grade physical fitness scores for upper body strength/endurance have not improved following the passing of Missouri Senate Bill 291.

Null Hypothesis #4: Fifth grade physical fitness scores for flexibility have not improved following the passing of Missouri Senate Bill 291.

Null Hypothesis #5: Ninth grade physical fitness scores for aerobic capacity have not improved following the passing of Missouri Senate Bill 291.

Null Hypothesis #6: Ninth grade physical fitness scores for abdominal strength/endurance have not improved following the passing of Missouri Senate Bill 291.

Null Hypothesis #7: Ninth grade physical fitness scores for upper body strength/endurance have not improved following the passing of Missouri Senate Bill 291.

Null Hypothesis #8: Ninth grade physical fitness scores for flexibility have not improved following the passing of Missouri Senate Bill 291.

Null Hypothesis #9: Overall physical fitness scores for fifth and ninth grade students have not improved following the passing of Missouri Senate Bill 291.

Additionally, the following null hypothesis was proposed, divided into four cases for statistical analysis:

Null Hypothesis: For fifth and ninth grade physical fitness students there will be no relationship between the dimensions of physical fitness of aerobic capacity, abdominal strength/endurance, upper body strength/endurance, and flexibility before passing of Missouri Senate Bill 291 nor after passing of Missouri Senate Bill 291

Null Hypothesis #10: For fifth grade physical fitness students there will be no relationship between the dimensions of physical fitness of aerobic capacity, abdominal strength/endurance, upper body strength/endurance, and flexibility before passing of Missouri Senate Bill 291.

Null Hypothesis #11: For fifth grade physical fitness students there will be no relationship between the dimensions of physical fitness of aerobic capacity, abdominal strength/endurance, upper body strength/endurance, and flexibility after passing of Missouri Senate Bill 291.

Null Hypothesis #12: For ninth grade physical fitness students there will be no relationship between the dimensions of physical fitness of aerobic capacity, abdominal strength/endurance, upper body strength/endurance, and flexibility before passing of Missouri Senate Bill 291.

Null Hypothesis #13: For ninth grade physical fitness students there will be no relationship between the dimensions of physical fitness of aerobic capacity, abdominal strength/endurance, upper body strength/endurance, and flexibility after passing of Missouri Senate Bill 291.

Researcher Background

The researcher served as a Missouri Assessment Program physical education and health item writer for MODESE in 1999. The researcher was also selected to score the Missouri Assessment Program Physical Education and Health assessments in 2000, in Indianapolis, IN. The researcher was a physical education instructor in a Missouri school district. The researcher's school district, prior to passage of Missouri Senate Bill 291 in 2009, offered of an average of 150 minutes of physical activity per week for students at the elementary level. The school district increased physical activity at the elementary school level to an average of 180 minutes per week in 2010-2011 school year, following the passage of Missouri Senate Bill 291. The 30-minute increase resulted in 25 minutes of additional recess time and five minutes more of physical education instruction.

Participants

All data sets analyzed in this study were secondary in nature. Indirect study participants who contributed to the secondary data included all fifth and ninth grade students participating in the Missouri statewide Physical Fitness Assessment for the years 2002 through 2012. The state of Missouri mandated reporting of physical fitness scores from school districts beginning in 2001. In 2002, there were 525 schools across the state of Missouri that submitted fitness scores to MODESE (MODESE, personal communication, June 5, 2014). Much of the data was incomplete for some school districts. Over the course of the next twelve years, despite mandatory reporting requirements, some school districts continued to not submit annual fitness testing scores. In 2012, there were 561 school districts listed on the MODESE fitness report sheet. A large number of these school districts had incomplete or missing data (MODESE, personal communication, June 4, 2014). After data cleaning, it was found that 242 school districts completed full remittance of fitness testing reports for the 11 years (2002-2012). For the purposes of this study, only these 242 school districts, representing approximately 50% of total number of Missouri school districts, were retained for data analysis (Table 7).

Table 7.

School Districts Included in the Analysis

Affton 101	Newburg R-II
Arcadia Valley R-II	Nixa R-II
Aurora R-VIII	Normandy
Ava R-I	North Callaway Co. R-I
Bernie R-XIII	North Kansas City 74
Bloomfield R-XIV	North Nodaway Co. R-VI
Blue Eye R-V	North Platte Co. R-I

Table 7. (continued)

School Districts Included in the Analysis	
Blue Springs R-IV	North St. Francois Co. R-I
Boonville R-I	North Wood R-IV
Butler R-V	Northeast Randolph Co. R-IV
Cabool R-IV	Northwest R-I
Camdenton R-III	Norwood R-I
Cameron R-I	Oak Grove R-VI
Carl Junction R-I	Oak Ridge R-VI
Caruthersville 18	Odessa R-VII
Cassville R-IV	Oregon-Howell R-III
Centralia R-VI	Orrick R-XI
Chillicothe R-II	Osage Co. R-I
Clark Co. R-I	Osage Co. R-II
Clever R-V	Osage Co. R-III
Columbia 93	Park Hill
Crawford Co. R-II	Parkway C-2
Dexter R-XI	Pattonville R-III
Dixon R-I	Perry Co. 32
Doniphan R-I	Pike Co. R-III
East Prairie R-II	Plato R-V
El Dorado Springs R-II	Platte Co. R-III
Elsberry R-II	Pleasant Hill R-III
Excelsior Springs 40	Polo R-VII
Ferguson-Florissant R-II	Poplar Bluff R-I
Fox C-6	Portageville
Francis Howell R-III	Potosi R-III
Fredericktown R-I	Princeton R-V
Ft. Zumwalt R-II	Putnam Co. R-I
Fulton 58	Ralls Co. R-II
Galena R-II	Raytown C-2
Gasconade Co. R-II	Reeds Spring R-IV
Grain Valley R-V	Republic R-III

Table 7. (continued)

School Districts Included in the Analysis	
Grandview C-4	Richards R-V
Green Forest R-II	Richmond R-XVI
Green Ridge R-VIII	Ritenour
Hannibal 60	Riverview Gardens
Harrisonville R-IX	Rockwood R-VI
Hartville R-II	Rolla 31
Hazelwood	Salem R-80
Henry Co. R-I	Santa Fe R-X
Hermitage R-IV	Sarcoxie R-II
Hickory Co. R-I	Savannah R-III
Hillsboro R-III	Schuyler Co. R-I
Holcomb R-III	Scotland Co. R-I
Holden R-III	Scott City R-I
Hollister R-V	Scott Co. Central
Houston R-I	Scott Co. R-IV
Independence 30	Sedalia 200
Jackson R-II	Senath-Hornersville C-8
Jennings	Seneca R-VII
Johnson Co. R-VII	Shelby Co. C-1
Joplin R-VIII	Shelby Co. R-IV
Joplin Schools	Sheldon R-VIII
Kansas City 33	Sherwood Cass R-VIII
Kearney R-I	Silex R-I
Kelso C-7	Slater
Kennett 39	Smithton R-VI
Kirksville R-III	Smithville R-II
Kirkwood R-VII	South Callaway Co. R-II
Knob Noster R-VIII	South Harrison Co. R-II
Knox Co. R-I	Southern Boone Co. R-I
La Monte R-IV	Southern Reynolds Co. R-I
Laclede Co. R-I	Southwest R-V

Table 7. (continued)

School Districts Included in the Analysis	
Ladue	Sparta R-III
Lafayette Co. C-1	Spokane R-VII
Lamar R-I	Springfield R-XII
Lawson R-XIV	St. Charles R-VI
Lebanon R-III	St. Clair R-XIII
Lee's Summit R-VII	St. Elizabeth R-IV
Leeton R-X	St. James R-I
Leopold R-III	St. Joseph
Lewis Co. C-1	St. Louis City
Lexington R-V	Stanberrry R-II
Liberal R-II	Ste. Genevieve Co. R-II
Liberty 53	Stewartsville C-2
Lincoln R-II	Stoutland R-II
Lindbergh R-VIII	Strafford R-VI
Lindbergh Schools	Sturgeon R-V
Linn Co. R-I	Sullivan
Lockwood R-I	Summersville R-II
Logan-Rogersville R-VIII	Sweet Springs R-VII
Macks Creek R-V	Taneyville R-II
Macon Co. R-I	Tarkio R-I
Maplewood-Richmond Height	Thayer R-II
Marceline R-V	Trenton R-IX
Maries Co. R-I	Troy R-III
Maries Co. R-II	Twin Rivers R-X
Marion C. Early R-V	Union R-XI
Marionville R-IX	University City
Marshall	Valley Park
Marshfield R-I	Van Buren R-I
Maryville R-II	Van-Far R-I
McDonald Co. R-I	Verona R-VII
Meadow Heights R-II	Warren Co. R-III

Table 7. (continued)

School Districts Included in the Analysis	
Meadville R-IV	Warrensburg R-VI
Mehlville R-IX	Warsaw R-IX
Meramec Valley R-III	Washington
Mexico 59	Waynesville R-VI
Mid-Buchanan Co. R-V	Weaubleau R-III
Midway R-I	Webb City R-VII
Miller R-II	Webster Groves
Moberly	Wentzville R-IV
Monett R-I	West Nodaway Co. R-I
Moniteau Co. R-I	West Plains R-VII
Monroe City R-I	West Platte Co. R-II
Montgomery Co. R-II	West St. Francois Co. R-I
Morgan Co. R-II	Wheatland R-II
Mountain Grove R-III	Willard R-II
Mountain View-Birch Tree	Willow Springs R-IV
Mt. Vernon R-V	Windsor C-1
Neelyville R-IV	Winfield R-IV
Neosho R-V	Winona R-III
New Franklin R-I	Winston R-VI
New Haven	Woodland R-IV
New Madrid Co. R-I	Wright City R-II of Warrenton

Research Setting

Data for this study was obtained from MODESE, for the years 2002 through 2012. Based upon the National Education Association Annual Report (NEA, 2014), Missouri ranked ninth in the nation in number of total school districts with 524, for 2012-2013 school year (p. 86). The NEA report listed Missouri as the 18th largest state in terms of public school enrollment, with 906,811 students during the 2012-2013 year (p. 87). Missouri also ranked number 16 in total number of high school graduates for the

academic school year 2012-2013 (p. 12). Data was collected by certified physical education teachers employed through public school districts across the state and submitted to MODESE for official record keeping.

Research Design

This study was a quantitative exploratory study using a secondary data set provided by MODESE. Physical fitness scores on the state-mandated *Missouri Physical Fitness Assessment* were collected by physical education specialists once a year for fifth and ninth grade. The *Physical Fitness Assessment* provided four sub-categories of physical fitness: aerobic capacity, abdominal strength, upper body strength, and flexibility. Data was subjected to a comparative design assessing differences between scores for years 2002-2009, pre-Missouri Senate Bill 291, and 2010-2012, post-Missouri Senate Bill 291.

Missouri Physical Fitness Assessment

The Missouri Physical Fitness Assessment measured student fitness levels in grades five and nine. The assessment included four events that measured the four fitness categories of aerobic capacity, abdominal strength/endurance, upper body strength/endurance, and flexibility.

Aerobic capacity. In the state of Missouri, aerobic capacity at the elementary school level was measured by one of the following tests: one-mile run/walk test or Progressive Aerobic Cardiovascular Endurance Run (PACER) test. The *Missouri Physical Fitness Assessment Manual* (2000) explained the one-mile run/walk, "To measure the time it takes a student to walk and/or run a one-mile distance at the fastest pace possible. If a student cannot run the total distance, walking is permitted" (p. 5). The

Missouri Physical Fitness Assessment Manual (2000) defined the PACER, "To determine aerobic capacity by having students run as long as possible back and forth across a 20 meter (21 yards and 32 inches) course at a specified pace that gets faster each minute" (p. 6).

Abdominal strength. In the state of Missouri, abdominal strength/endurance at the elementary level was measured by one of the following tests: Curl-Ups (one minute), Curl-Up (cadence), or Partial Curl-Up.

Curl-up: "To measure abdominal strength and endurance by counting the maximum number of curl-ups performed in one minute" (*Missouri Physical Fitness Assessment Manual,* 2000, p. 7).

Curl-up (cadence): "To measure abdominal muscle strength and endurance by counting the number of curl-ups performed in a controlled rhythmical fashion every 3 seconds up to a maximum of 75 seconds" (*Missouri Physical Fitness Assessment Manual,* 2000, p. 7).

Partial Curl-up: "To measure abdominal strength and endurance by counting the maximum number of curl-ups completed" (*Missouri Physical Fitness Assessment Manual,* 2000, p. 8).

Upper body strength. In the State of Missouri, upper body strength/endurance at the elementary school level was measured by one of the following tests: Push-Up, Pull-Up, Modified Pull-Up, or a Flexed Arm Hang.

Push-up: "To measure upper body strength and endurance by counting the number of push-ups the student can do at a rhythmic pace" (*Missouri Physical Fitness Assessment Manual,* 2000, p. 9).

Pull-up: "To measure upper body strength and endurance by counting the maximum number of pull-ups completed" (*Missouri Physical Fitness Assessment Manual,* 2000, p. 9).

Modified Pull-up: "To count the number of successfully completed modified pull-ups" (*Missouri Physical Fitness Assessment Manual,* 2000, p. 10).

Flexed-Arm Hang: "To measure upper body strength by timing how long the student can maintain the flexed-arm hang position" (*Missouri Physical Fitness Assessment Manual,* 2000, p. 10).

Flexibility. In the State of Missouri, flexibility at the elementary school level is measured by one of the following tests: Sit and Reach test, Back-Saver Sit and Reach test, and a V-Sit and Reach test.

Sit and Reach: "To measure flexibility of lower back and hamstrings by reaching as far as possible with the fingertips" (*Missouri Physical Fitness Assessment Manual*, 2000, p. 11).

Back-Saver Sit and Reach: "To measure hamstring flexibility by measuring how far the student can reach on the right and left sides of the body. The distance required to achieve healthy fitness range is age and sex adjusted" (*Missouri Physical Fitness Assessment Manual,* 2000, p. 12).

V-Sit Reach: "To measure the flexibility of the lower back and hamstrings by measuring how far a student can reach forward in the V position" (*Missouri Physical Fitness Assessment Manual,* 2000, p. 12).

The *Missouri Physical Fitness Assessment Manual* (2000) explained that the physical fitness testing was a part of the Missouri Assessment Program (MAP), which

was required by the Outstanding Schools Act of 1993, to assess student achievement. The health and physical education MAP assessment was created by MODESE. The test was first given to students on a pilot basis in the spring of 2000. According to the *Missouri Physical Fitness Manual* (2000),

> The assessment was mandatory for grades 5 and 9 starting in 2001. The assessment was required for all students at those grades in the spring of 2001. At each grade, the three session (two class periods) written test consists of three types of items: selected response (multiple choice), constructed response (short answer, and written performance events. In addition, a physical fitness assessment of all fifth and ninth graders was voluntary in 2000 and will be required in 2001. (p. 3)

It should be noted that the written assessment was no longer given to students, at the time of this writing. The written portion was a part of the Missouri Assessment Program (MAP) for fifth grade and ninth grade. At the time of this writing, students were only given the *Missouri Physical Fitness Assessment*.

The *Missouri Physical Fitness Assessment Manual* (2000) included objectives with goals, such as encouraging students to take part in physical activities that were fun, an assessment that could help determine fitness levels, and the ability to gather fitness scores for research.

> While the Physical Fitness Assessment is required for students in grades five and nine, it is hoped that all students in Missouri will be motivated to achieve a level of activity and fitness which is associated with the excellent health necessary for academic achievement. (p. 3)

The fitness test requirements for meeting the healthy fitness range standards were based on information found in the *Missouri Physical Fitness Assessment Manual* published in October 2000 (Appendix A).

Threats to Validity

Threat 1. The first threat to the validity of this study was the administration of the *Missouri Physical Fitness Assessment*. A difference in test administration may have created a validity threat, since different teachers conducted the fitness testing at individual school settings within the state. Differences as a result of different teachers conducting the fitness tests may have produced a variation in scores. Assessment procedures or starting cues to begin a fitness exam may have been different between the examiners.

Threat 2. Implementation was also a threat to the validity of this study. The same teacher was not used in the teaching of all students for the physical education activities. This study could not guarantee the styles, attitudes toward fitness, experience, lessons, or personal factors to be exactly equal.

Threat 3. Another threat to the validity of this study was the consideration of varying of physical activity hours. Some schools implemented structured recess in an attempt to increase physical activity. The researcher also could not plan for specific variation in activities that may have taken place during recess.

Threat 4. A threat also existed, created by varying resources available at each school. Various schools received donations or additional funding to provide equipment for physical education activities. The schools may not have all the same exact resources to use for physical education activities.

Statistical Treatment of Data

Data was submitted by MODESE to the researcher in an EXCEL spreadsheet format. In the spreadsheet, all schools with corresponding fitness data were listed by academic year for fifth grade and ninth grade students. Data was then converted to a format appropriate for SPSS 21.0 (Statistical Package for the Social Sciences). Variable string formatting was changed to reflect total number of students taking fitness assessment and total number of students passing fitness assessment. Passing scores were dictated by meeting the Healthy Fitness Range as delineated by MODESE (Table 8). For the purposes of analysis, comparison between groups was handled by using total percentage of students who passed successfully the Missouri state physical fitness assessment standard for each dimension. Data was also dummy coded to reflect the years pre-Missouri State Senate Bill 291 and post-Missouri State Senate Bill 291. Data was analyzed and cleaned using basic frequencies and descriptive statistics analysis. Comparisons were handled using Independent Sample *t*-tests using the year period as the grouping variable and percentage of students passing each fitness dimension as the testing variable. Equal variances were assumed and the statistical significance for the study was set at $p < .05$. The potential for relationships between the variables was examined through use of the Pearson Product Moment Correlation Coefficient, as calculated by the software package, after coding of the data was completed.

Table 8 represents the minimum standards for the Missouri healthy fitness range passing scores for fifth grade boys, fifth grade girls, ninth grade boys, and ninth grade girls, at the time of assessment. The fitness assessments are listed with each minimum standard for the *Missouri Physical Fitness Assessment*.

Table 8.

Healthy Fitness Standards

Fitness Variable	5th Gr. Boys	5th Gr. Girls	9th Gr. Boys	9th Gr. Girls
Aerobic Capacity				
1 Mile Run/Walk	11:30	12:30	10:00	11:30
PACER TEST	23	15	41	23
Abdominal Strength				
Curl-Up Timed	35	30	42	37
Curl-Up Cadence	12	12	21	18
Partial Curl Up	24	24	39	40
Upper Body Strength				
Push-Up Completed	7	7	12	7
Pull-Up Completed	1-3	1	1-6	1
Modified Pull-Up	5	4	8	4
Flexed Arm Hang	4-12sec	4-8sec	12-13sec	8sec
Flexibility				
Sit'n'Reach (cm)	25	28	26	31
Back Saver (inches)	8	9	8	10
V-Sit reach (inches)	1.0	3.0	0.5	3.5

Summary

This study was an exploratory study examining the potential contribution of Missouri State Senate Bill 291 (2009) to the physical fitness self-report scores of school districts in the state between the years of 2002 and 2012. The *Missouri Physical Fitness Assessment,* incorporating aerobic capacity, abdominal strength, upper body strength, and flexibility into its measures, was utilized to collect statewide fitness data for fifth grade and ninth grade students. Of the 524 school districts identified as such by MODESE, 242 school districts were included in the analysis. These were the schools submitting

complete data for the 11-year period under study. Data was analyzed using SPSS 21.0 and a series of Independent Sample *t*-tests and Pearson Product Moment Correlation Coefficient analyses were used to assess whether statistically significant differences existed for fitness scores for pre- and post-enactment of Missouri Senate Bill 291. Results of this analysis are presented in Chapter Four and a discussion of findings in Chapter Five.

Chapter Four: Results

Introduction

The purpose of this research study was to ascertain the extent to which Missouri Senate Bill 291 impacted physical fitness standards of fifth and ninth grade students in the state of Missouri. Comparison of 2002-to-2009 fitness scores to corresponding 2010-to-2012 fitness scores using a *t*-test for difference in passing rates were calculated by the Statistical Packages for Social Sciences (SPSS) 21.0. Relationships among performance on dimensions of physical fitness measured for aerobic capacity, abdominal strength/endurance, upper body strength/endurance, and flexibility were checked with the Pearson Product Moment Correlation analysis. The following chapter will present the findings and statistical analysis performed on the MODESE State Physical Fitness data set.

A case study methodology was applied to determine the potential extent to which Missouri Senate Bill 291 affected physical fitness scores of fifth and ninth grade students in the Study School District.

The Null Hypotheses applied to data in this study were:

Null Hypothesis: Fifth and ninth grade physical fitness student scores for aerobic capacity, abdominal strength/endurance, upper body strength/endurance, and flexibility will not improve following the passing of Missouri Senate Bill 291.

Null Hypothesis: For fifth and ninth grade physical fitness students there will be no relationship between the dimensions of physical fitness of aerobic capacity, abdominal strength/endurance, upper body strength/endurance, and flexibility before passing of Missouri Senate Bill 291 nor after passing of Missouri Senate Bill 291.

Aerobic capacity, abdominal strength/endurance, upper body strength/endurance, and flexibility performance were represented by student physical fitness assessment scores. Data gathered for the years 2002 through 2009 represented physical fitness performance prior to passing of the Missouri Senate Bill 291. Data gathered for the years 2010 through 2012 represented physical fitness performance following the passage of the bill.

Table 9 represents data for fifth graders taking the *Missouri Physical Fitness Assessment* for the years 2002-2009 and 2010-2012. Mean scores represent the average percentage of students passing each component of physical fitness in their respective school districts.

Table 9.

Fifth Grade Missouri Physical Fitness Passing Percentages by Year

Fitness Variable	N	Mean (%)	Standard Deviation
Aerobic Capacity			
2002-2009 Group	225	62.68	19.28
2010-2012 Group	225	64.35	20.60
Abdominal Strength			
2002-2009 Group	225	71.61	17.63
2010-2012 Group	225	72.39	18.74
Upper Body Strength			
2002-2009 Group	225	63.87	18.65
2010-2012 Group	225	65.42	19.29
Flexibility			
2002-2009 Group	225	67.10	18.36
2010-2012 Group	225	67.40	20.80

Table 10 represents data for ninth graders taking the *Missouri Physical Fitness Assessment* for the years 2002-2009 and 2010-2012. Mean scores represent the average percentage of students passing each component of physical fitness in their respective school districts.

Table 10.

Ninth Grade Missouri Physical Fitness Passing Percentages by Year

Fitness Variable	N	Mean (%)	Standard Deviation
Aerobic Capacity			
2002-2009 Group	220	64.78	18.78
2010-2012 Group	220	65.34	20.17
Abdominal Strength			
2002-2009 Group	220	73.27	18.07
2010-2012 Group	220	74.38	19.70
Upper Body Strength			
2002-2009 Group	220	69.54	18.26
2010-2012 Group	220	71.10	18.82
Flexibility			
2002-2009 Group	220	70.08	17.65
2010-2012 Group	220	72.28	19.38

Analysis of Data

The first null hypothesis was addressed by considering fifth grade data separately from ninth grade data and by considering each aspect of physical fitness assessment separately, with regard to the years before passage of Missouri Senate Bill 291, 2002-2009 and the years after passage, 2010-2012. A one-tailed independent *t*-test for difference in passing rates was applied.

The second hypothesis was addressed by considering fifth grade data separately from ninth grade data and by considering the relationship each aspect of physical fitness assessment may have to other aspects, considering potential relationships for the years before passage of Missouri Senate Bill 291, 2002-2009 separately from potential relationships for the years after passage, 2010-2012. A Pearson Product Moment Correlation Coefficient was calculated to determined potential relationships.

Results of Analysis

Null Hypothesis: Fifth and ninth grade physical fitness student scores for aerobic capacity, abdominal strength/endurance, upper body strength/endurance, and flexibility will not improve following the passing of Missouri Senate Bill 291.

The first null hypothesis proposed for this study was divided into nine individual categories for analysis, discussed in this section.

Table 11 represents results found for an Independent Samples *t*-test run to determine whether statistically significant differences exist between fifth grade students in the years 2002-2009 and 2010-2012 groups on the four dimensions of physical fitness as assessed by the *Missouri Physical Fitness Assessment*.

Table 11.

Pre-to-Post Fitness: Missouri Fifth Grade Passing Scores

Fitness Variable	t	df	Significance
Aerobic Capacity	-1.70	2063	.089
Abdominal Strength	-.874	2063	.382
Upper Body Strength	-1.645	2063	.100
Flexibility	-.315	2063	.753

Null Hypothesis #1: Fifth grade physical fitness scores for aerobic capacity have not improved following the passing of Missouri Senate Bill 291.

Null Hypothesis #1 was not rejected (t-test value = -1.70; p = 0.089). Data did not support a significant difference in the percentage of Missouri fifth grade students with passing Physical Fitness Assessment scores for aerobic capacity when comparing the years 2002-2009, pre-Missouri Senate Bill 291, to the years 2010-2012, post-Missouri Senate Bill 291.

Null Hypothesis #2: Fifth grade physical fitness scores for abdominal strength/endurance have not improved following the passing of Missouri Senate Bill 291.

Null Hypothesis #2 was not rejected (*t*-test value = -0.874; p = 0.382). Data did not support a significant difference in the percentage of Missouri fifth grade students with passing Physical Fitness Assessment scores for abdominal strength/endurance when comparing the years 2002-2009, pre-Missouri Senate Bill 291, to the years 2010-2012, post-Missouri Senate Bill 291.

Null Hypothesis #3: Fifth grade physical fitness scores for upper body strength/endurance have not improved following the passing of Missouri Senate Bill 291.

Null Hypothesis #3 was not rejected (*t*-test value = -1.645; p = 0.100). Data did not support a significant difference in the percentage of Missouri fifth grade students with passing Physical Fitness Assessment scores for upper body strength/endurance when comparing the years 2002-2009, pre-Missouri Senate Bill 291, to the years 2010-2012, post-Missouri Senate Bill 291.

Null Hypothesis #4: Fifth grade physical fitness scores for flexibility have not improved following the passing of Missouri Senate Bill 291.

Null Hypothesis #4 was not rejected (*t*-test value = -0.315; p = 0.753). Data did not support a significant difference in the percentage of Missouri fifth grade students with passing Physical Fitness Assessment scores for flexibility when comparing the years 2002-2009, pre-Missouri Senate Bill 291, to the years 2010-2012, post-Missouri Senate Bill 291.

Table 12 represents results found for an Independent Samples *t*-test run to determine whether statistically significant differences exist between ninth grade students in the years 2002-2009 and 2010-2012 groups on the four dimensions of physical fitness as assessed by the *Missouri Physical Fitness Assessment*.

Table 12.

Pre-to- Post Fitness: Missouri Ninth Grade Passing Scores

Fitness Variable	t	df	Significance
Aerobic Capacity	-.582	2018	.561
Abdominal Strength	-1.191	2018	.234
Upper Body Strength	-1.679	2018	.093
Flexibility	-2.417	2018	.016*

Note: *p<.05

Null Hypothesis #5: Ninth grade physical fitness scores for aerobic capacity have not improved following the passing of Missouri Senate Bill 291.

Null Hypothesis #5 was not rejected (*t*-test value = -0.582; p = 0.561). Data did not support a significant difference in the percentage of Missouri ninth grade students with passing Physical Fitness Assessment scores for aerobic capacity when comparing the years 2002-2009, pre-Missouri Senate Bill 291, to the years 2010-2012, post-Missouri Senate Bill 291.

Null Hypothesis #6: Ninth grade physical fitness scores for abdominal strength/endurance have not improved following the passing of Missouri Senate Bill 291.

Null Hypothesis #6 was not rejected (*t*-test value = -1.191; p = 0.234). Data did not support a significant difference in the percentage of Missouri ninth grade students with passing Physical Fitness Assessment scores for abdominal strength/endurance when comparing the years 2002-2009, pre-Missouri Senate Bill 291, to the years 2010-2012, post-Missouri Senate Bill 291.

Null Hypothesis #7: Ninth grade physical fitness scores for upper body strength/endurance have not improved following the passing of Missouri Senate Bill 291.

Null Hypothesis #7 was not rejected (*t*-test value = -1.679; p = 0.093). Data did not support a significant difference in the percentage of Missouri ninth grade students with passing Physical Fitness Assessment scores for body strength/endurance when comparing the years 2002-2009, pre-Missouri Senate Bill 291, to the years 2010-2012, post-Missouri Senate Bill 291.

Null Hypothesis #8: Ninth grade physical fitness scores for flexibility have not improved following the passing of Missouri Senate Bill 291.

Null Hypothesis #8 was rejected (*t*-test value = -2.417; p = 0.016). Data did support a significant increase in the percentage of Missouri ninth grade students with passing Physical Fitness Assessment scores for flexibility when comparing the years 2002-2009, pre-Missouri Senate Bill 291, to the years 2010-2012, post-Missouri Senate Bill 291.

Table 13 suggests that there is a statistically significant difference in total passing rates for students across four dimensions of physical fitness when comparing the pre-

Missouri State Senate Bill 291 group ($\mu = 67.88$, $s = 11.98$) to the post-Missouri State Senate Bill 291 group ($\mu = 69.05$, $s = 13.67$).

Table 13.

Pre-to- Post Fitness: Missouri Fifth and Ninth Grade Fitness

Variable	t	df	Significance
Average Total Passing Students	-2.168	2018	.030*

Note: p<.05.

Null Hypothesis #9: Overall physical fitness scores for fifth and ninth grade students have not improved following the passing of Missouri Senate Bill 291.

Null Hypothesis #9 was rejected (*t*-test value = -2.168; p = 0.030). Data did support a significant increase in the percentage of Missouri fifth and ninth grade with passing Physical Fitness Assessment scores for overall fitness when comparing the years 2002-2009, pre-Missouri Senate Bill 291, to the years 2010-2012, post-Missouri Senate Bill 291.

The second null hypothesis in this study checked for potential relationships between the four physical fitness categories.

Null Hypothesis: For fifth and ninth grade physical fitness students there will be no relationship between the dimensions of physical fitness of aerobic capacity, abdominal strength/endurance, upper body strength/endurance, and flexibility before passing of Missouri Senate Bill 291 nor after passing of Missouri Senate Bill 291.

Table 14 suggests that there is a statistically significant correlation between fitness scores for students taking the statewide fitness test in the fifth grade prior to the passing of Senate Bill 291. High scores on one dimension reflect high scores on the other dimensions.

Table 14.

Pre-Missouri Senate Bill 291: Fitness for Missouri Fifth Grade

Fitness Variable	Aerobic Capacity	Abdominal	Upper Body	Flexibility
Aerobic Capacity			.	
Pearson Correlation	1	.475**	.531**	.489**
Sig. (2-tailed)		.000	.000	.000
N	1519	1519	1519	1519
Abdominal Strength				
Pearson Correlation	.475**	1	.492**	.614**
Sig. (2-tailed)	.000		.000	.000
N	1519	1519	1519	1519
Upper Body Strength				
Pearson Correlation	.531**	.492	1	.516**
Sig. (2-tailed)	.000	.000		.000
N	1519	1519	1519	1519
Flexibility				
Pearson Correlation	.489**	.614**	.516**	1
Sig. (2-tailed)	.000	.000	.000	
N	1519	1519	1519	1519

Note: ** Correlation is significant at $p<0.01$

Null Hypothesis #10: For fifth grade physical fitness students there will be no relationship between the dimensions of physical fitness of aerobic capacity, abdominal strength/endurance, upper body strength/endurance, and flexibility before passing of Missouri Senate Bill 291.

Null Hypothesis #10 was rejected. Data did support a significant, moderate relationship between performance by fifth grade students in the categories of aerobic capacity, abdominal strength/endurance, upper body strength/endurance, and flexibility

before the passage of Missouri Senate Bill 291, when considering data for the years 2002-2009, pre-Missouri Senate Bill 291.

The Pearson Product Moment Correlation Coefficients representing the relationship between aerobic capacity and abdominal strength/endurance was 0.475; aerobic capacity and upper body strength/endurance was 0.531; aerobic capacity and flexibility was 0.489; abdominal strength/endurance and upper body strength/endurance was 0.492; abdominal strength/endurance and flexibility was 0.614; and upper body strength/endurance and flexibility was 0.516.

Table 15 suggests that there is a statistically significant correlation between fitness scores for students taking the statewide fitness test in the fifth grade after the passing of Senate Bill 291. High scores on one dimension reflect high scores on the other dimensions.

Null Hypothesis #11: For fifth grade physical fitness students there will be no relationship between the dimensions of physical fitness of aerobic capacity, abdominal strength/endurance, upper body strength/endurance, and flexibility after passing of Missouri Senate Bill 291.

Null Hypothesis #11 was rejected. Data did support a significant, moderate relationship between performance by fifth grade students in the categories of aerobic capacity, abdominal strength/endurance, upper body strength/endurance, and flexibility before the passage of Missouri Senate Bill 291, when considering data for the years 2010-2012, post-Missouri Senate Bill 291.

Table 15.

Post-Missouri Senate Bill 291: Fitness for Missouri Fifth Grade

Fitness Variable	Aerobic Capacity	Abdominal	Upper Body	Flexibility
Aerobic Capacity			.	
Pearson Correlation	1	.565**	.581**	.557**
Sig. (2-tailed)		.000	.000	.000
N	546	546	546	546
Abdominal Strength				
Pearson Correlation	.565**	1	.534**	.676**
Sig. (2-tailed)	.000		.000	.000
N	546	546	546	546
Upper Body Strength				
Pearson Correlation	.581**	.534**	1	.532**
Sig. (2-tailed)	.000	.000		.000
N	546	546	546	546
Flexibility				
Pearson Correlation	.557**	.676**	.532**	1
Sig. (2-tailed)	.000	.000	.000	
N	546	546	546	546

Note: ** Correlation is significant at $p<0.01$.

The Pearson Product Moment Correlation Coefficients representing the relationship between aerobic capacity and abdominal strength/endurance was 0.565; aerobic capacity and upper body strength/endurance was 0.581; aerobic capacity and flexibility was 0.557; abdominal strength/endurance and upper body strength/endurance was 0.534; abdominal strength/endurance and flexibility was 0.676; and upper body strength/endurance and flexibility was 0.532.

Table 16 suggests that there is a statistically significant correlation between fitness scores for students taking the statewide fitness test in the ninth grade prior to the

passing of Senate Bill 291. High scores on one dimension reflect high scores on the other dimensions.

Table 16.

Pre-Missouri Senate Bill 291: Fitness for Missouri Ninth Grade

Fitness Variable	Aerobic Capacity	Abdominal	Upper Body	Flexibility
Aerobic Capacity			.	
Pearson Correlation	1	.602**	.562**	.535**
Sig. (2-tailed)		.000	.000	.000
N	1484	1484	1484	1484
Abdominal Strength				
Pearson Correlation	.602**	1	.541**	.629**
Sig. (2-tailed)	.000		.000	.000
N	1484	1484	1484	1484
Upper Body Strength				
Pearson Correlation	.562**	.541**	1	.568**
Sig. (2-tailed)	.000	.000		.000
N	1484	1484	1484	1484
Flexibility				
Pearson Correlation	.535**	.629**	.568**	1
Sig. (2-tailed)	.000	.000	.000	
N	1484	1484	1484	1484

Note: ** Correlation is significant at $p<0.01$.

Null Hypothesis #12: For ninth grade physical fitness students there will be no relationship between the dimensions of physical fitness of aerobic capacity, abdominal strength/endurance, upper body strength/endurance, and flexibility before passing of Missouri Senate Bill 291.

Null Hypothesis #12 was rejected. Data did support a significant, moderate relationship between performance by fifth grade students in the categories of aerobic

capacity, abdominal strength/endurance, upper body strength/endurance, and flexibility before the passage of Missouri Senate Bill 291, when considering data for the years 2002-2009, pre-Missouri Senate Bill 291.

The Pearson Product Moment Correlation Coefficients representing the relationship between aerobic capacity and abdominal strength/endurance was 0.602; aerobic capacity and upper body strength/endurance was 0.562; aerobic capacity and flexibility was 0.535; abdominal strength/endurance and upper body strength/endurance was 0.541; abdominal strength/endurance and flexibility was 0.629; and upper body strength/endurance and flexibility was 0.568.

Table 17 suggests that there is a statistically significant correlation between fitness scores for students taking the statewide fitness test in the ninth grade after the passing of Senate Bill 291. High scores on one dimension reflect high scores on the other dimensions.

Null Hypothesis #13: For ninth grade physical fitness students there will be no relationship between the dimensions of physical fitness of aerobic capacity, abdominal strength/endurance, upper body strength/endurance, and flexibility after passing of Missouri Senate Bill 291.

Null Hypothesis #13 was rejected. Data did support a significant, moderate relationship between performance by fifth grade students in the categories of aerobic capacity, abdominal strength/endurance, upper body strength/endurance, and flexibility before the passage of Missouri Senate Bill 291, when considering data for the years 2010-2012, post-Missouri Senate Bill 291.

Table 17.

Post-Missouri Senate Bill 291: Fitness for Missouri Ninth Grade

Fitness Variable	Aerobic Capacity	Abdominal	Upper Body	Flexibility
Aerobic Capacity			.	
Pearson Correlation	1	.628**	.685**	.601**
Sig. (2-tailed)		.000	.000	.000
N	536	536	536	536
Abdominal Strength				
Pearson Correlation	.628**	1	.674**	.696**
Sig. (2-tailed)	.000		.000	.000
N	536	536	536	536
Upper Body Strength				
Pearson Correlation	.685**	.674**	1	.637**
Sig. (2-tailed)	.000	.000		.000
N	536	536	536	536
Flexibility				
Pearson Correlation	.601**	.696**	.637**	1
Sig. (2-tailed)	.000	.000	.000	
N	536	536	536	536

Note: ** Correlation is significant at p<0.01.

The Pearson Product Moment Correlation Coefficients representing the relationship between aerobic capacity and abdominal strength/endurance was 0.628; aerobic capacity and upper body strength/endurance was 0.685; aerobic capacity and flexibility was 0.601; abdominal strength/endurance and upper body strength/endurance was 0.674; abdominal strength/endurance and flexibility was 0.696; and upper body strength/endurance and flexibility was 0.637.

Descriptive Pre-Post Comparison of Study District to State Average

Table 18 represents the specific comparison for fitness scores from one selected Study School District in Missouri. The purpose of showing this comparison is to highlight the fact that Study School District attempted to meet the Senate Bill 291 mandate by adding 25 minutes of recess and five minutes of physical education time into the school's daily schedule. Interestingly, fitness scores on all four dimensions decreased when comparing years 2002-2009 and 2010-2012 for the fifth graders. Differences were less obvious for the ninth grade population.

Table 18.

Study School District Pre- and Post- to Missouri Mean Percentage

	5th Grade			9th Grade		
	Pre	Post	State Mean%	Pre	Post	State Mean%
Aerobic Capacity	68.00	65.10	(64.35)	64.87	60.82	(65.34)
Abdominal Strength	78.10	72.45	(72.39)	71.70	70.88	(74.38)
Upper Body Strength	67.53	63.52	(65.42)	58.93	59.84	(71.10)
Flexibility	67.71	66.99	(67.40)	65.60	65.80	(72.28)

Note: Pre includes years 2002-2009 and Post includes years 2010-2012. Includes 5th and 9th grade data.

Summary

Following analysis of the data set, a number of important findings became apparent. First and foremost, every physical fitness variable experienced an increase in terms of total average number of passing students in the post-Missouri State Senate Bill 291 group. This was true of fifth graders and ninth graders across the four dimensions of physical fitness incorporating aerobic capacity, abdominal strength, upper body strength, and flexibility. However, only one individual variable was found to be statistically

significant and that was for flexibility in the ninth grade at $p<.05$ level of significance. Post 2010 students scored over 2 points higher than the pre 2010 student group for flexibility. When total passing rates across all four fitness variables were taken into consideration, the post 2010 group scored statistically significantly higher than the pre-2010 group.

The *Missouri Physical Fitness Assessment* data for fifth grade percentage of passing scores improved in all four fitness dimensions between the years of 2003 and 2010. In addition, the *Missouri Physical Fitness Assessment* data for ninth grade percentage of passing scores improved in all four fitness dimensions between the years of 2003 and 2010. However, approximately 30% of students failed to meet the required standard for a passing score.

Chapter Five: Discussion and Conclusions

Introduction

This study examined eleven years of physical fitness scores on the *Missouri Physical Fitness Assessment* administered by MODESE. Specifically, the purpose of this study was to assess the extent to which Missouri State Senate Bill 291 contributed to improvement in fitness scores throughout the state of Missouri. Missouri Senate Bill 291 (2009) mandated physical education at the elementary school level and prescribed mandatory requirements in terms of hours of physical activity/physical education participation. The discussion in this chapter will review the findings of this quantitative study. Specifically, conclusions will be drawn from the data, limitations of the study will be discussed, and practical implications and suggestions for future study will be outlined.

Hypotheses

The following hypothesis was proposed for this study, divided into nine individual hypotheses for purposes of statistical analysis:

Hypothesis: Fifth and ninth grade physical fitness student scores for aerobic capacity, abdominal strength/endurance, upper body strength/endurance, and flexibility will improve following the passing of Missouri Senate Bill 291.

Hypothesis #1: Fifth grade physical fitness scores for aerobic capacity have improved following the passing of Missouri Senate Bill 291.

Hypothesis #2: Fifth grade physical fitness scores for abdominal strength/endurance have improved following the passing of Missouri Senate Bill 291.

Hypothesis #3: Fifth grade physical fitness scores for upper body strength/endurance have improved following the passing of Missouri Senate Bill 291.

Hypothesis #4: Fifth grade physical fitness scores for flexibility have improved following the passing of Missouri Senate Bill 291.

Hypothesis #5: Ninth grade physical fitness scores for aerobic capacity have improved following the passing of Missouri Senate Bill 291.

Hypothesis #6: Ninth grade physical fitness scores for abdominal strength/endurance have improved following the passing of Missouri Senate Bill 291.

Hypothesis #7: Ninth grade physical fitness scores for upper body strength/endurance have improved following the passing of Missouri Senate Bill 291.

Hypothesis #8: Ninth grade physical fitness scores for flexibility have improved following the passing of Missouri Senate Bill 291.

Hypothesis #9: Overall physical fitness scores for fifth and ninth grade students have improved following the passing of Missouri Senate Bill 291.

Additionally, the following hypothesis was proposed, divided into four cases for statistical analysis:

Hypothesis: For fifth and ninth grade physical fitness students there will be a relationship between the dimensions of physical fitness of aerobic capacity, abdominal strength/endurance, upper body strength/endurance, and flexibility before passing of Missouri Senate Bill 291 or after passing of Missouri Senate Bill 291

Hypothesis #10: For fifth grade physical fitness students there will be a relationship between the dimensions of physical fitness of aerobic capacity, abdominal strength/endurance, upper body strength/endurance, and flexibility before passing of Missouri Senate Bill 291.

Hypothesis #11: For fifth grade physical fitness students there will be a relationship between the dimensions of physical fitness of aerobic capacity, abdominal strength/endurance, upper body strength/endurance, and flexibility after passing of Missouri Senate Bill 291.

Hypothesis #12: For ninth grade physical fitness students there will be a relationship between the dimensions of physical fitness of aerobic capacity, abdominal strength/endurance, upper body strength/endurance, and flexibility before passing of Missouri Senate Bill 291.

Hypothesis #13: For ninth grade physical fitness students there will be a relationship between the dimensions of physical fitness of aerobic capacity, abdominal strength/endurance, upper body strength/endurance, and flexibility after passing of Missouri Senate Bill 291.

Results and Rationales

In order to test the research hypotheses, a comparison of statewide 2002-2009 fitness scores to statewide 2010-2012 fitness scores, measured by the *Missouri Physical Fitness Assessment,* was conducted using SPSS 21.0. For data generated by fifth grade students, Null Hypotheses #1, #2, #3, and #4 were not rejected, hence the corresponding Hypotheses #1, #2, #3, and #4 were not supported by the data. However, Null Hypotheses #10 and #11 were rejected and the corresponding Hypotheses #10 and #11 were supported by data. Therefore, a comparison of statewide 2002-2009 fitness scores to statewide 2010-2012 fitness scores for Missouri fifth graders indicated a significant relationship between the dimensions of physical fitness before the passing of Missouri Senate Bill 291 (2002-2009). For fifth grade students before passing of the bill, there was

a moderate-to-weak relationship between aerobic capacity and abdominal strength/endurance (0.475); aerobic capacity and upper body strength/endurance (0.531); aerobic capacity and flexibility (0.489); abdominal strength/endurance and upper body strength/endurance (0.492); abdominal strength/endurance and flexibility (0.614); and upper body strength/endurance and flexibility (0.516).

Data also supported a significant relationship between the dimensions of physical fitness after the passing of Missouri Senate Bill 291 (2010-2013). For fifth grade students there was a moderate relationship between aerobic capacity and abdominal strength/endurance (0.565); aerobic capacity and upper body strength/endurance (0.581); aerobic capacity and flexibility (0.557); abdominal strength/endurance and upper body strength/endurance (0.534); abdominal strength/endurance and flexibility (0.676); and upper body strength/endurance and flexibility (0.532).

For data generated by ninth grade students, Null Hypotheses #5, #6, and #7 were not rejected, hence the corresponding Hypotheses #5, #6, and #7 were not supported by the data. However, Null Hypotheses #8, #10 and #11 were rejected and the corresponding Hypotheses #8, #10 and #11 were supported by data. Therefore, a comparison of statewide 2002-2009 fitness scores to statewide 2010-2012 fitness scores for Missouri ninth graders indicated a significant increase in the percentage of Missouri ninth grade students with passing Physical Fitness Assessment scores for flexibility when comparing the years to the years 2010-2011.

In addition, a comparison of statewide 2002-2009 fitness scores to statewide 2010-2012 fitness scores for Missouri ninth graders indicated a significant relationship between the dimensions of physical fitness before the passing of Missouri Senate Bill 291

(2002-2009). For ninth grade students before passing of the bill, there was a moderate-to-mild relationship between aerobic capacity and abdominal strength/endurance (0.602); aerobic capacity and upper body strength/endurance (0.562); aerobic capacity and flexibility (0.535); abdominal strength/endurance and upper body strength/endurance (0.541); abdominal strength/endurance and flexibility (0.614); and upper body strength/endurance and flexibility (0.568).

Data also supported a significant relationship between the dimensions of physical fitness after the passing of Missouri Senate Bill 291 (2010-2012). For ninth grade students there was a moderate-to-mild relationship between aerobic capacity and abdominal strength/endurance (0.628); aerobic capacity and upper body strength/endurance (0.685); aerobic capacity and flexibility (0.601); abdominal strength/endurance and upper body strength/endurance (0.674); abdominal strength/endurance and flexibility (0.696); and upper body strength/endurance and flexibility (0.637).

For overall results that included both fifth and ninth grade students Null Hypothesis #9 was rejected, hence Hypothesis #9 was supported by data. Therefore, there was an overall significant improvement in performance in physical education when comparing the years 2002-2009 to the years 2010-2012.

These interpretations will further discuss the significance of the findings. An Independent Sample *t*-test for Comparison of Pre-Missouri Senate Bill 291 and Post-Missouri Senate Bill 291 fitness scores for Missouri ninth graders was conducted and found to have a statically significant change ($p < .05$, $t = -2.417$) for flexibility test (Table 12). Therefore flexibility for Missouri ninth graders appeared to have statistically

increased, post-Missouri Senate Bill 291. This may have been due to the passage of Missouri Senate Bill 291 in 2009 which mandated physical activity requirements. Interestingly, this finding of the ninth grade was inversely related to the finding for the fifth grade on flexibility. Flexibility had the smallest pre-to-post change (+.30) across all four dimensions and across both fifth grade and ninth grade. It is possible maturation, strength, or access to higher levels of sports and physical activity could be a contributing reason.

An Independent Sample *t*-test for Comparison of Pre-Missouri Senate Bill 291 and Post-Missouri Senate Bill 291 fitness scores for Missouri Fifth and ninth graders across all four dimensions of physical fitness was administered and suggested that there was a statistically significant difference in total passing rates for students across all four dimensions of physical fitness when comparing the pre-Missouri State Senate Bill 291 group ($\mu = 67.88$, $s = 11.98$) to the post-Missouri State Senate Bill 291 group ($\mu = 69.05$, $s = 13.67$). Again, this may have been due to the passage of Missouri Senate Bill 291 in 2009, which mandated physical activity requirements.

Overall, when examining the results in this study, hypothesis #8 proved the findings to be statistically significant for the dimension of flexibility. The ninth grade physical fitness scores for flexibility improved significantly following the passage of Missouri Senate Bill 291. All four dimensions of physical fitness, when grouped together for testing also proved to indicate statistically significant relationships to each other both before and after the passage of Missouri Senate Bill 291.

Limitations of the Study

While this study provided a sound quantitative design, as with any research there were limitations to the study that should be addressed. The first limitation of the study was the uniformity of the *Missouri Physical Fitness Assessment*. A difference in testing administration was a threat to the validity of this study. Different instructors were used to administer the fitness assessments, affecting the uniformity of the assessments provided to the students. Since this study utilized longitudinal, secondary data, the researcher could not control for this limitation.

Secondly, implementation is also a limitation of this study. The same administrator was not used in the teaching of all students for the physical education activities. Diverse teachers across the state of Missouri conducted the fitness assessments in different settings. Personality differences or differences in teaching style could also explain testing variation. Another variable to the limitations of this study was the varying minutes of physical activity offered in each school district. Some schools have met, while some schools exceed, the mandate of required minutes as outlined in Missouri Senate Bill 291. Once again, because of the longitudinal, secondary nature of this study, the researcher could not control for this limitation.

The final limitation existed with varying curricula across the state of Missouri school districts. Various curriculums are utilized throughout the state, a uniform curriculum has not been implemented statewide. A large sample of school districts across the state contributed to the secondary data set used for study. This was a variable not controlled for in this study design.

Recommendations and Implications for the Future

The nation's youth have been at risk of obesity due to a decline in physical activity. Therefore, research to determine the status of U.S. children's fitness levels is needed to provide data to effectively determine and monitor physical activity levels. The intent of this study was to further investigate the potential contribution of legislation in determining and monitoring physical activity levels, through use of the *Missouri Physical Fitness Assessment* scores, since the passage of Missouri Senate Bill 291, which went into effect for the 2010 – 2011 school year.

The results may provide valuable information to MODESE and to school districts across the state of Missouri. Specifically, the statistically significant relationships between all four fitness assessments for fifth grade and ninth grade post-mandate Missouri Senate Bill 291 provides a point for analysis of curriculum activities utilized during mandated physical activity time periods. The significant improvement in flexibility of ninth grade students pre- to post-Missouri Senate Bill 291 indicates a possible contribution of legislation to improvement of youth physical fitness. This research provides a foundation for the state of Missouri to report fitness assessment results to the nation to complete a national report card regarding our youth's fitness levels. The National Physical Activity Plan (2014) did not have adequate data to prepare a grade for fitness scores of our nation's children. The report stated, "However, currently there are insufficient nationally representative data available to inform the selection of a grade. Therefore, the Committee assigned an incomplete to this indicator" (p. 20).

The research also has the potential to provide school districts across the state of Missouri valuable information in regards to how each district is performing since the

passage of Missouri Senate Bill 291. This research may provide the foundation for each Missouri school district to receive its own physical fitness report card. A local physical fitness report card could potentially be compared to a state physical fitness report card to assist school districts with data to guide curricula and wellness activities.

This study indicated an approximate 70% pass rate for Missouri fifth grade and ninth grade on the four physical fitness dimensions in the state of Missouri (Pre-2009 State Bill, 67.88% pass rate; Post-2009 State Bill, 69.05% pass rate). The National Physical Activity Plan (2014) report card contained a rubric scoring guide that would give Missouri students an overall grade of a B. The National Physical Activity Plan stipulated a benchmark of 61% to 80% as a B. The idea of a 70% pass rate in other academic disciplines, such as math or communication arts, would create concerns to address the need for remediation or programs to improve those types of scores. The analysis of this study suggests that 30% of Missouri students are still struggling to meet the minimum fitness requirements for the *Missouri Physical Fitness Assessment* and should provide some motivation to explore further research to administer improvements.

This study revealed only 1% of school districts in the state of Missouri met the standards for the district fitness award. It was also noted that one K-12 school was a recipient, while the others were K-8 districts. School districts that serve grades K-12 would need to meet the standards for fifth grade and ninth grade, whereas the K-8 district would need to meet the criteria for fifth grade. The research revealed that 3.7% of schools qualified for the school award in 2012, and the percentage of schools qualifying for the award dropped to 3.0% in 2013. This trend should continue to be monitored with further research.

Data from the year 2012 revealed 69 schools attained the school fitness award, with 41 awarded to Division of Youth Services. The year 2013 indicated the number of schools qualifying for the school award decreased to 56, with 36 of those from the Division of Youth Services. Further studies of the methods or resources used by the Division of Youth Services warrants consideration, due to receipt of a high percentage of the school fitness awards.

Since 2002, MODESE has collected data from school districts across the state. Many school districts failed to submit complete data sets as required by the Missouri State Department of Education. Complete data sets were submitted by 242 school districts for the years 2002 to 2012. This is less than 50% of Missouri school districts required to submit physical fitness data. A recommendation would be for MODESE to collect data from more than just fifth grade and ninth grade. MODESE planned to start collecting fitness data for 7th grade starting in the school year 2014 – 2015. Valuable data should be collected for fifth grade, seventh grade, ninth grade, and eleventh grade. Adding an additional grade at the secondary level, such as 11th, would allow for research to be conducted to analyze the contribution to physical activity at the secondary level. MODESE should also consider compiling a comprehensive statistical fitness report available to all school districts, and the public, that could benefit curricula modifications for a school district. A complete and accurate summative report may also prove beneficial in providing valuable data for a national report. A comprehensive physical fitness report card for each district may provide benefits for school districts and communities to work together to improve fitness levels for youth throughout the state of Missouri.

A recommendation is also made to update the *Missouri Physical Fitness Manual*. The last revision occurred in 2000. Part of this recommendation is for a more uniform assessment. The year 2000 version of the testing manual had many options for conducting the fitness testing. For example, to evaluate aerobic capacity, the administrator could choose the mile run or PACER. Upper body strength/endurance could be assessed by choosing push-ups, pull-ups, modified pull-ups, or the flexed arm hang. Flexibility testing could be conducted with a sit and reach, back-saver sit and reach, or v-sit and reach assessment. The abdominal strength/endurance test could be administered by timed curl-ups, curl-up to a cadence, or partial curl-up test. Uniform testing could result in more accurate analysis of test scores. Statewide training on physical fitness testing would also assist in gathering accurate data sets.

School districts, at the time of this writing, were in a time of meeting common core state standards and accountability for demonstrating proficient academic achievement. The cross-referencing of a district's physical fitness assessments with academic test scores may prove beneficial in determining appropriate time allotments for physical education and recess. The monitoring and referencing of physical fitness test results would enhance curricula changes and assist with building schedules to construct appropriate physical activity times.

States with mandated physical activity requirements and required reporting of physical fitness scores to the state department may want to consider cross examining fitness scores with academic scores. The comparison could aid in determining appropriate physical activity needs. Many physical education teachers may voice that those youth

who are physically fit perform better academically; however, more research needs to be conducted to determine the validity of this type of statement.

A common thread throughout the research found that children need 60 minutes of physical activity per day. A health and physical education survey conducted by the Missouri Association for Health, Physical Education, Recreation, and Dance (2005) analyzed the minutes of physical activity in the Missouri schools. The findings included that approximately 50% of Missouri elementary schools schedule physical education two times per week, 8% utilize three times per week, and 8% meet daily (p. 2. The study identified that approximately 40% of elementary physical education was 20-to-30 minutes in length and 31% met in duration of 31-to-45 minutes (p. 2). The study went on to report that 68% of secondary schools had a one year physical education course requirement and 13.3% have a two year arrangement (p. 3). Class minutes for high schools were typically 46-to-60 minutes with 62.6% of schools reporting and 28% meeting over 60 minutes (p. 3). This report, coupled with the findings of 30% of Missouri students failing the *Missouri Physical Fitness Assessment,* provides a valuable baseline of data that lends itself to further research to search for data driven actions to improve physical fitness levels measured by physical fitness scores.

It is also recommended to continue to track the Missouri physical fitness data to examine trends beyond the scope of 2012. An updated study to determine applicable minutes of physical activity across the state of Missouri may prove useful for further research. The implementation of collecting fitness data for seventh grade, starting with the 2015 – 2016 school year may provide an opportunity to examine trends as youth move from elementary-to-high school settings.

Summary

In conclusion, this dissertation study may provide valuable research on the effects of Missouri Senate Bill 291 towards fifth and ninth grade physical fitness levels and an understanding of the alignment of physical fitness standards with youth fitness. The research revealed a positive correlation between the mandate and the physical fitness assessments for ninth grade flexibility. All four dimensions of the *Missouri Physical Fitness Assessment*, when analyzed as a group, were statistically significant in relation to each other both pre- and post-Missouri Senate Bill 291.

This study also discovered that three out of ten students in Missouri were not passing the *Missouri Physical Fitness Assessment*. The 30% failure of passing rate was a concern that can be further evaluated by MODESE and school districts across the state of Missouri. This research may be used in order to motivate the design and implementation of strategies or best practices to improve the passing rate on the *Missouri Physical Fitness Assessment*.

It seems evident that physical activity is paramount to youth overall well-being. Society must continue to research and implement new physical activity practices, in order to develop youth physically, academically, and socially. School districts need trained physical educators implementing curriculum designed to optimize physical activity. MODESE, school districts, and communities must collaboratively work together to research and develop policies to improve youth physical fitness. Missouri Senate Bill 291's impact should continue to be tracked to determine data trends of physical fitness levels of Missouri's youth.

The research supports 60 minutes of physical activity per day as part of a healthy lifestyle. School districts may want to consider not only meeting the Missouri Senate Bill 291 mandate, but striving toward exceeding the state minimum requirements due to the potential benefits. The benefits offered by increasing the minutes of physical activity may include improved student academic performance, better student behavior, enhanced social skills, and an overall awareness of a healthy lifestyle.

Although Missouri Senate Bill 291 generated some statistical improvement in passing scores of the *Missouri Physical Fitness Assessment,* further research may encourage an increase in mandated minutes of student physical activity. Further research could indicate the need for changes in curricula to improve physical fitness passing scores. Research may be needed to determine the quality of minutes devoted to physical fitness activities to maximize the benefits of passing scores of the *Missouri Physical Fitness Assessment*.

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Appendix A

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Missouri Physical Fitness Assessment Manual

Missouri Physical Fitness Assessment Manual

Missouri Department of Elementary and Secondary Education
D. Kent King, Commissioner of Education
October 2000

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The Missouri Physical Fitness Assessment Program is based on standards and criteria from the *President's Challenge* and the *FitnessGram*. This material is used with permission. To order these documents, you may contact the following agencies.

President's Challenge
President's Council on Physical Fitness
and Sports
200 Independence Ave., SW, Room 738H
Washington, DC 20201
Phone: 1-800-258-8146

FitnessGram
Human Kinetics
PO Box 5076
Champagne, IL 61825-5087
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INTRODUCTION

The Missouri Assessment Program (MAP), as required by the Outstanding Schools Act of 1993, measures student progress toward the Show-Me Standards. The Department of Elementary and Secondary Education developed the MAP assessment for Health and Physical Education and administered it to fifth- and ninth-grade students on a voluntary basis in the spring of 2000. The assessment will be required for all students at these grades in the spring of 2001. At each grade, the three-session (two class periods) written test consists of three types of items:

- selected response (multiple choice),
- constructed response (short answer), and
- written performance events.

In addition, a physical-fitness assessment of all fifth and ninth graders was voluntary in 2000 and will be required in 2001. **This document addresses the physical fitness components that are to be assessed and presents instructions for reporting the results.**

The goals of the Missouri Physical Fitness Assessment are to promote enjoyable regular physical activity and to provide a wellness-related fitness assessment and baseline data for Missouri's youth. While the Physical Fitness Assessment is required for students in grades five and nine, it is hoped that **all** students in Missouri will be motivated to achieve a level of activity and fitness which is associated with the excellent health necessary for academic achievement.

A quality health and physical education program seeks to develop affective, cognitive, and behavioral components for all students, regardless of gender, age, disability, or any other factor. A key concept of the Missouri Physical Fitness Assessment is that physical activity should be enjoyable and that physical activity contributes to good health, optimal functioning, learning, and well being, and is important throughout a person's lifetime. Physical fitness testing is most effective when it is part of a comprehensive physical education program that supports testing with educational and motivational information. School programs should have the long-term view of promoting appropriate physical activity rather than focusing only on developing "athletic" physical fitness.

The Missouri Physical Fitness Assessment is designed to meet three distinct purposes. First, the assessment provides students, teachers, and parents/guardians with information regarding the student's current fitness status. Fitness information can be used as the basis for designing an individualized fitness program for each student. Second, the assessment provides information for program evaluation. A teacher can determine the number of students who meet or exceed the Healthy Fitness Range (HFR) and adjust the curriculum, if needed, and encourage improvement for students at the lower end of the Healthy Fitness Range (HFR). Third, the assessment provides information for statewide monitoring of fitness levels of Missouri's fifth- and ninth-grade students.

The components to be assessed are based on the *President's Challenge* and the *FitnessGram* because these are physical fitness assessments that are commonly used in Missouri schools. Pictures and diagrams depicting how to administer each of the different tests are available in both the *President's Challenge* and *FitnessGram* manuals. (See page 2 for ordering information.)

Both the *President's Challenge* and the *FitnessGram* have been administered to millions of students and have proven to be very safe. However, teachers should recognize that the possibility of injury exists with any physical activity. Districts should establish policies related to medical information, records, and clearance for physical activity, and teachers must be knowledgeable about these policies.

Prior to conducting any fitness test, it is vital that teachers are aware of any potential student health problems. Some students may have health conditions that require considerations during the administration of fitness assessments. Maximizing the safety of all students should be of foremost consideration.

The Missouri Physical Fitness Assessment measures the following components of fitness that have been identified as being important because of their relationship to overall wellness, optimal function, and learning.

1) Aerobic Capacity (choose one of the following)
    1a) One Mile Run/Walk
    1b) The PACER

2) Abdominal strength/endurance (choose one of the following)
    2a) Curl-up (one minute)
    2b) Curl-up (cadence)
    2c) Partial Curl-up

3) Upper Body Strength/Endurance (choose one of the following)
    3a) Push-up
    3b) Pull-up
    3c) Modified Pull-up
    3d) Flexed Arm Hang

4) Flexibility (choose one of the following)
    4a) Sit and Reach
    4b) Back-Saver Sit and Reach
    4c) V-Sit Reach

5) Body Composition (optional)
    5a) Body Mass Index
    5b) Skin fold Measurements

ADMINISTRATION AND SCORING

1. AEROBIC CAPACITY

Aerobic capacity is perhaps the most important area of any fitness program. Research clearly indicates that acceptable levels of aerobic capacity are associated with a reduced risk of high blood pressure, coronary heart disease, obesity, diabetes, some forms of cancer, and other health problems in adults.

Aerobic capacity relative to body weight is considered to be the best indicator of a person's overall cardio respiratory capacity. Many terms have been used to describe this dimension of physical fitness, including cardiovascular fitness, cardio respiratory fitness, cardio respiratory endurance, aerobic fitness, aerobic work capacity, and physical working capacity. A laboratory measure of maximal oxygen uptake is generally considered to be the most accurate measure of aerobic capacity. *(FitnessGram Manual*, page 31)

(Choose one of the following to administer.)

1a. One-Mile Run/Walk

Source: *President's Challenge* and *FitnessGram*

Objective: To measure the time it takes a student to walk and/or run a one-mile distance at the fastest pace possible. If a student cannot run the total distance, walking is permitted.

Equipment: A flat running course, stopwatch, pencil, and score sheets are required. The course may be a track or any other measured area. The course may be measured using a tape measure or cross-country wheel. If the track is metric or shorter than 440 yards, adjust the running course (1609.34 meters = 1 mile; 400 meters = 437.4 yards; 1,760 yards = 1 mile). On a metric track, add 10 yards to the total four laps.

Testing: On a safe one-mile course, students begin running on the count, "**Ready? Go!**" Walking may be interspersed with running. However, students should understand that the objective is to cover the distance as fast as possible.

Recommendations for test administration: Before administering this test, students' health status should be reviewed. Students should be given ample instruction on how to pace themselves and should be allowed to practice running this distance against time. Sufficient time should be allowed for warming up and cooling down before and after the test.

Scoring: The score is the time it takes to complete the run and is recorded in minutes and seconds.

1b. PACER (*Progressive Aerobic Cardiovascular Endurance Run*)

Source: *FitnessGram*

Objective: To determine aerobic capacity by having students run as long as possible back and forth across a 20 meter (21 yards and 32 inches) course at a specified pace that gets faster each minute.

Equipment: Cassette tape player or a CD player with adequate volume, pre-recorded tape with timed "beeps" or music, marker cones, measuring tape, and a flat, non-slippery surface at least 20 meter (21 yards and 32 inches) in length. (In order to perform the PACER, a pre-recorded CD or cassette tape is needed. These are available only through *FitnessGram*.)

Set-Up: Mark the 20-meter (21 yards and 32 inches) course with marker cones to divide lanes. Also tape or chalk a line at each end. If using the audiotape, calibrate it by using the one-minute test interval at the beginning of the tape.

Testing: Following the five second count down, the student should run across the 20 meter distance and touch the line with his/her foot by the time the beep sounds. At the sound of the beep, the student turns around and runs back to the other end. If the student gets to the line before the beep, he/she must wait for the beep before running the other direction. The PACER test contains 21 levels (21 minutes). During the first minute (level one) of the PACER, the student has **nine seconds** to run the distance (20 meters). Each minute (level) the pace increases by **one-half second**.

Allow the student to attempt to catch up with the pace until he/she has missed two beeps. The student is stopped after being unable to reach the lines two times (not necessarily in succession). Students who have missed two beeps should walk away from the testing area to a designated cool-down area, being careful not to interfere with others who may still be running.

Recommendations for test administration: Students should be allowed at least two practice sessions. First, allow students to listen to several minutes of the tape so they know what to expect, and then have students perform a couple of practice runs. Allow students to select a partner, with one student performing the test while the other student counts laps.

Scoring: The score is the total **number of laps completed** by each student. Single beeps indicate the end of a lap (20-meter course). A lap is defined as running across the 20-meter distance one time.

2. ABDOMINAL STRENTH/ENDURANCE

Strength and endurance of the abdominal muscles are important in promoting good posture and correct pelvic alignment. The latter is particularly important in the maintenance of low back health.

In testing and training the muscles of this region, it is difficult to isolate the abdominal muscles. It is important to note that the new partial (abdominal) curl-ups and curl-ups with a cadence, done slowly with the knees bent and feet not held, are a better indicator of the strength and endurance of the abdominal muscles than the timed curl-ups. Furthermore, compression of the spine and assistance of hip flexor muscles are minimized in these tests. (*FitnessGram Manual*, page 21)

(Choose one of the following to administer.)

2a. Curl-up (one minute)

Source: *President's Challenge*

Objective: To measure abdominal strength and endurance by counting the maximum number of curl-ups performed in one minute.

Equipment: Stopwatch, mat or other clean and cushioned surface.

Testing: Have the student lie on a cushioned, clean surface with knees flexed and feet about 12 inches from the buttocks. The partner holds the student's feet. Arms are crossed with hands placed on opposite shoulders and elbows held close to chest. Keeping this arm position, the student raises the trunk; curling up to touch elbows to thighs, and then lowers the back to the floor so that the scapulas (shoulder blades) touch the floor. This constitutes one curl-up. To start, a timer calls the signal, "**Ready? Go!**" and begins timing the student for one minute. The student stops on the word "**Stop.**" Bouncing off the floor is not permitted.

Scoring: The number of curl-ups performed correctly in one minute.

2b. Curl-up (cadence)

Source: *FitnessGram*

Objective: To measure abdominal muscle strength and endurance by counting the number of curl-ups performed in a controlled rhythmical fashion every 3 seconds up to a maximum of 75 seconds.

Equipment: Mat or other clean, cushioned surface; a marking strip 4½ inches wide; and a cassette tape or CD player. (A pre-recorded cassette tape or CD is available through *FitnessGram*.)

Testing: A measuring strip 4½ inches wide should be placed on the floor. Allow students to select a partner. Partner A will perform the curl-ups, while partner B counts and watches for form errors. Partner B may place hands under Partner A's head, or a piece of paper may be put on the mat instead, to help Partner B see that Partner A's head touches down on each repetition. Partner A lies on a cushioned surface with knees flexed at a 140 degree angle, feet flat on the floor, arms extended forward with fingertips at the edge of the measuring strip. The feet are **NOT** held or anchored. Partner A curls up slowly, sliding the fingertips past the strip, then back down. Curl-ups are performed at a cadence of about 20 curl-ups per minute (one curl-up every three seconds). The test administrator should call an "**Up, Down**" command (cadence), or use the pre-recorded cadence found on the PACER music tape or CD from *FitnessGram*. Curl-ups are continued until the student has two form corrections, can no longer continue, or until a maximum of 75 curl-ups are performed. If the student gets off the cadence, it is an error. Two times off the cadence ends the test.

Scoring: Record only those curl-ups performed with proper form and in rhythm.

2c. Partial Curl-up

Source: *President's Challenge*

Objective: To measure abdominal strength and endurance by counting the maximum number of curl-ups completed.

Equipment: Mat or other clean and cushioned surface, metronome or audiotape.

Testing: Have student lie on cushioned surface with knees flexed and feet about 12 inches from buttocks. The feet are **NOT** held or anchored. Arms are extended forward with fingers resting on the legs and pointing toward the knees. The student's partner is behind the head with hands cupped under the student's head. The student being tested curls up slowly sliding the fingers up the legs until the fingertips touch the knees, then back down until the head touches the partner's hands. The curl-ups are done to a metronome, audiotape, or to test administrator's "**Up, Down**" command with one complete curl-up every three seconds and continued until the student has not done the last three in rhythm.

Scoring: Record only those curl-ups performed with proper form and in rhythm.

3. UPPER BODY STRENGTH/ENDURANCE

Upper body strength is important for maintaining functional health and correct posture, thereby reducing possibilities of lower-back pain and restrictions in independent living. It is important to educate students regarding the prevention of problems that can affect them as adults.

(Choose one of the following to administer.)
3a. Push-up

Source: *President's Challenge* and *FitnessGram*

Objective: To measure upper body strength and endurance by counting the number of push-ups the student can do at a rhythmic pace.

Equipment: Mat or other clean and cushioned surface, metronome, or audiotape. A pre-recorded cassette or CD is available through *FitnessGram*.

Testing: The student being tested assumes a prone position on the mat with hands placed under the shoulders, fingers stretched out, legs straight and slightly apart, and toes tucked under. The student pushes up off the mat with the arms until arms are straight, keeping legs and back straight. The back should be kept in a straight line from head to toes throughout the test. The student lowers the body, using the arms, until the elbows bend at a 90-degree angle and the upper arms are parallel to the floor. This movement is repeated as many times as possible. According to *FitnessGram*, a partner watches to see that the student being tested bends the elbow to 90 degrees with the upper arms parallel to the floor. According to *President's Challenge*, the partner holds his or her hand at the point of the 90-degree angle so the student being tested goes down only until his or her shoulder touches the partner's hand.

Push-ups are performed to a metronome, audiotape, or to the test administrator's "**Up, Down**" command, with one complete push-up every three seconds, and continued until the student has not done the last three on pace. (*FitnessGram* calls for push-ups to be continued until the second form correction is made or the student can no longer continue.)

Scoring: Record only those push-ups performed with proper form and rhythm.

3b. Pull-up

Source: *President's Challenge* and *FitnessGram*

Objective: To measure upper body strength and endurance by counting the maximum number of pull-ups completed.

Equipment: A horizontal bar approximately 1½ inch in diameter at a height from which the student can hang with arms fully extended with feet off the floor.

Testing: The student hangs from a horizontal bar with arms and body fully extended, feet free from the floor, using an overhand grasp (palms facing away from the body) or an underhand grip (palms facing toward the body). *FitnessGram* only allows the overhand grip with palms facing away from the body. Small students may be lifted to the starting position. The student raises his/her body until the chin clears the bar, and then lowers the body to full-hang starting position. The student performs as many correct pull-ups as possible.

Recommendations for test administration: Pull-ups should be done in a smooth, rather than jerky, motion. Kicking or bending the legs is not permitted, and the body should not swing during the movement.

Scoring: Total number of pull-ups the student performs correctly.

3c. Modified Pull-up

Source: *FitnessGram*

Objective: To count the number of successfully completed modified pull-ups.

Equipment: A modified pull-up stand, pencil, and score sheet are necessary to administer this test.

Testing: The student lies down on his/her back with the shoulders directly under a bar that has been set one to two inches above the student's reach. Place an elastic band seven to eight inches below and parallel to the bar.

The student grasps the bar with an overhand grip (palms away from body). Pull-up begins in "**down**" position with arms and legs straight, buttocks off the floor, and only the heels touching the floor. The student then pulls up until his/her chin is above the elastic band.

Recommendations for test administration: The movement should be done using only the arms. The body must be kept straight. The movement must be rhythmical and continuous. The student may not stop and rest. The test should be terminated if the student experiences extreme discomfort or pain.

Scoring: The score is the number of correct pull-ups performed.

3d. Flexed-Arm Hang

Source: *President's Challenge* and *FitnessGram*

Objective: To measure upper body strength by timing how long the student can maintain the flexed-arm hang position.

Equipment: A horizontal bar approximately 1½ inch in diameter (placed at a height from which the student can hang with arms and legs fully extended and with feet off the floor) and a stopwatch.

Testing: Using either the underhand or overhand grip, the student assumes a flexed-arm hang position with chin clearing the bar. (The *FitnessGram* only allows for use of the overhand grip with palms facing away from the body.) The student may be lifted to this position. The student, on the start signal, holds this position as long as possible. The chest should be held close to the bar with legs hanging straight. Time stops when the

student's chin touches or falls below the bar. (*FitnessGram* specifies the watch is stopped when the student's chin touches the bar, his head tilts backward to keep his chin above the bar, or his chin falls below the level of the bar.)

Scoring: Record the number of minutes and seconds the student maintains the proper flexed-arm hanging position.

4. FLEXIBILITY

Maintaining adequate joint flexibility is important to functional health. Decreased flexibility is generally not a significant health problem for young people. However, students need to understand the importance of maintaining flexibility and range of motion as they age.

(Choose one of the following to administer.)

4a. Sit and Reach

Source: *President's Challenge*

Objective: To measure flexibility of lower back and hamstrings by reaching as far as possible with the fingertips.

Equipment: This assessment requires a sturdy box approximately 12 inches high (four-fold mats may be stacked to 12 inches in lieu of the box). A measuring scale (meter stick) is placed on top of the box with 23 centimeters at the level of the feet.

Testing: The student removes his/her shoes and sits on the floor with knees fully extended, feet shoulder-width apart and soles of feet held flat against the end of the box (or mats). With hands on top of each other, palms down, and legs held flat, the student reaches along the measuring line as far as possible. After **three practice reaches**, the **fourth reach is held** while the distance is recorded. The legs must remain straight, soles of feet against the box, and fingertips of both hands should reach evenly along the measuring line.

Scoring: Scores are recorded to the nearest centimeter.

4b. Back-Saver Sit and Reach

Source: *FitnessGram*

The Back-Saver Sit and Reach is very similar to the traditional Sit and Reach except that it is performed one side at a time. The measurement is performed on one side at a time so that students are not encouraged to hyper extend.

Objective: To measure hamstring flexibility by measuring how far the student can reach on the right and left sides of the body. The distance required to achieve healthy fitness range is age and sex adjusted.

Equipment: This assessment requires a sturdy box approximately 12 inches high (four-fold mats may be stacked to 12-inches in lieu of the box) and a measuring scale (yardstick/twelve inch ruler).

Set-Up: The measuring scale is placed on top of the box with the 9-inch mark even with the near edge of the box. The "zero" end of the ruler is nearest the student.

Testing: The student removes his/her shoes and sits down in front of the test apparatus. One leg is fully extended with the foot **flat** against the end of the box. The other knee is bent with the sole of the foot flat on the floor and two to three inches to the side of the straight knee. The arms are extended forward over the measuring scale with the hands placed one on top of the other. With palms down, the student reaches forward with both hands along the scale four times and holds the position of the **fourth** reach for at least one second. After measuring one side, the student reverses the position of the legs and reaches again.

Scoring: Record the **highest** number of inches reached (both sides, right and left) to the nearest 1/2 inch reached and to a maximum of 12 inches.

4c. V-Sit Reach

Source: *President's Challenge*

Objective: To measure the flexibility of the lower back and hamstrings by measuring how far a student can reach forward in the V position.

Equipment: A clean surface and a measuring scale (yardstick and/or tape measure).

Set-Up: A straight line, two feet long, is marked on the floor as the baseline. A measuring line is drawn perpendicular to the midpoint of the baseline extending two feet on each side and marked off in half inches. The point where the baseline and measuring line intersect is the "zero" point.

Testing: The student removes his or her shoes and sits on the floor with a measuring line between the legs and the soles of the student's feet immediately behind the baseline, heels 8 to 12 inches apart. The student clasps his or her thumbs so that the hands are together, palms down, placing them on the measuring line. With the legs held flat by a partner, the student slowly reaches forward as far as possible, keeping his or her fingers on the baseline and feet flexed. After three practice tries, the student **holds the fourth reach** for **three seconds** while the distance reached is recorded. The legs must remain straight with the soles of the feet held perpendicular to the floor (feet flexed). Students should be encouraged to reach slowly rather than bounce while stretching.

Scoring: The score is recorded to the nearest ½ inch and is read as plus scores for reaches beyond baseline, minus scores for reaches behind baseline.

5. BODY COMPOSITION (Optional)

Although body composition is an important component of wellness-related fitness, it is not required due to the sensitive issues surrounding this component. **Districts may choose to collect this data, but they are not required to submit results to DESE.**

The body composition test results provide an estimation of the percent of a student's weight that is fat in contrast to fat-free body mass (muscles, bones, and organs). Maintaining appropriate body composition is vital in preventing the onset of obesity, which is associated with increased risk of coronary heart disease, stroke, and diabetes.

5a. Body Mass Index

Source: *President's Challenge* and *FitnessGram*

Objective: To measure the appropriateness of a child's weight relative to height.

Testing: Body Mass Index is determined by the following formula:

Weight (kg)/Height (m)^2 Weight (2.2lbs=1 kg) Height (1 inch=0.00254m)

Example: While the data can be entered in pounds and inches, the results are only meaningful with the metric formula. A 16-year-old boy weighing 154 pounds (70 kg) and 68 inches tall (1.727 meters) has a body mass index of 23.5.

Body Mass Index does not estimate the percent of fat; it merely provides information on the appropriateness of the weight relative to the height. For those children found to be heavy for their height, a skin fold test would clarify if the weight were due to excess fat. (For recommended BMI scores, refer to the manuals from *President's Challenge* and *FitnessGram*.)
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5b. Skin fold Measurements

Source: *FitnessGram*

Objective: To measure a student's triceps and calfskin fold thickness for calculation of the percent of body fat.

Equipment: A skin fold caliper is necessary to perform this measurement. Both expensive and inexpensive calipers have been shown to be effective when used by teachers who have had sufficient training and practice.

Testing: The triceps and calfskin folds are easily measured and are highly correlated with total body fat. The skin fold fat measure consists of a double layer of subcutaneous fat and skin.

The triceps skin fold is measured on the back of the arm over the triceps muscle of the right arm midway between the elbow and the acromion process of the scapula. The skin fold site should be vertical. Pinching the fold slightly above the midpoint will ensure that the fold is measured right on the midpoint.

The calfskin fold is measured on the inside of the right leg at the level of the maximal calf girth. The right foot is placed flat on an elevated surface with the knee flexed at a 90-degree angle. The vertical skin fold should be grasped just above the level of maximal girth.

Recommendations for test administration: Skin fold measurements should be performed in a setting that provides the students with privacy. Skin folds should be measured on the right side of the body. The student should be instructed to relax the arm or the leg being measured. The skin fold should be firmly grasped between the thumb and forefinger and lifted away from the other body tissue. The grasp should not be so firm that it is painful. The caliper is placed in the middle of the fold. (An instructional video for taking skin fold measurements is available through *FitnessGram*.)

Scoring: The skin fold measure is registered on the dial of the caliper. Each measurement should be taken three times, with the recorded score being the median (middle) of the three scores. Each reading is recorded to the nearest .5 millimeter.

REPORTING

School districts must report Missouri Physical Fitness Assessment results annually to the Missouri Department of Elementary and Secondary Education (DESE) for all fifth- and ninth-grade students. Use the "Missouri Criteria for the Healthy Fitness Range" on pages 20 through 24 of this manual to determine the number of students that meet or exceed the Healthy Fitness Range for each component. Record these numbers by school building on Screen 17 "Local Physical Fitness Assessment, " and transmit the data electronically to DESE no later than June 15 each year. (See page 17 for a sample of Screen 17.) Individuals in the district's central office have access to this computer screen.

Data to be collected and reported to DESE on Screen 17 includes:

- Number of fifth- and ninth-grade students by gender who are assessed
- Number of fifth- and ninth-grade students by gender who are not assessed
- Number of fifth- and ninth-grade students by gender that meet or exceed the Healthy Fitness Range
- Number of minutes per week for physical education classes for fifth-grade students
- Average class size for fifth-grade students
- Percentage of ninth-grade students who are enrolled in physical education classes
- Average class size for physical education classes that include ninth-grade students

We expect that students with special health care needs may not be able to be assessed on every component of the Physical Fitness Assessment; however, we encourage district personnel to administer as many of the components as possible. (A student's IEP will be helpful in determining which assessments can be administered.) For this reason, the number of students tested in every component may vary depending on the number of students who may not be able to be assessed due to special health-care needs.

Note: Districts should collect and report data for **all** fifth- and ninth-grade students, even though the Criteria for the Healthy Fitness Range are listed for ages.

The Missouri Department of Elementary and Secondary Education will generate a statewide report of all data collected. The goal is not to compare districts but rather to monitor statewide fitness levels over time to see if improvements are occurring. **The Department will not link results of the Physical Fitness Assessment to the student's written MAP score, and the results will not be included in the district's MSIP Performance Report.** District staff should share individual student data with students and parents/guardians for the purposes of helping students to set goals and develop a self-improvement plan.

LOCAL PHYSICAL FITNESS ASSESSMENT
(SCREEN 17)

The Local Physical Fitness Assessment screen is used to collect the results of the locally administered physical fitness assessment data. The number of students tested, number not tested, and number meeting or exceeding the healthy fitness range (HFR) are reported by school for grades 5 and 9. In addition, the number of minutes per week 5th grade students are scheduled for Physical Education (PE) and the average class size for 5th grade PE classes, and the percentage of 9th grade students enrolled in PE and the average class size for PE classes that enroll 9th grade students are reported by school.

SCREEN: 17 CORE DATA SYSTEM 04/24/2000
VERSION: 11.0 LOCAL PHYSICAL FITNESS ASSESSMENT 11:41 am

SCHOOL YEAR: ....-.. DIST CODE/NAME: ...-... .....
SCHOOL NO/NAME: .....

GRADE / GENDER	AEROBIC CAPACITY	ABDOMINAL STRENGTH	UPPER BODY STRENGTH	FLEXIBILITY
5 - FEMALE: # TESTED	0	0	0	0
: # NOT TESTED	0	0	0	0
: # > HFR	0	0	0	0
5 - MALE: # TESTED	0	0	0	0
: # NOT TESTED	0	0	0	0
: # > HFR	0	0	0	0
9 - FEMALE: # TESTED	0	0	0	0
: # NOT TESTED	0	0	0	0
: # > HFR	0	0	0	0
9 - MALE: # TESTED	0	0	0	0
: # NOT TESTED	0	0	0	0
: # > HFR	0	0	0	0

GRADE 5 - MINUTES PER WEEK: 000 AVERAGE CLASS SIZE: 00
GRADE 9 - PERCENTAGE IN PE: 0.00 AVERAGE CLASS SIZE: 00
F1 –HELP
F2 –BROWSE
F3 –EXIT
F6 -NXT SCHL
SHFT-F4 -DELETE
F12 - SAVE

LAST ACTION: .. /.. /....
Press F3 to Exit, F2 to Scroll or Enter for new Building.

NOTE: See pages 17 and 18 for further descriptions of data entry fields and function keys.

ITEM DEFINITIONS
LOCAL PHYSICAL FITNESS ASSESSMENT (Screen 17)

SCHOOL YEAR - Item is displayed from Date and Time Setup, Screen M.6.1.

DISTRICT CODE/NAME - Item is displayed from District Data screen (02).

SCHOOL NUMBER/NAME - 4-digit school number of the attendance center. Name of the attendance center is displayed from Attendance Center screen (08).

The four physical fitness assessment components (column headings) are:

AEROBIC CAPACITY
ABDOMINAL STRENGTH
UPPER BODY STRENGTH
FLEXIBILITY

Report the number of students in these four assessment components as follows:

GRADE 5 - FEMALE/# TESTED – Number of 5th grade female students at this school tested in each of the physical fitness assessment components.

GRADE 5 - FEMALE/# NOT TESTED – Number of 5th grade female students at this school not tested in each of physical fitness assessment components.

GRADE 5 - FEMALE/# > HFR – Number of 5th grade female students at this school who meet or exceed the healthy fitness range (HFR) criteria in each of the physical fitness assessment components.

GRADE 5 - MALE/# TESTED – Number of 5th grade male students at this school tested in each of the physical fitness assessment components.

GRADE 5 - MALE/# NOT TESTED – Number of 5th grade male students at this school not tested in each of the physical fitness assessment components.

GRADE 5 - MALE/# > HFR – Number of 5th grade male students at this school who meet or exceed the healthy fitness range (HFR) criteria in each of the physical fitness assessment components.

GRADE 9 - FEMALE/# TESTED – Number of 9th grade female students at this school tested in each of the physical fitness assessment components.

GRADE 9 - FEMALE/# NOT TESTED – Number of 9th grade female students at this school not tested in each of the physical fitness assessment components.

GRADE 9 - FEMALE/# > HFR – Number of 9th grade female students at this school who meet or exceed the healthy fitness range (HFR) criteria in each of the physical fitness assessment.

GRADE 9 - MALE/# TESTED – Number of 9th grade male students at this school tested in each of physical fitness assessment components.

GRADE 9 - MALE/# NOT TESTED – Number of 9th grade male students at this school not tested in each of the physical fitness assessment components.

GRADE 9 - MALE/# > HFR – Number of 9th grade male students at this school who meet or exceed the healthy fitness range (HFR) criteria in each of the physical fitness assessment components.

GRADE 5 - MINUTES PER WEEK – Number of minutes per week 5th grade students at this school are scheduled for Physical Education class.

GRADE 5 - AVERAGE CLASS SIZE – Average Physical Education class size for 5th grade students at this school.

GRADE 9 - PERCENTAGE IN PE – Percentage of 9th grade students enrolled in a Physical Education class at this school.

GRADE 9 - AVERAGE CLASS SIZE – Average Physical Education class size at this school for 9th grade students.

FUNCTION KEYS

(The following function keys are available on this screen.)

F1-HELP - Displays information about the current screen.

F2-BROWSE - Displays list of grade level screens currently entered. Use cursor movement keys and enter key to select grade level screen to update.

F3-EXIT - Returns to the Core Data - Update Menu screen.

F6-NXT SCHL - Displays the next school in the district.

F12 SAVE - Saves data entered.

SHFT-F4-DELETE - Deletes the information currently displayed.

5th GRADE
MISSOURI CRITERIA FOR HEALTHY FITNESS RANGE

AEROBIC CAPACITY

GIRLS		
Age	1a One Mile Run/Walk (Min: Sec)	1b PACER (# of laps)
10	12:30	15
11	12:00	15
12	12:00	23
13	11:30	23

BOYS		
Age	1a One Mile Run/Walk (Min: Sec)	1b PACER (# of laps)
10	11:30	23
11	11:00	23
12	10:30	32
13	10:00	41

ABDOMINAL STRENGTH/ENDURANCE

GIRLS			
Age	2a Curl-up (Timed)	2b Curl-up (Cadence)	2c Partial Curl-up
10	30	12	24
11	32	15	27
12	35	18	30
13	37	18	40

BOYS			
Age	2a Curl-up (Timed)	2b Curl-up (Cadence)	2c Partial Curl-up
10	35	12	24
11	37	15	26
12	40	18	32
13	42	21	39

Note: For purposes of reporting to DESE, the Missouri Criteria for the Healthy Fitness Range (HFR) should be used. Only the lower end of the HFR is listed.

5th GRADE
MISSOURI CRITERIA FOR HEALTHY FITNESS RANGE

UPPER BODY STRENGTH/ENDURANCE

GIRLS						
Age	3a Push-up (Completed)	3b Pull-up (Completed) Over Grip	3b Pull-up (Completed) Under Grip	3c Modified Pull-up (Completed)	3d Flexed-Arm Hang (Seconds) Over Grip	3d Flexed-Arm Hang (Seconds) Under Grip
10	7	1	1	4	4	8
11	7	1	1	4	6	7
12	7	1	1	4	7	7
13	7	1	1	4	8	8

BOYS						
Age	3a Push -up (Completed)	3b Pull-up (Completed) Over Grip	3b Pull-up (Completed) Under Grip	3c Modified Pull-up (Completed)	3d Flexed-Arm Hang (Seconds) Over Grip	3d Flexed-Arm Hang (Seconds) Under Grip
10	7	1	1	5	4	12
11	8	1	2	6	6	11
12	10	1	2	7	10	12
13	12	1	3	8	12	14

FLEXIBILITY

GIRLS			
Age	4a Sit &Reach (Centimeters)	4b Back-Saver Sit & Reach (Inches)	4c V-Sit Reach (Inches)
10	28	9	3.0
11	29	10	3.0
12	30	10	3.5
13	31	10	3.5

BOYS			
Age	4a Sit & Reach (Centimeters)	4b Back-Saver Sit & Reach (Inches)	4c V-Sit Reach (Inches)
10	25	8	1.0
11	25	8	1.0
12	26	8	1.0
13	26	8	0.5

Note: For purposes of reporting to DESE, the Missouri Criteria for the Healthy Fitness Range (HFR) should be used. Only the lower end of the HFR is listed.

9th GRADE
MISSOURI CRITERIA FOR HEALTHY FITNESS RANGE

AEROBIC CAPACITY

GIRLS		
Age	1a One Mile Run/Walk (Min: Sec)	1b PACER (# of laps)
13	11:30	23
14	11:00	23
15	10:30	23
16	10:00	32
17	10:00	41

BOYS		
Age	1a One Mile Run/Walk (Min: Sec)	1b PACER (# of laps)
13	10:00	41
14	9:30	41
15	9:00	51
16	8:30	61
17	8:30	61

ABDOMINAL STRENGTH/ENDURANCE

GIRLS			
Age	2a Curl-up (Timed)	2b Curl-up (Cadence)	2c Partial Curl-up
13	37	18	40
14	37	18	30
15	36	18	26
16	35	18	26
17	34	18	40

BOYS			
Age	2a Curl-up (Timed)	2b Curl-up (Cadence)	2c Partial Curl-up
13	42	21	39
14	45	24	40
15	45	24	45
16	45	24	37
17	44	24	42

Note: For purposes of reporting to DESE, the Missouri Criteria for the Healthy Fitness Range (HFR) should be used. Only the lower end of the HFR is listed.

9th GRADE
MISSOURI CRITERIA FOR HEALTHY FITNESS RANGE

UPPER BODY STRENGTH/ENDURANCE

GIRLS						
Age	3a Push-up (Completed)	3b Pull-up (Completed) Over Grip	Under Grip	3c Modified Pull-up (Completed)	3d Flexed-Arm Hang (Seconds) Over	Under
13	7	1	1	4	8	8
14	7	1	1	4	8	9
15	7	1	1	4	8	7
16	7	1	1	4	8	7
17	7	1	1	4	8	7

BOYS						
Age	3a Push-up (Completed)	3b Pull-up (Completed) Over	Under	3c Modified Pull-up (Completed)	3d Flexed-Arm Hang (Seconds) Over	Under
13	12	1	2	8	12	13
14	14	2	3	9	15	20
15	16	3	4	10	15	30
16	18	5	5	12	15	28
17	18	5	6	14	15	30

FLEXIBILITY

GIRLS			
Age	4a Sit &Reach (Centimeters)	4b Back-Saver Sit & Reach (Inches)	4c V-Sit Reach (Inches)
13	31	10	3.5
14	33	10	4.5
15	36	12	5.0
16	34	12	5.5
17	35	12	4.5

BOYS			
Age	4a Sit & Reach (centimeters)	4b Back-Saver Sit & Reach (Inches)	4c V-Sit Reach (Inches)
13	26	8	.5
14	28	8	1.0
15	30	8	2.0
16	30	8	3.0
17	34	8	3.0

Note: For purposes of reporting to DESE, the Missouri Criteria for the Healthy Fitness Range (HFR) should be used. Only the lower end of the HFR is listed.

Appendix B

Reprinted with permission from the Missouri Department of Elementary and Secondary Education Office of College and Career Readiness

Missouri Senate Bill 291 Interpretation

Chris L. Nicastro, Ph.D.
Commissioner of Education

Stan Johnson
Assistant Commissioner
Division of School Improvement

Missouri Department of Elementary and Secondary Education

Making a positive difference through education and service

SENATE BILL 291:
INTERPRETATION OF LAW RELATING TO PHYSICAL ACTIVITY

This law goes into effect beginning with the 2010-2011 school year:

167.720.2(1): School districts shall ensure that students in elementary schools participate in moderate physical activity for the entire school year, including students in alternative education programs. Students in the elementary schools shall participate in moderate physical activity for an average of one hundred fifty minutes per five-day school week, or an average of thirty minutes per day. Students with disabilities shall participate in moderate physical activity to the extent appropriate as determined by the provisions of the Individuals with Disabilities Education Act, or Section 504 of the Rehabilitation Act;

INTERPRETATION: This section refers to physical activity rather than physical education. There is no change in the current elementary requirement of 50 minutes per week taught by a certified teacher. Therefore, the currently required 50 minutes can count towards the 150-minute minimum. If a school also provides one 20-minute recess period per day, then those additional 100 minutes can count towards the minimum requirement as well. Other than that, additional minutes of physical activity must be provided. The additional activity may be supervised by any certificated teacher, not just one certificated in physical education.

167.720.2(2): Each year the commissioner of education shall select for recognition students, schools and school districts that are considered to have achieved improvement in fitness;

INTERPRETATION: The department will promulgate rules regarding the selection process.

167.720.2(3): Students in middle schools may at the school's discretion participate in at least two hundred twenty-five minutes of physical activity per school week.

INTERPRETATION: Current requirements mandate 3,000 minutes per year of physical education at the middle school level (an average of 75 minutes per week). Schools may always exceed the minimum standard. This section is not a mandate.

167.720.2(4): A minimum of one recess period of twenty minutes per day shall be provided for children in elementary schools, which may be incorporated into the lunch period.

INTERPRETATION: Currently there is no state mandate for recess, so this will necessitate a change in some school districts. The language "…incorporated into the lunch period" is unclear.

Clearly eating lunch does not satisfy the definition of recess, so the Department supports a daily 20-minute recess that should not be interrupted by the regularly scheduled lunch time.

Additional language in the law: Any requirement of this section above the state minimum physical education requirement may be met by additional physical education instruction, or by other activities approved by the individual school district under the direction of any certificated teacher or administrator or other school employee under the supervision of a certificated teacher or administrator.

INTERPRETATION: The language is clear that the general classroom teacher, a teacher's aide or paraprofessional supervised by a certificated teacher, or administrator may lead students in additional physical activity during the school day. As defined in the law, this could include stretching, calisthenics, or exercise such as jumping jacks or running.

Appendix C

Institutional Review Board Approval

LINDENWOOD

LINDENWOOD UNIVERSITY ST. CHARLES, MISSOURI

DATE:	July 3, 2014
TO:	Robert Johnston
FROM:	Lindenwood University Institutional Review Board
STUDY TITLE:	[630044-1] Evaluating the Impact of Missouri Senate Bill 291 on the Physical Fitness of 5th Graders within the State of Missouri.
IRB REFERENCE #:	
SUBMISSION TYPE:	New Project
ACTION:	DETERMINATION OF EXEMPT STATUS
DECISION DATE:	July 3, 2014
REVIEW CATEGORY:	Exemption category # *[enter category]*

Thank you for your submission of New Project materials for this research study. Lindenwood University Institutional Review Board has determined this project is EXEMPT FROM IRB REVIEW according to federal regulations.

We will put a copy of this correspondence on file in our office.

If you have any questions, please send them to IRB@lindenwood.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within Lindenwood University Institutional Review Board's records.

Appendix D

Tables D1-D7 represent the statewide Missouri Physical Fitness Data for 2003 through 2009. The purpose of these tables is to allow examination of passing scores for all fifth and ninth grade students that took the fitness test in 2003 through 2009. The number tested represents all the students in Missouri that completed the specific fitness test listed. The percent greater than Healthy Fitness Range (% > HFR) is the percentage of students that met or exceeded the Healthy Fitness Range Scores, as determined by the Missouri Physical Fitness Manual.

Table D1.

Missouri Physical Fitness Data Totals 2003

Fifth and Ninth Grade Missouri Physical Fitness Passing Percentages by Year 2003

Grade	Fitness Test	N Tested	% > HFR
5	Aerobic Capacity	64,735	62.26
5	Abdominal Strength	65,161	71.77
5	Flexibility	65,255	66.64
5	Upper Body Strength	64,738	62.17
9	Aerobic Capacity	53,610	61.41
9	Abdominal Strength	54,431	70.74
9	Flexibility	54,230	68.82
9	Upper Body Strength	54,081	66.60

Note: Source: MODESE, 2003-2010.

Table D2.

Missouri Physical Fitness Data Totals 2004

Fifth and Ninth Grade Missouri Physical Fitness Passing Percentages by Year 2004

Grade	Fitness Test	N Tested	% > HFR
5	Aerobic Capacity	64,252	63.80
5	Abdominal Strength	64,826	71.87
5	Flexibility	64,127	67.46
5	Upper Body Strength	64,383	62.07
9	Aerobic Capacity	53,775	61.89
9	Abdominal Strength	54,513	69.63
9	Flexibility	54,295	67.31
9	Upper Body Strength	53,986	66.80

Note: Source: MODESE, 2003-2010.

Table D3.

Missouri Physical Fitness Data Totals 2005

Fifth and Ninth Grade Missouri Physical Fitness Passing Percentages by Year 2005

Grade	Fitness Test	N Tested	% > HFR
5	Aerobic Capacity	63,027	64.06
5	Abdominal Strength	63,600	72.97
5	Flexibility	63,272	67.48
5	Upper Body Strength	63,458	62.22
9	Aerobic Capacity	56,860	61.83
9	Abdominal Strength	57,603	70.70
9	Flexibility	57,439	67.62
9	Upper Body Strength	57,376	67.03

Note: Source: MODESE, 2003-2010.

Table D4.

Missouri Physical Fitness Data Totals 2006

Fifth and Ninth Grade Missouri Physical Fitness Passing Percentages by Year 2006

Grade	Fitness Test	N Tested	% > HFR
5	Aerobic Capacity	61,921	63.68
5	Abdominal Strength	62,149	73.30
5	Flexibility	61,679	67.54
5	Upper Body Strength	61,670	63.02
9	Aerobic Capacity	56,282	60.03
9	Abdominal Strength	56,992	69.96
9	Flexibility	56,464	66.17
9	Upper Body Strength	57,107	65.66

Note: Source: MODESE, 2003-2010.

Table D5.

Missouri Physical Fitness Data Totals 2007

Fifth and Ninth Grade Missouri Physical Fitness Passing Percentages by Year 2007

Grade	Fitness Test	N Tested	% > HFR
5	Aerobic Capacity	57,270	63.82
5	Abdominal Strength	57,613	72.97
5	Flexibility	56,912	67.94
5	Upper Body Strength	57,265	63.27
9	Aerobic Capacity	52,314	61.23
9	Abdominal Strength	53,139	71.19
9	Flexibility	52,559	68.11
9	Upper Body Strength	52,891	67.78

Note: Source: MODESE, 2003-2010.

Table D6.

Missouri Physical Fitness Data Totals 2008

Fifth and Ninth Grade Missouri Physical Fitness Passing Percentages by Year 2008

Grade	Fitness Test	N Tested	% > HFR
5	Aerobic Capacity	49,033	66.97
5	Abdominal Strength	49,688	75.49
5	Flexibility	49,369	68.82
5	Upper Body Strength	49,472	66.36
9	Aerobic Capacity	45,235	65.60
9	Abdominal Strength	45,881	73.63
9	Flexibility	45,631	72.10
9	Upper Body Strength	45,654	72.95

Note: Source: MODESE, 2003-2010.

Table D7.

Missouri Physical Fitness Data Totals 2009

Fifth and Ninth Grade Missouri Physical Fitness Passing Percentages by Year 2009

Grade	Fitness Test	N Tested	% > HFR
5	Aerobic Capacity	49,897	65.95
5	Abdominal Strength	50,266	74.54
5	Flexibility	49,734	67.86
5	Upper Body Strength	50,058	63.78
9	Aerobic Capacity	45,838	66.82
9	Abdominal Strength	46,097	77.90
9	Flexibility	45,584	74.23
9	Upper Body Strength	45,922	73.05

Note: Source: MODESE, 2003-2010.

Vitae

Robert Johnston graduated from Scotland County R-1 High School in Memphis, Missouri in 1988. Robert attended Iowa Wesleyan College and received a Bachelor of Arts Degree in 1992. He received a Master of Science Degree from Drake University in Education Leadership in 2000. He earned an Education Specialist Degree from Lindenwood University in 2004.

Robert has served as a superintendent, principal, teacher, and coach. Robert currently teaches elementary physical education and coaches' basketball in the Fort Zumwalt School District.

Robert is a registered representative with Primerica, a financial services company. He and his family are members of the Sunrise United Methodist Church in O'Fallon, Missouri.

Robert is married to Kendal Johnston and they live in Lake St. Louis, Missouri with their four children, Caroline, Samuel, Kate and Nicholas.