An Analysis of the Effects of Athletic Clothing on Performance of Students who are Participating in the FitnessGram® Tests

By

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ABSTRACT

An Analysis of the Effects of Athletic Clothing on Performance of Students who are Participating in the FitnessGram® Test (Under the direction of Dr. Andrew Pustina) Carthage College, Spring 2018. The purpose of this study was to determine whether differences in FitnessGram® Test scores exist for students who dressed for gym class vs. students who did not dress for gym class. Test scores were collected from an urban school from the 2017-2018 school year. The data collected shows the results from three tests, the Pacer Test, Sit-Up Test and the Push-Up Test. This researcher used a quantitative study along with a longitudinal-observational experimental design. Participants in this study ranged from 18 to 19 years of age. The statistical analysis of the research questions resulted in the rejection of the null hypothesis in one area. The null hypothesis (1) was rejected when viewing the results of the Sit-Up test. The null hypothesis (2) was accepted for the Push-Up and Pacer Tests.
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Chapter 1

Overview

Physical Education class is a specialized environment that fosters development of fine and gross motor skills. Fine motor skills involve small movements made by the body. When a person picks up a ball with their hands they are using fine motor skills. Gross motor skills involve large range of motion. When a person runs or jumps they are using gross motor skills. These motor skills are taught and fine-tuned in physical education class. Physical Education class has long been associated with physical activity, group activity, team sports, lifetime fitness, competitive games and wearing gym clothes. Over the years, participation in physical education class has fluctuated. With the rise of standardized tests, school districts are choosing to focus more time and resources on academics (Pellegrini et al, 2005). With the push to incorporate standardized tests into the physical education curriculum, school districts have adopted the FitnessGram® Test. The FitnessGram® is a physical fitness test that teachers use to assess a large number of students on aerobic capacity and muscular endurance in a limited amount of time. With most standardized tests, the goal is to achieve the highest possible grade. One way of achieving a high score on the FitnessGram® test is to dress in clothing that provides the least restrictive movement. This study was undertaken to understand the different effects athletic clothing has on the FitnessGram® tests results.

The dress code policy across school districts varies from district to district and from state to state. Take Downers Grove South High School, in Illinois for example. Their policy reads as followed “it is expected that students will wear the required P.E. t-shirt purchased during registration. It is also expected that students will wear appropriate gym shorts, sweatpants or yoga pants, and appropriate gym shoes”. During cooler weather, appropriate warm clothing is
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couraged (Schwartz & E.H. 2016-2017). Downers Grove South requires outlets for students who forget their gym clothing. Students can rent gym clothes for one dollar per item. The reason behind this policy is that physical education class is based on activity and participation in physically active sports. In contrast, Chris Tompkins the Executive Director of Curriculum and Instruction at Racine Unified School District, described the physical education dress policy as “We encourage students to dress for gym in separate dress, but we are not requiring it.”

Ellemberg et al. (2009) study demonstrated that schools who implement the FitnessGram® Pacer Test show an increase in scores across all areas of students. When children who participated in 30 minutes of aerobic physical activity were compared with children who watched television for the same amount of time, the former children cognitively outperformed the latter (Ellemberg et al., 2009).

Pellegrini et al. (2005) showed that when urban schools cut programs and policies like physical education, the districts academic test scores declined. This study revealed that students with a lower socioeconomic status (SES) scored lower in physical education class. The results came down to opportunities afforded to each student. Students whose parents fell in a higher bracket of SES could provide better opportunities for their children (De Greeff, 2014).

Equipment has been shown to provide a slight increase in performance. It is possible that parents in a higher SES bracket could provide better equipment for their children. It is possible that when a student performs a fitness test in street clothing; (clothing that consists of blue jeans, boots, sandals, dress, and a coat, or anything that isn’t athletic wear;) their movement becomes restricted. With a dress code policy every student would be required to wear athletic clothing that would comfortably fit his or her body, thus allowing them to perform without limitations on the FitnessGram®. The first chapter of this thesis offers the background of the study, states the
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problem, lists the hypotheses, gives a summary of the methodology, and provides definitions of key terms.

Background of the Study

The shortening of physical education class and recess has limited physical activity in schools. With the onset of No Child Left Behind Act, school districts are focusing on academic achievement and increased school accountability (NCBL Act, 2001). Schools have placed an emphasis on standardized tests. In Wisconsin, the standardized tests include the Wisconsin Forward Exam, Dynamic Learning Maps (MAPS), and the American College Test (ACT). The Wisconsin Forward Exam focuses on grades 3-8 in English and Math. Science is added in grades 4-8, and in grade 10, Social Studies is added. The test is used to track learning over the student’s career.

The Dynamic Learning Maps (MAPS) focuses on grades 3-11 in English, Language Arts, and Math, grades 4, 8-11 in Science, grades 4,8, and 10 in Social Studies. Over all this test is a benchmark for learning in the middle schools.

The American College Test Plus Writing focuses on 11th grade students in Reading, English, Math, Science, and Writing and The American College Test focuses on 11th grade students in career readiness.

Since 2001 there has been a reduction in recess and PE, so that more time can be used for instruction in the classroom and standardized testing. There has been a correlation between schools limiting physical education, recess and physical activity and increasing time spent in core academic classes (Pellegrini et al., 2005). However, with these adjustments standardized test scores have not increased in Wisconsin.
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In 2009, Wisconsin passed the Assembly Bill 620. The Bill requires that all schools that receive federal and state funding will use the FitnessGram® test to assess aerobic capacity. The Bill states that results must be assessed annually. With the creation of the standardized test known as the FitnessGram®, physical educators could assess student’s fitness. The FitnessGram® provides a model for testing a large number of students in a short amount of time. This test will be explained in detail in chapter 2.

Purpose Statement

The purpose of this study was to determine the differences in FitnessGram® Test scores for students who dressed for gym class vs. the students who did not dress for gym class. Test scores were collected from an urban school from the 2017-2018 school year. The data collected shows the results from three test sections of the fitness test (PACER, Sit-Up Test and Push-Up Test. Participants were all senior-level students in this researcher’s physical education class.

Statement of the Problem

Students often do not dress properly for physical education class. The examined problem was to determine if test scores for students who dressed for gym class vs. the students who did not dress for gym class had their scores on the FitnessGram® impacted. Fitness scores along with dress trends of students were recorded following standard district grading policy. Using the FitnessGram® test this researcher was able to assess students’ fitness of both groups.
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**Guiding Questions:**

The following questions guided this research study:

1. How are test scores affected by not dressing?
2. Is there a difference in FitnessGram® scores between students who do, and do not dress for physical education class?

**Hypotheses:**

Null Hypothesis: Students will score the same on the FitnessGram® test when wearing any type of clothing.

Research Hypothesis: Students will score higher on the FitnessGram® tests because they are wearing athletic clothing.

Null Hypothesis: (2) Students who wear athletic clothing see an increase in test scores compared to those who do not wear athletic clothing.

Research Hypothesis: (2) Students who do not wear athletic clothing see a decrease in FitnessGram® test scores.

**Definition of Terms:**

*Urban School:* education facilities that provide education to students who live in metropolitan areas.

*No Child Left Behind Act: (NCLB)* the federal program and legislation affecting kindergarten through high school. NCLB is built on four principles such as accountability, choices for parents, greater local control and flexibility, and emphasis on scientific research when making education policy.
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**FitnessGram®**: A fitness assessment and reporting program for youth. Students are tested over a variety of health-related physical fitness areas that assess aerobic capacity, muscular strength, muscular endurance, and flexibility.

**FitnessGram® Pacer Test**: Is a multistage aerobic capacity test that progressively gets more difficult as it continues. The 20-meter pacer test running speed starts slowly but gets faster each minute after you hear the signal.

**Progressive Aerobic Capacity Endurance Run**: (Pacer) is a 20-meter multistage fitness run to measure aerobic capacity.

**Aerobic capacity**: aerobic capacity is the measure of the ability of the heart and lungs to get oxygen to the muscles.

**Muscular strength**: Muscular strength refers to the amount of force a muscle can produce with a single maximal effort.

**Muscular endurance**: muscular endurance is the ability of a muscle or group of muscles to sustain repeated contractions against a resistance for an extended period of time.

**Flexibility**: Flexibility the quality of bending easily without breaking.

**Body Mass Index**: (BMI): is a person's weight in kilograms (kg) divided by his or her height in meters squared.

**Overweight**: is a BMI of 27.3 or more for women and 27.8 or more for men

**Obesity**: is a BMI of 30 or more for either sex

**Fine motor skills**: are small movements.

**Gross motor skills**: are the bigger movements.

**Street Clothing**: - Street clothes are clothes suitable for everyday wear in public.

**Athletic Clothing**: sport-specific clothing that is worn for most sports and physical exercise, for practical, comfort or safety reasons.
**ACT Writing Test**: Is an optional essay test you can take immediately after the other sections of the Act.

**ACT Work Keys**: consists of three elements: Job skill assessments, which are designed to measure foundational and personal skills as they apply to the workplace.

**Wisconsin Forward Exam Testing**: is designed to gauge how well students are doing in relation to the Wisconsin Academic Standards. These standards outline what students should know and be able to do in order to be college and career ready.

**Measure of Academic Progress (MAPS)**: is a computerized adaptive test, which helps teachers, parents, and administrators improve learning for all students and make informed decisions to promote a child's academic growth.
Chapter Summary

Over the years, participation in physical education class has fluctuated. With the rise of standardized tests school districts are focusing more time and resources on academic classes. With the push to incorporate standardized tests into the physical education curriculum school districts have adopted the FitnessGram® Test. This study was conducted to assess test scores for students who dressed for gym class vs. the scores of the students who did not dress for gym. Results from the data analysis can be used to help teachers and administration generate evidence-backed policies to insure students maximize their physical activity time.
Chapter 2

**Review of Related Literature**

The topics that are relevant to this study are physical fitness and academic performance, the physical fitness levels of school age students, school fitness testing and how physical education classes assess their students, and the relationship between school’s dress policies and student performance. This researcher used educational databases along with peer reviewed journal articles to search for keywords such as FitnessGram®, gym uniform, health, and physical fitness testing.

Since the No Child Left Behind Act (NCLB) was legislated in 2001 schools have seen increased accountability, more school choice options for students and parents, flexibility on how to best serve students, and mandated academic assessment (No Child Left Behind Act of 2001). Student access to physical education and physical activity throughout the school day has dwindled or been cut from the school schedule. As a result, more time and resources are dedicated to academics, which leaves less time for physical education class (Lorenz, 2017). The absence of physical activity may negatively impact students from childhood through adulthood. These negatively consequences can lead to an unhealthy lifestyle and chronic disease later in life.

As school districts comply with NCLB, physical education classes are adopting programs like the FitnessGram®. With time being decreased for physical education class, a test was needed to maximize time spent in class. The Cooper Institute (1981) developed the FitnessGram®. The purpose of the FitnessGram® is to simplify assessment and monitor student progress in physical education. The hope is that students will learn to develop physical activity skills that can be used over a lifetime. Over the past decade the FitnessGram® emerged as the main test to assess fitness levels in students in physical education class. Over 10 million students
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across the United States have completed the FitnessGram® (Corbin & Pangrazi, 2008). New York City, Texas, Alabama, Delaware, California, North Carolina, South Carolina, Wisconsin and West Virginia are all states that mandate their public schools to use the FitnessGram® tests. The FitnessGram® test can help students’ track fitness growth over a period of time. It can show parents how their child has improved over the course of the school year in physical education class. Data can be collected to show fitness levels of students over the course of a school year (Corbin & Pangrazi, 2008).

Youth Physical Education Guidelines

One of the main goals of physical education class, besides assessing student’s fitness levels, is to provide a safe environment where students can learn the benefits of living a physically active lifestyle. The Center for Disease Control (CDC) youth physical activity guidelines state that children and adolescents aged 6 to 17 years should have 60 minutes or more of physical activity each day (Leavitt, 2008). From professional observation, students who did not get the 60 minutes of physical activity per week scored lower on the FitnessGram®. Many of these students did not wear the required clothing in physical education class. When a student participates in physical activity without wearing the proper clothing it puts them at a disadvantage as well as increasing the likelihood of injury (Reddy-Best & Harmon, 2015). Lack of clothing options for children who are unhealthy can lead to a decrease in physical activity (Reddy-Best & Harmon, 2015). To ensure a positive and safe learning environment, students should dress in the proper clothing for physical education class.
Physical Fitness Levels of School Age Students:

If a child does not eat healthy and doesn’t exercise multiple times a week, these behaviors can lead to an unhealthy lifestyle (Caspersen et al., 2000). Getting children involved in healthy eating and physical activity at a young age can positively impact their adult lives. Caspersen found that in adolescents, physical activity generally decreased from ages 15 through 18. Their strength declined from ages 12 through 21 in a group of adolescents who were not active.

In 2008, the Department of Health and Human Services (DHHS) recommended that all children and adolescents ages 6 to 17 have a minimum of 60 minutes of physical activity every day. As a way to try and combat low fitness levels, the Physical Activity Guidelines for Americans (PAGA) set standards for health and physical educators to teach how much physical activity was needed to achieve a healthy lifestyle. When children live a sedentary lifestyle, it leads to unhealthy patterns that can negatively impact the life of that child. With the rise of the obesity epidemic in children, adolescents, and adults, the impact of living a physically active lifestyle can change how a child grows into an adult.

A Link Between Being Physically Active and Performing at a Higher Level in School

There are many studies that have been conducted on physical fitness levels of adolescents and how it relates to academics (NCLB of 2001). As school districts comply with NCLB, physical education classes are adopting programs like the FitnessGram® to assess students’ fitness levels. The FitnessGram® gives a teacher the ability to test many students in a short time (Welk et al., 2008). As time decreases for physical education class, there has been an increase in focus on academic achievement. The NCLB of 2001 focused on four things, increased accountability, more school choice options for students and parents, flexibility on how to best
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serve students, and methodology students must be taught in a way that they can understand the information (NCLB, 2001).

**Physical fitness and Academics**

De Greeff et al. (2014) examined the differences between children with a low socioeconomic status [socially disadvantaged children (SDC)] and children without this disadvantage (non-SDC) on physical fitness and academic performance. The study sample consisted of 544 second and third graders. Math and spelling tests were completed before and after a physical fitness test. The fitness test used was the FitnessGram®, consisted of a 20-meter shuttle run along with pushups and sit-ups. The results showed a slight increase in math and spelling scores for students who performed well on the fitness tests. The study showed that students who score high physically may have a better chance to succeed in an academic setting (De Greef, et al., 2014).

A follow up study conducted by Lorenz et al., (2017) looked at physical fitness as a positive baseline of academic performance on standardized tests. The participants in this study consisted of fourth-grade students 38 female and 65 males. The students tested for physical fitness using the FitnessGram® test. The study found that the higher students scored on the pacer test the higher their reading, writing, and mathematics scores were. This study suggests that when students are exposed to physical activity their overall quality of life goes up.

The main idea from these studies is that healthier students tend to perform better in an academic setting. It is important that students and adolescents have the right balance of physical activity and academic ability.
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Fitness Testing and School Fitness Assessments

Student assessment and testing has been an ever-evolving practice in education. Assessments are conducted by educators to gather data on students to see how successful students are at retaining knowledge learned in an academic setting. Fitness testing was reformed in 1954, as a direct result of low fitness test scores across the United States as compared to Europe and the Soviet Union (Mood et al., 2007; Plowman et al., 2013). As a result of these low-test scores, President Eisenhower formed the President’s Council on Physical Youth that stressed the importance of physical activity and physical fitness in young people (Mood et al., 2007). According to Mood, Jackson, and Morrow (2007), there were five important proceedings that have seen the rise of physical fitness and fitness testing in schools. First, an increased in being physically active in 1950. Second, the developments of health-related assessments. Third, an increase in nationwide youth fitness studies that assessed fitness levels in American youth. Fourth, a movement away from norm referenced testing to criteria referenced testing. Fifth, measuring activity levels instead of just measuring fitness. All schools were mandated through NCLB to conduct standardized fitness tests.

The FitnessGram® assessment was created by Charles L. Sterling in 1977. After 1981, the FitnessGram® partnered with The Cooper Institute for Aerobics Research (Plowman, et al. 2013). According to the Cooper Institute, the FitnessGram® has been used in over 11,000 schools and impacts the lives of over 10 million children and adolescents. In 2009, the Wisconsin State Legislature passed Assembly Bill 620, which stated that all schools receiving federal and state funding must use the FitnessGram® test to assess fitness.
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Based on data from The Youth Risk Behavior Surveillance System (YRBSS), adolescents fall into four categories, inactive (any activity where the participant is standing around and not participating or little or no energy is used), low (any activity where the participant is walking at a slow (2mph or less) pace using some energy but not much. Fewer than 150 minutes a week), medium (any activity that is done with a purpose, walking at 3 to 4 mph or yard work are common activities, 150 minutes to 300 minutes a week), and high (any activity that spends less than 1 percent of the time walking. Activities are walking 4.5 to 5 mph, jogging, and running; More than 300 minutes a week) (Healthy Schools, 2016). High school boys usually fell into the medium to high physical activity range while girls fell in the low to medium range (Leavitt, 2008). The Physical Activity Guidelines for Americans goal is to provide all Americans with knowledge on how to be healthy and achieve suitable physical activity levels.

The Cooper Institute FitnessGram® program measures aerobic capacity (PACER), abdominal strength (sit-ups), body composition (skinfold), flexibility (sit and reach), and upper body strength and endurance (push-ups and pull-ups). The multitude of tests can be performed in any location or space to meet the needs of its participants. Each district decides how they will grade students based on their performance scores. The FitnessGram® tests can be used to tell a participant their personal fitness level and personal best training. The test also provides institutional standardized testing, parental reporting, and personal goal tracking. In recent years, bigger districts have adopted the FitnessGram® tests largely based on the tests ability to test large numbers of students in a short period of time (Welk et al., 2011). The FitnessGram® provides teachers with an ongoing record of fitness data that could follow a student from 4th grade through high school. The data provides a teacher with knowledge of student’s fitness levels, which can gauge the success of a physical education program (Gallo et al., 2006). The
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data can also show patterns in student behavior, such as the child dressing for physical education class.

Questions that can also be answered include:

Is the student performing well on the fitness tests?

Has the student shown improvement over the course of their school career?

Does the student hold a constant level of fitness activity?

**Dress Policy and Athletic Clothing**

The FitnessGram® test can collect data over the course of a student’s career, which can foreshadow a pattern of low motivation, and not dressing for physical education class. When students participate in physical activity without wearing the proper clothing it puts them at a disadvantage. Lack of clothing options for children who are overweight can lead to a decrease in physical activity (Reddy-Best & Harmon, 2015). When a student dresses appropriately for class they see in increase in comfort levels as well as a higher participation percentage (Racine District Observational Data). The purpose of athletic clothing is to enhance performance and reduce risk of injury. Along with enhanced performance, the participant can see a decrease in recovery time and a decreased chance of injury (Doan et al., 2003). The ability for a student to participate at their full potential requires the appropriate dress clothing. Students who wear athletic clothing or approved gym attire find their movement is least restricted. When students are allowed to wear street clothing their movement can become restricted which allows for limited participation in physical education class.

As physical education evolves and adjusts to new thoughts and strategies so has the physical education uniform. When a student is in a uniform they will see an increase in self-
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esteem, increased school attendance, and improved classroom behavior (Lumsden, 2001). When a student dresses in a physical education uniform they are making a conscious effort to perform at a high level in class. When a student enters a physical education setting and is not dressed in athletic clothing they are at risk of poor performance on the test and receiving the minimum benefits of the physical education class.

When children and adolescents participate in at least 60 minutes of physical activity every day, they receive multiple health benefits. Regular physical activity builds healthy bones and muscles, improves muscular strength and endurance, reduces the risk for developing chronic disease risk factors, improves self-esteem, and reduces stress and anxiety (Rasberry et al., 2011).

Physical performance requires proper dress. In an academic setting dress options are less important, since the focus is on learning, not movement competency (Basch, 2011). A physical education setting with a dress policy evens the playing field. When students all wear the same athletic clothing they all reap the benefits of increased performance. When students follow a dress policy they develop a sense of community within the class, which can lead to students working together (Lumsden, 2001).
Chapter Summary

The topics that are relevant to this research study were presented Youth Physical Education Guidelines, Physical Fitness Levels of school age students, A link between being physically active and performing at a higher level in school, Physical fitness and Academics, Fitness testing and school assessments on fitness, and Dress Policy and Athletic Clothing. Since NCLB, schools have seen increased accountability, and flexibility on how to best serve students, and mandated academic assessment. As school districts comply with NCLB, they are adopting programs like the FitnessGram®. As time decreases for physical education class a test was needed to maximize time spent in class testing students.
Chapter 3

Methodology

The purpose of this study was to determine if test scores for students who dressed for gym class vs. the students who did not dress for gym were class impacted on the FitnessGram® test scores. This researcher used the FitnessGram® series of physical fitness tests to evaluate the physical fitness levels of the participants. Data about how the participants were dressed was also recorded to evaluate the level of success on the FitnessGram® test.

Research Participants

The total school population consists of 1762 students. With 410 freshmen, 487 tenth grade students and 437 eleventh grade students and 428 seniors. The sample group was 40 senior students age eighteen or older. These students completed a yearlong physical education class. A random sample was not possible in part as students were scheduled into physical education class by the school’s administration. The study consisted of 26 males (65%) and 14 females (35%).

Research Design

This researcher used quantitative methodology along with a longitudinal-observational experimental design. The variables used for comparison were the participant’s fitness test scores measured by the FitnessGram® series of physical fitness tests. Comparisons were made between students who dressed for gym class and students who did not dress for physical education class.

Research Context

The participants were tested at the beginning and end of the school year. The school district where the study was conducted is one of the biggest districts in its area, and historically performs slightly below state and national averages on standardized tests. This district consists of
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approximately 19,500 students in 40 schools, including three high schools. The district sees a consistency in enrollment going into the 2018-2019 school year.

At the research location, the graduation requirement in physical education is to pass 2½ credits. Swimming and health is a required during the freshman year and is one credit. Physical education classes are conducted every other day on a rotating block schedule, and were 93 minutes long. Traditional team sports and recreational sports were available after school as well as intramural sports and open weights. These activities provided opportunities for students to be physically active in and outside a school setting. The testing location used the FitnessGram® to assess students’ fitness levels. All three high schools in the district operate using the same assessment methods and testing instruments. All students in the district are required to complete the FitnessGram® assessment at least six times a year. Three tests are a practice tests and three are the scored assessments. All tests are performed in a climate-controlled field house, and weight room for fitness testing in physical education class.

*Instruments Used in Data Collection*

The Sit-Up Test was used to assess muscle endurance of the abdominal muscles. The Sit-up Test was chosen over the sit-up test for four reasons: 1) less movement of the spine, 2) to minimize the movement of the hips, 3) to increase movement of the obliques and abdominals, and 4) to maximize abdominal muscle activation of the lower and upper rectus abdominis; when compared with a variety of sit-ups (Plowman & Meredith, 2007).
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Figure 1. Sit-Up Test Grading Chart

<table>
<thead>
<tr>
<th>SIT-UP TEST</th>
<th>AGE</th>
<th>GRADE A</th>
<th>GRADE B</th>
<th>GRADE C</th>
<th>GRADE D</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOYS</td>
<td>ALL</td>
<td>55+</td>
<td>45-54</td>
<td>30-44</td>
<td>20-29</td>
</tr>
<tr>
<td>GIRLS</td>
<td>ALL</td>
<td>46+</td>
<td>36-45</td>
<td>25-35</td>
<td>15-24</td>
</tr>
</tbody>
</table>

The following techniques for the Sit-Up Test are referenced from the FitnessGram® Test Administration Manual:

Partner A laid in a supine position on the mat, knees bent at an angle of approximately 140°, feet flat on the floor, legs slightly apart, arms straight and parallel to the trunk with palms of hands resting on the mat. The fingers were stretched out and the head is in contact with the mat. Partner B placed a measuring strip on the mat under Partner A’s legs so that partner A’s fingertips were resting on the nearest edge of the measuring strip. Keeping heels in contact with the mat, Partner A curled up slowly, sliding fingertips across the strip until fingertips reached the other side. Partner A curled back down until his or her head touched the mat. Movement should be slowed and gauged to the specified 54 cadences of about 20 curl-ups per minute. The teacher used a prerecorded cadence. Partner A continues until he or she can no longer continue or has completed 75 curl-ups. Students were stopped when the second form correction is made, or when they could no longer continue (Welk et al., 2008).

Progressive Aerobic Capacity Endurance Run (PACER):

The Progressive Aerobic Capacity Endurance Run (PACER) is a multistage 20-meter shuttle run developed by Charles L. Sterling. The PACER Test was used to measure aerobic
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capacity. This researcher chose the Pacer Test because the PACER can be performed indoors in a gym or field house and weather is a non-factor.

FitnessGram® recommends the PACER for the following reasons:
1. All students are more likely to have a positive experience in performing the PACER.
2) The PACER helps students learn the skill of pacing. 3) Students who have a poorer performance will finish first and not have the embarrassment of being the last person to complete the test.

Participants practiced the PACER a week in advance during their physical education class. Cones were set up 20 meters apart running down each sideline of the basketball court. After students completed the test, they continued to walk and stretch in the designated cool down area (Welk et al., 2008). The following techniques for the PACER Test are referenced from the FitnessGram® Test Administration Manual:

Figure 2. Pacer Test Grading Scale.

<table>
<thead>
<tr>
<th>Pacer Test</th>
<th>F</th>
<th>D</th>
<th>C</th>
<th>B</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOYS</td>
<td>0-35</td>
<td>36-49</td>
<td>50-65</td>
<td>66-79</td>
<td>80 &amp; Above</td>
</tr>
<tr>
<td>GIRLS</td>
<td>0-25</td>
<td>26-35</td>
<td>36-49</td>
<td>50-65</td>
<td>66 &amp; Above</td>
</tr>
</tbody>
</table>

The teacher marked the 20-meter course with cones that divided the lanes, and a taped line at each end. The FitnessGram® Test Administration Manual stated; before test day, students to listened to several minutes of the tape so that they know what to expect. Students should then be allowed at least two practice sessions (Welk et al., 2008).
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The test gave a 5-second countdown and told the students when to start. Students ran across the 20-meter distance and touched the line with their foot by the time the beep sounded. At the sound of the beep, they turned around and ran back to the other end. If students got to the line before the beep, they waited for the beep before running the other direction. Students continued in this manner until they fail to reach the line before the beep for the second time. A single beep sounded at the end of the time for each lap. The triple beep served the same function as the single beep and alerted the runners that the pace got faster. The first time a student fails to reach the line by the beep, the student stopped where he or she is and reversed direction immediately, attempting to get back on pace. The test is completed for a student the next time (second time) he or she failed to reach the line by the beep. (Welk et al., 2008)

**Push-Up Test:**

The Push-Up test was used to measure the upper-body strength and endurance of the participant. No equipment was used for this fitness test. During attendance students were marked with (M) for male (F) for female, (D) for dresses and (ND) for not dressed.

Figure 3. Push-Up Test Grading Chart

<table>
<thead>
<tr>
<th>PUSH-UP TEST</th>
<th>AGE</th>
<th>GRADE A</th>
<th>GRADE B</th>
<th>GRADE C</th>
<th>GRADE D</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOYS</td>
<td>ALL</td>
<td>43+</td>
<td>30-42</td>
<td>15-29</td>
<td>8-15</td>
</tr>
<tr>
<td>GIRLS</td>
<td>ALL</td>
<td>23+</td>
<td>8-22</td>
<td>5-7</td>
<td>1-4</td>
</tr>
</tbody>
</table>

The following techniques for the Push-Up Test are referenced from the FitnessGram® Test Administration Manual:
An Analysis of the Effects of Athletic Clothing on Performance of Students who are Participating in the FitnessGram® Tests

Each student assumed a prone position on the mat with their hands placed under or slightly wider than their shoulders, fingers stretched out, legs straight and slightly apart, and toes tucked under their feet. The student pushed off the mat with their arms until arms were straight, kept the legs and back straight. Subjects were instructed to keep their back in a straight line from their head to their toes throughout the test. The student then lowered the body using the arms until the elbows bend at a 90° angle and the upper arms are parallel to the floor. This movement was repeated as many times as possible. The rhythm was approximately 20, 90° push-ups per minute or 1, 90° push-ups every 3 seconds. Students were stopped when the second form correction was made. The score was recorded as the number of push-ups performed. (Welk et al. 2008).

Procedure

With the approval from the Institutional Review Board of Carthage College and the school principal, this researcher administered the fitness tests in accordance to the guidelines laid out by the Cooper Institute referenced in the FitnessGram® Test Administration Manual (Welk et al., 2008).

This researcher collected and analyzed data for each of the following physical fitness tests: Curl-Ups, Push-Ups, and PACER Test. After all tests were completed, data were analyzed. The department chair marked ND (Not Dressed) or D (Dressed) after the student score to indicate if they were dressed in athletic clothing or not dressed in athletic clothing. One fitness test was conducted each day over a period of 6 days. An extra day was added for participants that missed one or more of the tests.
Data Analysis

Using the Excel Data Analysis package, with a significance level use a 0.10; an independent sample-test was conducted on the data collected. First, the data were grouped by students that were dressed in athletic clothing vs. the students who were not dressed in athletic clothing. Comparisons were made using a one tailed t-test. Cohen’s d was calculated to determine the magnitude of change or difference between groups.
Chapter Summary

This chapter consisted of detailed descriptions of the participants, fitness instruments and procedures used in this study. A description of the school demographics linked the validity, and reliability of the FitnessGram® Tests along with the procedures for performing the tests. The variables used for comparison were the participant’s fitness levels measured by the FitnessGram® series of physical fitness tests to evaluate the physical fitness levels of students who dressed for gym class vs. the students who did not dress for physical education class.
Chapter 4

Hypothesis 1 Results

The research questions investigated in this study were:

1. Students will score higher on the FitnessGram® tests because they are wearing athletic clothing. Null Hypothesis: Students will score the same on the FitnessGram® test when wearing any type of clothing.

Individual Results

Among the entire sample n=40, no significant difference was found between students who wore athletic clothing and students who did not (Table 1). The PACER (p = 0.00e), sit-up (p =0.02), push-up (p =0.01). The entire sample was then divided by sex. Among total sample, the PACER was not significantly different (p = 0.00), as well as the sit-up (p = 0.02), the push-up test (p = 0.10). No significance difference between males in all three of the tests but females had a significance difference in the pacer but not the sit-ups and push-ups.

Table 1 shows test sample data from pre to post test scores

<table>
<thead>
<tr>
<th></th>
<th>Pre-</th>
<th>Post</th>
<th>% Change</th>
<th>p-value</th>
<th>Cohen's d</th>
<th>Descriptor</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pacer Test</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dressed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Sample</td>
<td>64.8</td>
<td>31.2</td>
<td>0.00</td>
<td>2.77</td>
<td>Very Large</td>
<td></td>
</tr>
<tr>
<td>Females</td>
<td>49.7</td>
<td>24.5</td>
<td>0.00</td>
<td>1.03</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>69.1</td>
<td>41.3</td>
<td>0.07</td>
<td>1.55</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sit-Up</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Sample</td>
<td>39.5</td>
<td>29.5</td>
<td>0.02</td>
<td>0.86</td>
<td>Moderate</td>
<td></td>
</tr>
<tr>
<td>Females</td>
<td>34.2</td>
<td>25.7</td>
<td>0.17</td>
<td>0.48</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>41.1</td>
<td>34.0</td>
<td>0.45</td>
<td>0.81</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Push-Up</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Sample</td>
<td>24.5</td>
<td>16.6</td>
<td>0.10</td>
<td>0.86</td>
<td>Moderate</td>
<td></td>
</tr>
<tr>
<td>Females</td>
<td>21.4</td>
<td>12.9</td>
<td>0.41</td>
<td>0.40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>25.2</td>
<td>21.8</td>
<td>0.49</td>
<td>0.82</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Hypothesis 2 Results

The research questions investigated in this study were. Students who do not wear athletic clothing see a decrease in FitnessGram® test scores. Null Hypothesis: (2) Students who wear athletic clothing see an increase in test scores from the beginning to the end of the year compared to those who do not wear athletic clothing.

Total Sample

Among the entire sample n=40, a significant difference was found on the in FitnessGram® test scores. The Null Hypothesis (2) Students who wear athletic clothing see an increase in test scores compared to those who do not wear athletic clothing. (Table 2 & 3)

Individual Results

Among the entire sample n=40, a significant difference was found between students who wore athletic clothing and students who did not (Table 1). The PACER (p =0.01, sit-up (p = 0.00), push-up (p = 0.00). The entire sample was then divided by sex. Among dressed females, the PACER was not significantly different (p = 0.02), as well as the sit-up (p = 0.01), and the push-up test (p = 0.01). All dressed females did not see a significant different in all their scores. Among not dressed females, the PACER was not significantly different (p = 0.01), as well as the sit-up (p = 0.02), and the push-up test (p = 0.04). All not dressed females did not see a significant different in all their scores.

Among dressed males the PACER was not significantly different (p = 0.01), as well as the sit-up (p = 0.00), and the push-up test (p = 0.00). All dressed males did not see a significant different in all their scores. Among not dressed males the PACER was significantly different (p = 0.53), as well as the sit-up (p = 0.77), and the push-up test (p = 0.76). All not dressed males saw a significant different in all their scores.
An Analysis of the Effects of Athletic Clothing on Performance of Students who are Participating in the FitnessGram® Tests

Table 2. Changes from pre- to post for dressed and not dressed students.

<table>
<thead>
<tr>
<th>Pacer Test</th>
<th>Pre-</th>
<th>Post</th>
<th>% Change</th>
<th>p-value</th>
<th>Cohen's d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dressed</td>
<td>57.2</td>
<td>64.8</td>
<td>11.7%</td>
<td>0.001</td>
<td>0.39</td>
</tr>
<tr>
<td>Not Dressed</td>
<td>26.3</td>
<td>28.4</td>
<td>7.2%</td>
<td>0.895</td>
<td>0.13</td>
</tr>
</tbody>
</table>

**Sit-Ups**

<table>
<thead>
<tr>
<th></th>
<th>Pre-</th>
<th>Post</th>
<th>% Change</th>
<th>p-value</th>
<th>Cohen's d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dressed</td>
<td>31.7</td>
<td>39.5</td>
<td>19.9%</td>
<td>0.000</td>
<td>0.72</td>
</tr>
<tr>
<td>Not Dressed</td>
<td>24.5</td>
<td>29.5</td>
<td>16.7%</td>
<td>0.143</td>
<td>0.33</td>
</tr>
</tbody>
</table>

**Push-Ups**

<table>
<thead>
<tr>
<th></th>
<th>Pre-</th>
<th>Post</th>
<th>% Change</th>
<th>p-value</th>
<th>Cohen's d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dressed</td>
<td>19.1</td>
<td>23.7</td>
<td>19.1%</td>
<td>0.000</td>
<td>0.42</td>
</tr>
<tr>
<td>Not Dressed</td>
<td>11.5</td>
<td>15.5</td>
<td>25.4%</td>
<td>0.0005</td>
<td>0.49</td>
</tr>
</tbody>
</table>

Table 3 Changes from pre- to post for dressed and not dressed groups of male and female students.

<table>
<thead>
<tr>
<th>PACER Test</th>
<th>Pre-</th>
<th>Post</th>
<th>% Change</th>
<th>p-value</th>
<th>Cohen's d</th>
<th>Descriptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dressed Females</td>
<td>42.3</td>
<td>49.7</td>
<td>14.8%</td>
<td>0.02</td>
<td>0.90</td>
<td>Moderate</td>
</tr>
<tr>
<td>Not Dressed Females</td>
<td>19.8</td>
<td>24.5</td>
<td>19.4%</td>
<td>0.01</td>
<td>1.09</td>
<td>Moderate</td>
</tr>
<tr>
<td>Dressed Males</td>
<td>61.5</td>
<td>69.1</td>
<td>11.1%</td>
<td>0.01</td>
<td>0.39</td>
<td>Small</td>
</tr>
<tr>
<td>Not Dressed Males</td>
<td>36.8</td>
<td>33.0</td>
<td>-11.5%</td>
<td>0.53</td>
<td>0.24</td>
<td>Small</td>
</tr>
</tbody>
</table>

**Sit-Up Test**

<table>
<thead>
<tr>
<th></th>
<th>Pre-</th>
<th>Post</th>
<th>% Change</th>
<th>p-value</th>
<th>Cohen's d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dressed Females</td>
<td>30.3</td>
<td>34.2</td>
<td>11.2%</td>
<td>0.01</td>
<td>0.32</td>
</tr>
<tr>
<td>Not Dressed Females</td>
<td>17.9</td>
<td>25.7</td>
<td>30.4%</td>
<td>0.02</td>
<td>1.29</td>
</tr>
<tr>
<td>Dressed Males</td>
<td>32.0</td>
<td>41.0</td>
<td>21.9%</td>
<td>0.00</td>
<td>0.85</td>
</tr>
<tr>
<td>Not Dressed Males</td>
<td>35.2</td>
<td>34.0</td>
<td>-3.5%</td>
<td>0.77</td>
<td>0.59</td>
</tr>
</tbody>
</table>

**Push-Up Test**

<table>
<thead>
<tr>
<th></th>
<th>Pre-</th>
<th>Post</th>
<th>% Change</th>
<th>p-value</th>
<th>Cohen's d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dressed Females</td>
<td>13.3</td>
<td>18.2</td>
<td>26.6%</td>
<td>0.01</td>
<td>0.37</td>
</tr>
<tr>
<td>Not Dressed Females</td>
<td>7.1</td>
<td>11.5</td>
<td>38.0%</td>
<td>0.04</td>
<td>0.00</td>
</tr>
<tr>
<td>Dressed Males</td>
<td>20.8</td>
<td>25.2</td>
<td>17.5%</td>
<td>0.00</td>
<td>0.45</td>
</tr>
<tr>
<td>Not Dressed Males</td>
<td>18.6</td>
<td>21.8</td>
<td>14.7%</td>
<td>0.06</td>
<td>0.76</td>
</tr>
</tbody>
</table>

Greater than 0.05. Less than 0.05 there is a significant change.
Chapter Summary

The statistical analysis of the research questions resulted in the rejection of the null hypothesis in one area. The null hypothesis (1) was rejected when viewing the results of the Sit-Up test. The null hypothesis (2) was accepted for the Push-Up and Pacer Tests. When comparing data from the pretest to the middle test, the results found small discrepancies in the test scores between students who dressed in athletic clothing compared to students who did not wear athletic clothing. When data was looked at from the pretest and compared with data from the final test, a larger variation was seen. This data suggested that, students who wear athletic clothing see an increase in test scores compared to those who do not wear athletic clothing.
An Analysis of the Effects of Athletic Clothing on Performance of Students who are Participating in the FitnessGram® Tests

Chapter 5

Discussion

The general purpose of this study was to determine how clothing impacts performance in physical education classes. The study was broken down into two specific questions: 1. How is physical performance impacted by athletic clothing? 2. How does clothing impact change in performance from the beginning to the end of a school year?

On average, students who wore athletic clothing scored 64.8 on the PACER, which is in the fit-category. In contrast, the non-dressed group scored a 31.2, and fell in the “fitness needs improvement category”. This evidence indicates that clothing may have a strong impact on PACER performance.

On average, students who wore athletic clothing scored a 39.5 on the Sit-up test, which is in the fit-category. In contrast, the non-dressed group scored a 29.5, and fell in the “fitness needs improvement category”.

For the push-up test, students who wore athletic clothing completed 24.5 repetitions, which is in the fit-category. In contrast, the non-dressed group scored a 16.6, and fell in the “fitness needs improvement category”. When observing the physical performance data from the three assessments, it appears that students who wore athletic clothing were more fit than students who did not wear athletic clothing.

There were significant differences in all testing groups except male pacer, male and female sit-up and all push-up. For the male group, a significant difference was observed for the pacer test (p = 0.00).

Regardless of clothing, all scores across all tests improved from the pretest to the post test. Students who dressed saw an 11.7% increase on their PACER test score when comparing
An Analysis of the Effects of Athletic Clothing on Performance of Students who are Participating in the FitnessGram® Tests

pre- to post test. Dressed students had an average post test score of 64.8 on the PACER, students fell in the fit-category. In contrast, not-dressed students saw a 7.2% increase performance the PACER, but they still fell in the “fitness needs improvement category”. This can be a result of students trying harder for the final exam, lack of motivation, and students being restricted by their clothing options. Students who dressed saw an 19.9% increase on their Sit-up score when comparing pre to post tests. With an average of 39.5 on the Sit-ups students fell in the fit-category. In contrast, not-dressed students saw a 16.7% increase in repetitions for the Sit-ups test. This places them in the fit category. The reason behind this is Sit-ups are the least restrictive movement, clothing choice should not impact the outcome. Students who dressed saw an 19.1% increase on the Push-up test from the beginning of the year to the end of the year. With an average score of 23.7 for the Push-up test students fall in the fit-category. In contrast, not-dressed students saw a 25.4% increase in score on the Push-up test. With an average score of 15.5 on the Push-up test students falls in the “fitness needs improvement category”. This is likely a result of inadequate fitness levels or low motivation, since Push-ups are the least restrictive movement; clothing options should not impact the score.

Dressed females and not-dressed females saw significant changes in fitness from the pre- to post test. Dressed females scored in a high fitness category and were able to sustain it over the pre- and posttests. Non-dressed females still were able to improve their score and fitness levels for the Sit-up and Pushup test.

Dressed males did not see a significant change in fitness. The reason behind this is that they started out in the fit-category. A person can only improve their fitness so much before they hit their genetic limit. Human performance is limited by anaerobic and aerobic energy supplies. This is based off a person's height and weight. Healthy individuals have an easier time training to
hit their genetic limit (Ekblom, 2018). Not-dressed males saw a decrease in score in the PACER and Sit-up tests. The average score for the Push-up test showed an increase and it still placed the students in the “fitness needs improvement category”. This can be linked to low motivation or inadequate fitness levels. The law of diminishing returns stated by Ekblom states “that as fitness levels improve, people become fitter, the returns start to diminish” (2018). Students that started in the high fitness category showed an increase in scores, but those increases were small compared to students who started in the unfit category. The unfit students had a higher increases in performance because their pre test score was low. Students who fell in the physically fit category may have experienced low motivation or grade complacency (Ekblom, 2018). Students who were in the physically fit category only achieved one or two points above their previous score, because they already were at a passing score. Students who had achieved a passing score chose to stop at a passing score instead of pushing their limit.

**Limitations:**

The researcher chose 40 seniors who ages from eighteen to nineteen as the participants for this study from a high school physical education class. The researcher chose not to include data from the rest of the student body.

The researcher used informal observations during the course of FitnessGram® testing. From the observations the researcher concluded that many undressed students did not put forth their best effort on the FitnessGram® test. Many students were observed stopping the FitnessGram® test once they hit a passing score as opposed to stopping at the point of exhaustion. These observations helped the researcher “weed out” students who would not fully perform on the FitnessGram® test.
An Analysis of the Effects of Athletic Clothing on Performance of Students who are Participating in the FitnessGram® Tests

The final limiting factor that this researcher found was clothing mobility. Students in the study showed a constant they were either dressed for the FitnessGram® or they were not dressed. Students dressed in clothing made for physical activity saw that their movements were not limited compared to those students who wore street clothing; clothing worn in day to day activity i.e. blue jeans, button down shirts, skirts, sun dresses, heels, and boots. These students saw their movement limited. The same could be said student motivation participants in this study all saw growth throughout the testing process.

Recommendations for Further Research:

This study could be important to students, physical educators, and school administration. The researcher recommends continuing study involving younger students. As students get older, the ratio of students who are physically active shrinks. Research could determine a link between age and motivation to succeed on the FitnessGram® tests. The results could help to promote the importance of being physically active. Future research may be able to show when student motivation begins to decline. Research might be able to provide an insight into the factors that would restrict student involvement in physical activity.
An Analysis of the Effects of Athletic Clothing on Performance of Students who are Participating in the FitnessGram® Tests

**Conclusion:**

This research provides physical education teachers and school administration an in-depth look into test scores for students who dressed for gym class vs. the students who did not dress for gym class. This study shows how their choice impacted their FitnessGram® test scores. The knowledge gained from this study can be used to implement a physical education dress code that would place students in the best possible position to succeed in a physical education setting.
An Analysis of the Effects of Athletic Clothing on Performance of Students who are Participating in the FitnessGram® Tests

FITNESSGRAM
Report for Parents

People come in all shapes and sizes, but everyone can benefit from regular physical activity and a healthy level of physical fitness. The FITNESSGRAM fitness test battery evaluates five different parts of health-related fitness, including aerobic capacity, muscular strength, muscular endurance, flexibility, and body composition. Parents play an important role in shaping children's physical activity and dietary habits. This report will help you evaluate your child’s current level of health-related fitness and help you identify ways to promote healthy lifestyles in your family.

AEROBIC CAPACITY

Aerobic capacity is a measure of the ability of the heart, lungs, and muscles to perform sustained physical activity. In general, the more your child exercises, the higher his or her aerobic capacity level will be. Aerobic capacity is measured with the PACER test, the one-mile run, or the walk test. 

Importance: Good aerobic capacity can reduce risks of heart disease, stroke, and diabetes. Although generally not present in children, these diseases can begin during childhood and adolescence.

Healthy Fitness Zone for 11 year-old girls = 15 - 41 laps

MUSCLE STRENGTH, ENDURANCE, & FLEXIBILITY

These components of health-related fitness measure the overall fitness of the musculoskeletal system. A variety of tests are used to assess these different components.

Importance: The fitness level of muscles is important for injury prevention and overall body function. Strength, endurance, and flexibility are important for maintaining good posture, low back health, and total body function.

Healthy Fitness Zone for 11 year-old girls
Curl-Up = 15 - 29 repetitions
Trunk Lift = 9 - 12 inches
Push-Up = 7 - 15 repetitions
Back-Saver Sit and Reach = At least 10 inches on R & L

BODY COMPOSITION

The body composition measure refers to the relative proportion of fat to lean tissue in the body. Body fat percentage can be estimated by skinfold calipers or other measuring devices. The Body mass index (BMI) is another indicator that determines if a person is at a healthy weight for his or her height.

Importance: Overweight youth are at high risk for being overweight adults. Adult obesity is associated with a number of chronic health problems. Many of these health problems can begin early in life. It is important to begin healthy eating and regular activity early.

Healthy Fitness Zone for 11 year-old girls = 13.00 - 32.00 %

INTERPRETING THE FITNESSGRAM REPORT

Health-related fitness includes a variety of factors. With regular physical activity most children will be able to score in the Healthy Fitness Zone for most of the tests. It is important for all children to be physically active every day (a total of 60 minutes is recommended) even if they are already fit. If your child is in the Needs Improvement area on a particular test, it is important to provide additional opportunities to be active so they can improve their levels of fitness.

Please refer to the back page of the parent report for a description of the Healthy Fitness Zone and for tips on promoting physical activity in your family.

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Appendices

Graph 1

The graph shows female students who were dressed in athletic clothing and female students who were no dressed in athletic clothing. The graph contains data from the pre, middle, and final Sit-Up test.

Graph 2

The graph shows female students who were dressed in athletic clothing and female students who were no dressed in athletic clothing. The graph contains data from the pre, middle, and final Push-Up test.
An Analysis of the Effects of Athletic Clothing on Performance of Students who are Participating in the FitnessGram® Tests

Graph 3

The graph shows female students who were dressed in athletic clothing and female students who were not dressed in athletic clothing. The graph contains data from the pre, middle, and final Pacer test.

Graph 4

The graph shows male students who were dressed in athletic clothing and male students who were not dressed in athletic clothing. The graph contains data from the pre, middle, and final Sit-Up test.
An Analysis of the Effects of Athletic Clothing on Performance of Students who are Participating in the FitnessGram® Tests

The graph shows male students who were dressed in athletic clothing and male students who were no dressed in athletic clothing. The graph contains data from the pre, middle, and final Sit-Up test.

Graph 5

![Graph 5](image)

The graph shows male students who were dressed in athletic clothing and male students who were no dressed in athletic clothing. The graph contains data from the pre, middle, and final Push-Up test.

Graph 6

![Graph 6](image)
An Analysis of the Effects of Athletic Clothing on Performance of Students who are Participating in the FitnessGram® Tests

The graph shows male students who were dressed in athletic clothing and male students who were no dressed in athletic clothing. The graph contains data from the pre, middle, and final Pacer test.

Graph 7

The graph contains data of female students who were dressed in athletic clothing and female students who were no dressed in athletic clothing, from the Sit-Up pretest and compares it with the data from the final Sit-up test.

Graph 8
An Analysis of the Effects of Athletic Clothing on Performance of Students who are Participating in the FitnessGram® Tests

The graph contains data, of female students who were dressed in athletic clothing and female students who were not dressed in athletic clothing, from the Sit-Up pretest and compares it with the data from the final Push-up test.

Graph 9

The graph contains data, of female students who were dressed in athletic clothing and female students who were not dressed in athletic clothing, from the Sit-Up pretest and compares it with the data from the final Pacer test.

Graph 10
An Analysis of the Effects of Athletic Clothing on Performance of Students who are Participating in the FitnessGram® Tests

The graph contains data, of male students who were dressed in athletic clothing and male students who were no dressed in athletic clothing, from the Sit-Up pretest and compares it with the data from the final Sit-up test.

Graph 11

![Graph 11](image1)

The graph contains data, of male students who were dressed in athletic clothing and male students who were no dressed in athletic clothing, from the Sit-Up pretest and compares it with the data from the final Push-up test.

Graph 12

![Graph 12](image2)
An Analysis of the Effects of Athletic Clothing on Performance of Students who are Participating in the FitnessGram® Tests

The graph contains data, of male students who were dressed in athletic clothing and male students who were no dressed in athletic clothing, from the Sit-Up pretest and compares it with the data from the final Pacer test.
An Analysis of the Effects of Athletic Clothing on Performance of Students who are Participating in the FitnessGram® Tests

Work Cited Page


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https://eric.ed.gov/?q=Physical+education+assessment+&pr=on&ft=on&id=EJ794484 pg: 46-50


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