

The Relationship Between 5<sup>th</sup> Grade Students' Physical Confidence and FitnessGram  
Scores

By Samuel Cassard

Submitted in Partial Fulfillment of the Requirements for the  
Degree of Master of Education

April 2021

Graduate Programs in Education  
Goucher College

## Table of Contents

List of Tables	i
List of Figures	ii
Abstract	iii
I. Introduction	
Overview	1
Statement of Problem	2
Hypothesis	3
Operational Definitions	3
II. Review of the Literature	
Introduction to Physical Confidence	5
Fitness Testing in PE	6
Contributing Factors to Fitness Levels	7
Motivational Factors in PE	10
Summary	13
III. Methods	
Design	14
Participants	14
Instrument	15
Procedure	16
IV. Results	
Descriptive Statistics	17
Relationships between predictors and FBIQ results	18
Correlations between the Single Predictor and Criterion Variables	20
Descriptive Statistics for the Criterion (FBIQ) Items	21
V. Discussion	

Descriptive Statistics	24
Relationships between predictors and FBIQ results	24
Correlations between the Single Predictor and Criterion Variables	25
Descriptive Statistics for the Criterion (FBIQ) Items	25
Threats to Validity	26
Connections to previous studies	26
Conclusion	27
References	29
Appendix A: Functional Body Image Questionnaire (FBIQ)	32
Appendix B: FitnessGram Healthy Fitness Zone (HFZ) Chart	33

## List of Tables

1. Descriptive Statistics	17
2. Descriptive data by Sex	18
3. Multiple Regression Model Summary	19
4. Analysis of Variance of Regression Model	19
5. Regression Results	19
6. Pearson Product Moment Correlations between Variables	20
7. Item and Total scores for all Participants and Disaggregated by Sex	21

## List of Figures

1. Bar chart of Mean Item responses on the Confidence Survey 23

## Abstract

The purpose of this study was to determine whether FitnessGram test scores could accurately predict 5<sup>th</sup> grade students' confidence in PE class. The researcher hypothesized that FitnessGram scores would significantly predict confidence levels, with the strongest predictor of confidence likely being the Pacer test of cardiovascular endurance. A Functional Body Image Questionnaire (FBIQ) created by the researcher was completed by 58 fifth grade students to yield a confidence score. A multiple regression was used to determine if the four FitnessGram test scores gathered for each student from the previous year could accurately predict confidence scores. The results indicated the combination of the four FitnessGram scores did not significantly explain the variance of the criterion (Confidence scores) ( $R\text{-squared} = .129, p < .113$ ). Therefore, the null hypothesis was retained. Results did indicate there were four significant correlations between the following scores, only one of which was with the criterion, Confidence. These were between the Confidence and Push-Up scores ( $r = .27, p < .04$ ), Pacer and Push-Up scores ( $r = .36, p < .004$ ), Curl-Up and Push-Up scores ( $r = .345, p < .008$ ) and Sit and Reach and Pacer scores ( $r = .264, p < .045$ ). Factors influencing confidence of students in PE class should continue to be researched in order to develop more effective ways to motivate children to live a healthy lifestyle.

## CHAPTER I

### INTRODUCTION

#### Overview

At any level of an activity, confidence tends to drive a person to want to participate, especially when success in the activity brings the outcome of joy. In the case of physical activity, there may be a number of motivating factors, but the health outcomes hold the highest importance. In a country where 18.4% of children ages six to 11 are obese, it is clear that a significant lack of value is placed on physical health from an early age (Hales, Carrol, Fryar, & Ogden, 2017). Learning the importance of health is the main goal of the curriculum in Physical Education, a class that is required of all elementary-aged students. Children of this age group naturally have the instinct to play, and that often comes in the form of physical activity. Some may have more interest and intrinsic motivation to participate in sports and physical games, but it is hard to ignore that the most active students are typically the ones who are more talented athletes.

As an elementary Physical Education teacher, the researcher has a unique perspective on confidence in physical movement of children ages five to eleven. Although physical education class is a place to gain the skills and knowledge to be more confident in one's physical abilities, those who are not as genetically predisposed to skill-related health components tend to sideline themselves from giving their best effort in PE class. Students who lack confidence often make excuses to sit out of activities.

Students in the intermediate (3<sup>rd</sup>-5<sup>th</sup>) grades have a tendency to compare themselves to others, which can be a detriment to confidence in PE. Many of the students who label themselves as "unathletic" are developing at a normal rate and are

capable of performing a variety of skills proficiently for their PE grade level outcomes. However, when they see more talented classmates performing at higher levels, some become reluctant to persevere. The relationship between students' low fitness scores and low confidence in their ability during PE class is fairly noticeable during the FitnessGram testing period. Some tests, such as the cardiovascular endurance test, called the Pacer, seem to weigh heavily on the nerves of those less fit students. The pressure of performing the Pacer, along with the Push-Up and Curl-Up test, in front of peers often results in a lack of best effort due to the insecurity of intermediate-aged students who feel or recognize that they are not as physically talented as some of their peers.

### **Statement of Problem**

As noted in the Overview, many factors affect students' confidence in the PE class setting. The researcher was interested in examining the relationship between the health-related FitnessGram test component scores and the confidence levels of 5<sup>th</sup> grade students as physical movers in PE class since this data is collected at school. Knowing about these relationships could help PE teachers use that information to design fitness units aimed at improving confidence as well as all-around fitness. The results would give PE teachers a better idea of how to address SHAPE Standard 5 which says students will "express the enjoyment and/or challenge of participating in a favorite physical activity" (Courtourier et. al, 2013). Fitness testing is a stressful time for many in PE, so the researcher hopes to discover which tests relate to confidence the most in order to improve upon those skills, thus increasing confidence and the motivation to live an active lifestyle and perform well in PE.

### **Hypothesis**



The null hypothesis tested using a multiple regression analysis was that there would be no statistically significant relationship between FitnessGram test scores and the functional body image of 5<sup>th</sup> grade students in PE class.

$$h_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$$

### **Operational Definitions**

*FitnessGram Test* – A series of fitness tests performed to indicate health zones in the following 5 fitness categories: cardiovascular endurance, muscular strength, muscular endurance, flexibility, and body composition. Rather than focusing on percentile norms, which rank students against each other, FitnessGram focuses on criterion-referend standards.

*Healthy Fitness Zone (HFZ)* – A test cutoff score in each fitness category that indicates a student performed well enough to be considered to be in good overall health

*Needs Improvement Zone* – A test cutoff score in each category that indicates a potential for future health risks if the student's fitness in this area does not improve

*Health Risk Zone* – A test cutoff score in each category that suggests the student has a probability for future health problems if they do not improve their physical fitness

*Functional Body Image (FBI)* – The way an individual perceives their body's movement and function. Aspects of affective (feeling confident in physical ability), behavioral (participating in physical activity often), and cognitive (believing it is important to take care of your body) domains play a part in FBI. FBI was assessed in this study by using the FBI Questionnaire found in Appendix A.

## FitnessGram Test

*Cardiovascular Endurance* – The efficiency with which the heart, blood vessels, and lungs supply oxygen rich blood to working muscles during physical activity.

*Muscular Strength* – The maximal force your muscles can exert in a single effort

*Muscular Endurance* – The ability to sustain or repeat muscular activity over time

*Flexibility* – Describes the range of motion of muscles at the joint

*Body Composition* – Describes what part of total body weight is fat verses fat free weight, such as bones and muscles.

## CHAPTER II

### REVIEW OF THE LITERATURE

#### Introduction to Physical Confidence

Obesity is one of the core issues that plagues the health of American children. According to the CDC, 18.4% of American children ages 6 to 11 qualify as obese (Hales, Carrol, Fryar, & Ogden, 2017). When health risks are identified in the younger population, the first thought is to identify and address them at the root of the problems. Elementary Physical Educators hold some of the responsibility for teaching their students the important role that physical activity plays in a healthy lifestyle from an early age. Unfortunately, like in all school subjects, there are some students who lack the confidence in their perceived abilities to fully engage in the activities during PE classes. Signs that a student lacks confidence in their physical ability during PE class include sitting out of activities, shying away from involvement in team games, only partnering with friends during group activities, and more. A number of factors can affect a child's confidence in PE that may have nothing to do with their physical ability, but reflect their general outlook on their physical confidence. These factors can be best described by the term "functional body image" (Allen, Telford, Telford & Olive, 2019).

The term "body image" tends to evoke ideas about people's outlook on the aesthetic properties of their physical body. The characteristics of functional body image affects how an individual perceives both their body's movement and function.

"Like aesthetic body image, functional body image is thought to be multidimensional, occurring across affective, behavioral and cognitive domains. Abbott and Barber (2010) conceptualize these domains in the following ways: affective - relates to the evaluations made regarding how satisfied an individual is with their body (e.g. feeling good about one's physical ability); cognitive - relates

to the value an individual places on aspects of their body (e.g. believing it's important to take care of the body); and behavioral - describes the investment individuals dedicate to maintaining aspects of their body (e.g. participating in physical activities often)." (Allen et al., paragraph 3, pg. 2)

The study quoted above correlated Embodied Image Scale (EIS) scores, which applied a 5-point Likert scale to determine functional body image based off of a subscale score calculated by averaging all scores 1-5, with physical activity levels recorded using accelerometers.

### **Fitness Testing in PE**

Health-related fitness components are a significant part of the grade-level outcomes created by the Society of Health and Physical Educators (SHAPE) to be implemented by PE teachers across the nation. Standard 3 of the outcomes pledges that "the physically literate individual demonstrates the knowledge and skills to achieve and maintain a health-enhancing level of physical activity and fitness" (Courturier et al., 2013). The fitness components of cardiovascular endurance, muscular strength, muscular endurance, flexibility, and body composition are defined and assessed in gymnasiums by PE teachers using a measuring tool called the FitnessGram. The FitnessGram assessment was developed by The Cooper Institute to measure student physical fitness levels in the five categories previously listed. There are a multitude of tests used to measure each fitness category, but PE teachers use their discretion as to which ones they choose to test based on the availability of the required equipment. Each test has a Healthy Fitness Zone (HFZ) number that students try to exceed and which indicates they have satisfactory fitness for their age and gender. For an example, a 10-year-old boy would be considered in the HFZ for muscular strength if he can score at least 7 on the push-up test.

Questions have been raised about the validity of the test and if the HFZ target numbers are appropriate for each fitness test. A recent study examining the validity of the cardiovascular endurance Healthy Fitness Zone used two cross-sectional data points, making the point that health-risk factors are not considered into fitness zone classifications (Lee et al., 2020). Findings suggested that the validity of the cut-points used to determine if the child is in the healthy zone or not, may be inflated due to some logistical challenges such as a student's dislike of fitness testing or resistance from parents. The data gathered determined that 50-56% of males and 34-36% of females were in the HFZ for cardiovascular endurance, as calculated using their Pacer test scores (Lee et al., 2020). Although FitnessGram can be an excellent tool for goal-setting and tracking improvement in fitness categories as an individual, the students may lose confidence when they fall below the HFZ or when they compare their scores to those of peers who scored higher. The recording of FitnessGram data starts as early as 4<sup>th</sup> grade, when students are likely to be 9 or 10 years old and can be tracked as far the end of High School for some states. Is it appropriate to assume that a 9-year-old student who has not developed the upper-body strength to complete 6 push-ups is a health risk? Is it fair to say that the boys must outperform girls to attain a score in the HFZ for cardiovascular endurance? These cut-points could be contributing factors to the confidence of a student and their functional body image, particularly as they pertain to PE class.

### **Contributing Factors to Fitness Levels**

Trying to determine the fitness of elementary-aged students can be challenging at times, since many factors contribute to fitness levels. Physical activity is consistently associated with a lower risk for childhood obesity, but educators can only control the scheduled time for movement that takes place in a school day.

“In 2016, more than three-quarters (76%) of children and adolescents in the USA did not meet the guidelines-recommended daily PA level (i.e., at least 60 min of PA every day of the week). In the meantime, nearly half (47%) of children and adolescents exceed 2 hours per day of sedentary behavior” (An, Liu & Liu, 2020).

Many states mandate less than 3 PE classes a week, totaling for 90 minutes or less per child. This means that opportunities to meet or exceed the suggested 60 minutes of physical activity a day must come outside of the school day. Data also indicates that children, on average, spend less than half (45%) of their PE time actually engaged in moderate to vigorous physical activity (An et al., 2020). States with laws governing an increase in PE frequency and duration demonstrate higher physical activity levels amongst their students (An et al., 2020). This includes recess time and physical brain breaks during class time as well.

Access to movement opportunities outside of school, and other health factors like nutrition, are not uniform for children across the United States. A 2018 study explored the relationship of cardiovascular endurance with a number of variables amongst urban public-school students (Clark et al., 2018). The study acknowledged that many factors, such as genetics, sex, age, body composition, and patterns of physical activity, played a part in a child’s cardiovascular endurance. The main focus was to note socioeconomic factors that played a role in the physical activity of the residents. Low-income urban neighborhoods demonstrated a lower rate of student’s walking to school, due to parent’s perception of the neighborhood as “unpleasant” (Clark et al., 2020). Acts of social disorder, such as loitering, fighting, and drug epidemics, were associated with less physical activity among youth in Chicago (Clark et al., 2020). This relationship to crime was seen in San Diego as well, where children participated in 40 minutes less physical activity a day than those residing in an area with low crime. The study concluded that sex, age, and daily physical activity levels were the highest factors contributing to low

cardiovascular endurance (Clark et al., 2020). Only 48.9% of boys and 34.7% of girls in the urban settings studied were found to achieve the recommended 60 minutes of physical activity a day, based off the step count of their accelerometer (Clark et al., 2020). Low socioeconomic status has shown to limit opportunities for participation in sports and other recreational activities outside of school. The students from the urban sample had a 54.6% rate of meeting the Health Fitness Zone for cardiovascular endurance, which was noticeably lower than the 65.7% found in wealthier areas (Clark et al., 2020). On top of that, under-nutrition in developing areas has been positively associated with low fitness levels (Patki, Parasher & Bhatnagar, 2015).

Some of these factors are unfortunately out of the control of physical educators, parents, and other influencers in a child's life. As much as we can tell children they can control their own fitness, genetics play a huge part in fitness components, especially body composition, from an early age. Many overweight and obese children feel they are less physically competent and perform poorly on endurance and weight-bearing tasks, such as push-ups (Cleveland, Boeckne, Takahashi & Fischer, 2016). A 2016 study that explored the relationship of students' body weight perception to their actual BMI and fitness scores showed that students who perceived themselves as larger scored lower on curl-up, push-up, and Pacer tests (Cleveland et al., 2016). However, no correlation was found between body weight perception and flexibility tests, such as the sit-and-reach.

Clearly, fitness levels play a significant role in children's functional body image, but health-related fitness components do not account for all of the content that goes into a PE lesson. Manipulative skill competency accounts for a majority of the skill-based outcomes listed in standard 1 of the SHAPE grade-level outcomes. Desire to participate in physical activities in PE that require skills relies on the confidence students have regarding their ability to execute those skills. "Empirical studies showed

that children with adequate motor skill competency spent significantly more time in moderate-to-vigorous physical activity than children with insufficient motor skill competency” (Chen, Mason, Hammond-Bennett & Zalmout, 2016, p. 491). These skills contribute significantly more to the child’s likelihood to participate in sports, which has been previously linked to better health-related fitness in this paper. A 2016 study compared 4 manipulative skills and their relationship to FitnessGram fitness components, finding that the association between these skills and the Pacer test of cardiovascular endurance was stronger in boys than it was girls. (Chen et al., 2016) Uniquely, it found that these skills contributed more to push-up and trunk lift tests for girls compared to boys. (Chen et al., 2016) The study concluded that, although boys outperform girls on the manipulative skills test, the girls outperformed the boys in 3 of the fitness tests, besides push-ups (Chen et al., 2016).

### **Motivational Factors in PE**

It would be naive to assume that a child’s fitness level and genetic athletic disposition are the only factors limiting their motivation in PE class. Physical educators must be determined to find activities that are engaging and enjoyable for students of all ability levels. Student’s who thrive in the physical environment of PE appear to be more intrinsically motivated by the opportunity to succeed and display skills in front of their peers. Results of a 2020 study using a two-stage cluster analysis approach based on self-determined motivational profiles toward PE showed that the high self-determined students significantly improved their cardiovascular endurance throughout the fitness unit compared to the control group of moderate self-determination profiles (Gujarro-Romero, Mayorga-Vega, Casado-Robles & Viciano, 2020). Of the five fitness components, cardiovascular endurance is known to be the best overall metric of health-related fitness in grade school children. Physical educators all over the country try a



variety of units and activities to spark the interest of even their least confident student, but it remains to be clarified exactly what motivating factors play a part in a student's effort in school.

It has been documented that fifth-grade students see a noticeable decrease in engagement and motivational attitude, which makes the transition period at the end of elementary school a sensitive developmental time (Heatly & Votruba-Drzal, 2019). Student's who have strong and warm relationships with their parents and teachers are typically more motivated than those who are distant and encounter conflict often (Heatly & Votruba-Drzal, 2019). Building connections with these students outside of the PE environment is essential to transitioning that relationship back into the classroom. Opening the line of communication with families of students who are unmotivated in PE might help the student see the value in the content, as long as the family is willing to advocate for the importance of PE with the student.

"Self-determination theory (SDT) has been used to explain the role of psychosocial and motivational factors on engagement in physical activity within the context of PE" (Kalajas-Tilga, Koka, Hein, Tilga & Raudsepp, 2020, p. 462). SDT is a way to measure 4 different types of motivation or regulation as they relate to a person participating in a certain activity.

"These are intrinsic motivation (i.e., doing an activity for its inherent fulfilment rather than for a certain result), identified regulation (i.e., acting to acquire self-endorsed outcomes), introjected regulation (i.e., behaving out of a sense of obligation, guilt, or worry), and external regulation (i.e., acting to avoid sanctions or to receive a reward). These 4 forms of regulations fall along a continuum of self-determination, anchored by intrinsic motivation on 1 pole and external regulation on the other pole." (Kalajas-Tilga et al., 2020, p. 463)

It may be helpful to think of what each type of motivation may look like in a PE setting. An intrinsically motivated child would be a student who fully engages in any physical activity because they get joy out of movement, which is often due to their success in the skills required for the activity. These students do not need any special attention or engagement methods from the PE teacher in order to give the entirety of their effort to PE activities. Someone who is displaying identified regulation may be motivated by circumstance, such as a 5<sup>th</sup> grade girl with a gymnastics background showing increased motivation during the gymnastics unit. Introjected regulation may take the form of a student giving some effort in a group activity due to the guilt or worry that their teammates might criticize their engagement. The external regulator would increase participation in order to win a reward or to avoid a bad grade in PE. Motivational strategies for these external regulation students are what a physical educator must really focus on to get the most out of an entire class. Social factors play a part in manipulating student's motivation toward an activity by addressing their psychological needs. "By acknowledging the students' feelings, providing them choices, and, at the same time, diminishing demands and avoiding punishments, teachers are likely to satisfy students' psychological needs." (Kalajas-Tilga et al., 2020, p. 463). Giving students choice and the ability to modify activities to better suit the reasonable goals set by them can better temper expectations and eliminate confidence-diminishing comparisons to higher-ability students. Making grade-appropriate objectives very clear for each lesson can also help unmotivated students feel like they have an achievable goal to reach, instead of going in with the mindset that there will be students who are way more successful than them. It is also important to note that there are outside emotional factors that may affect a child's motivation on any given day, so presenting instruction in an unchallenging way devoid of punishment might be more respectful of student's feelings and yield higher motivation and participation in PE.

## Summary

It cannot be overstated how influences during the stages between childhood and adolescence can impact how our student's value their own health. The effects that puberty can have on the perceived aesthetic body image means that managing the confidence of students in the PE environment becomes more important than ever. Acknowledging the socio-economic, gender, and genetic limitations that impact the fitness levels of students can facilitate attainable goal-setting, especially when it comes to FitnessGram test scores. The Healthy Fitness Zones set for FitnessGram can be arbitrary, so using test and re-test goal-setting instead of HFZ may improve student engagement and effort in their attempts to beat previous scores. Findings about the relationships drawn between manipulative skills and fitness scores tell us that encouraging students to participate in team sports outside of school can also vastly improve overall fitness. It also means that skill-based units in PE may be just as effective as fitness units for increasing FitnessGram scores, particularly in cardiovascular endurance.

To enhance motivation and success, PE teachers must continue to challenge themselves to build relationships with unmotivated students and their families outside of class, while providing student-choice and activity modification during lessons in PE. Confidence drives participation and the desire to engage in moderate to vigorous physical activity (MVPA). With technology becoming more relevant and time-consuming in the lives of our children, reaching 60 minutes of MVPA a day seems more and more challenging. Building confidence in the physical abilities of our youth may be our best hope at escaping the health-risks that threaten the obese children of our nation.

## **CHAPTER III**

### **METHODS**

#### **Design**

The study used a correlational design to examine whether four FitnessGram test scores of Pacer, Push-up, Curl-up, and Sit and Reach could accurately predict the Functional Body Image (confidence scores) of 5<sup>th</sup> graders in the researcher's PE class. He hoped to determine whether these relationships might inform instructional methods and goals in PE.

#### **Participants**

A convenience sample was used, as FitnessGram data was only available for the researcher's three 5<sup>th</sup> grade classes. The Functional Body Image Questionnaire (described below) was sent to the 66 students in these classes with their FitnessGram data from the previous year and 58 students participated by completing the survey. All participants, 29 boys and 29 girls, were aged 10 or 11 years old. Since the age of the sample is similar, and Healthy Fitness Zone scores between genders do not vary much for this age group, the demographics of the sample were not used as an experimental variable.

#### **Instrument**

Two testing instruments were used in the study, including the FitnessGram test, which was designed by The Cooper Institute, and a Functional Body Image Questionnaire, which was designed by the researcher.

The FitnessGram test is essentially a fitness report card that assesses the physical fitness of students in school districts that choose to adopt it. There are options of which tests to administer for each of the five fitness components, but for this study, only four were used: cardiovascular endurance, muscular strength, muscular endurance, and flexibility. As the fifth component, body composition is no longer tested by the researcher's school system. A brief description of each test used follows.

The Pacer test is a recorded cadence that instructs students to run back and forth between a line for as long as they can and tests cardiovascular endurance. The Push-Up test uses a cadence that tells students when to go down and up in their push-ups for as many as they can do to test upper-body muscular strength. The Curl-Up test uses a cadence that tells students when to go up and down in their sit-up for as many as they can do to test core muscular endurance. The students also performed two flexibility tests, including the Sit and Reach test and Shoulder Stretch test, but only the Sit and Reach test was used, since the Shoulder Stretch test data was not recorded or quantifiable. The Sit and Reach test uses a box marked with inch lines to test hamstring and lower back flexibility by measuring how far the students can reach with their legs straight.

The Functional Body Image Questionnaire was designed by the researcher to assess the confidence students have in their physical ability, particularly in PE class. A five-point Likert scale was used for each of the 10 questions. Responses could range from one (not confident) to five (very confident). Questions focused on specific scenarios that may happen in PE class. The total scores out of a possible 50 points were used for the analysis, but each student's confidence level was also categorized as "highly confident" (40 or more), "somewhat confident" (30 to 39), "not confident" (29 or less).

## Procedure

The 4<sup>th</sup> Grade FitnessGram data for each student from last years' test were gathered through Synergy, the platform in which the scores were recorded.

The Functional Body Image Questionnaire was administered during the week of March 1st through 6th to allow the 5<sup>th</sup> grade students time to complete it. Since the Covid-19 pandemic has forced the student's PE class to be fully virtual, the questionnaire was completed through Canvas, the online instructional platform used by the school system. Total scores were calculated for the analysis by summing the response values (from one to five) for each item and totaled. Higher scores reflected higher confidence in health-related fitness in PE.

## CHAPTER IV

### RESULTS

The researcher was interested in learning how FitnessGram test results related to his PE students' functional body images, which he assessed using a survey (Functional Body Image Questionnaire) about confidence about their fitness and body image. The null hypothesis for this study was tested using a multiple regression analysis to determine if there was a statistically significant relationship between FitnessGram test scores and the functional body image of 5<sup>th</sup> grade students in PE class ( $h_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$ ). Descriptive statistics and the results of the regression and correlations results follow below.

#### Descriptive Statistics

Descriptive statistics for the dependent/criterion variable (Confidence) and independent/predictor variables were computed and follow in Table 1. Results indicate the FitnessGram test scores ranged from 0 to 70 points and that most had considerable variance, although the Sit and Reach test's standard deviation was fairly small (2.529).

**Table 1**

*Descriptive Statistics for Variables*

	N	Minimum	Maximum	Mean	Std. Deviation
Confidence (FBIQ score)	58	18	49	37.155	7.145
Pacer	58	9	70	20.310	12.051
Pushup	58	0	37	10.172	9.327
Curlup	58	0	50	15.224	14.417
SitandReach	58	3	15	9.535	2.529

To gain a bit more insight about performance on the FitnessGram and Confidence Survey results, descriptive statistics were computed after disaggregating the data for males and females. Results follow in Table 2 and, as suspected by the

researcher, indicated fairly small differences between the mean test scores of males and females. The mean FitnessGram scores indicated males demonstrate slightly more muscular strength and endurance, as shown in the Push-up and Curl-up test scores, while females demonstrated more flexibility in the Sit and Reach test.

**Table 2**

*Descriptive data of Variables disaggregated by Sex*

	<b>Sex</b>	<b>N</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean</b>	<b>Std. Deviation</b>
<b>Confidence</b>	<i>Males</i>	29	25	49	37.931	6.530
	<i>Females</i>	29	18	49	36.379	7.748
<b>Pacer</b>	<i>Males</i>	29	9	70	20.379	13.439
	<i>Females</i>	29	9	63	20.241	10.726
<b>Pushup</b>	<i>Males</i>	29	1	31	11.759	8.322
	<i>Females</i>	29	0	37	8.586	10.130
<b>Curlup</b>	<i>Males</i>	29	2	45	16.862	12.831
	<i>Females</i>	29	0	50	13.586	15.905
<b>SitandReach</b>	<i>Males</i>	29	3	15	8.655	2.636
	<i>Females</i>	29	6	15	10.414	2.113

### **Relationships between predictors and Functional Body Image Questionnaire results**

#### **Multiple Regression Results**

A multiple regression was run to investigate whether the four FitnessGram scores could significantly predict participants' Confidence Survey scores. The results follow in the tables below and indicated that the model using the four predictor FitnessGram scores explained just 12.9% of the variance ( $R^2 = .129$ ) and that the combination of FitnessGram scores did not significantly help predict Confidence scores:  $F(4, 53) = 1.968, p < .113$ ). The multiple regression results yielded the following equation in which none of the Beta weights for the four predictors were statistically significant ( $p > .05$  for each). Therefore, the Null Hypothesis was retained.



$$\text{Confidence} = 30.355 + .085 \text{ Pacer} + .123 \text{ Pushup} + .067 \text{ Curlup} + .294 \text{ Sit and Reach}$$

**Table 3***Multiple Regression Model Summary*

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.360	.129	.064	6.91357

**Table 4***Analysis of Variance of Regression Model*

ANOVA						
Model		Sum of Squares	df	Mean Square	F	P (Sig.)
1	Regression	376.342	4	94.085	1.968	.113
	Residual	2533.262	53	47.797		
	Total	2909.603	57			

**Table 5***Regression Components*

Model	Unstandardized Coefficients		t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error			Lower Bound	Upper Bound
1 (Constant)	30.355	3.656	8.302	.00	23.021	37.689
Pacer	.085	.084	1.009	.32	-.084	.254
Pushup	.123	.112	1.096	.28	-.102	.347
Curlup	.067	.069	.970	.34	-.071	.205
SitandReach	.294	.383	.768	.45	-.474	1.063

### Correlations between the Predictor and Criterion Variables

In running the multiple regression, Pearson Product Moment correlations were also computed between the four FitnessGram and Functional Body Image Questionnaire scores. Results follow in Table 6 and indicated that all of the scores correlated positively and that there were four statistically significant correlations between the scores, although only one of those was between a predictor (Pushups) and the criterion (Confidence), and interestingly, that was on Pushups, a variable on which boys outperformed the girls on average. Those correlations follow in Table 6 and included: Confidence and Pushup scores ( $r = .27, p < .04$ ), Pacer and Pushup scores ( $r = .36, p < .004$ ), and Curlup and Pushup scores ( $r = .345, p < .008$ ) and SitandReach and Pacer scores ( $r = .264, p < .045$ ).

**Table 6**

*Pearson Product Moment Correlations between Variables*

Variable		Confidence	Pacer	Pushup	Curlup	SitandReach
Confidence	Pearson Correlation	1	.247	<b>.270*</b>	.230	.188
	Sig. (2-tailed)		.062	.040	.082	.158
	N	58	58	58	58	58
Pacer	Pearson Correlation		1	<b>.368**</b>	.124	<b>.264*</b>
	Sig. (2-tailed)			.004	.352	.045
	N		58	58	58	58
Pushup	Pearson Correlation			1	<b>.345**</b>	.104
	Sig. (2-tailed)				.008	.438
	N			58	58	58

<b>Curlup</b>	Pearson Correlation				1	.214
	Sig. (2-tailed)					.107
	N				58	58
<b>SitandReach</b>	Pearson Correlation					1
	Sig. (2-tailed)					
	N					58

\*. Correlation is significant at the 0.05 level (2-tailed).

\*\*. Correlation is significant at the 0.01 level (2-tailed).

### Descriptive Statistics for the Criterion (Functional Body Image Questionnaire) Items

Finally, descriptive statistics were computed for responses to each item on the Functional Body Image Questionnaire for the total sample and for the boy and girl participants to see if they differed dramatically across items. Results follow in Table 7 and show that the male mean scores exceeded the females on seven of the ten items

**Table 7**

*Descriptive Statistics for Item and Total scores on the Functional Body Image Questionnaire for all Participants and Disaggregated by Sex*

Item	Group	Range	Mean	Std. Deviation
1. How confident are you in running the Pacer test during PE?	Total N=58	1-5	3.534	1.217
	Males N=29	2-5	3.758	1.090
	Females N=29	1-5	3.310	1.312
2. How involved do you get in team games, such as basketball, during PE?	Total	1-5	3.65	1.147

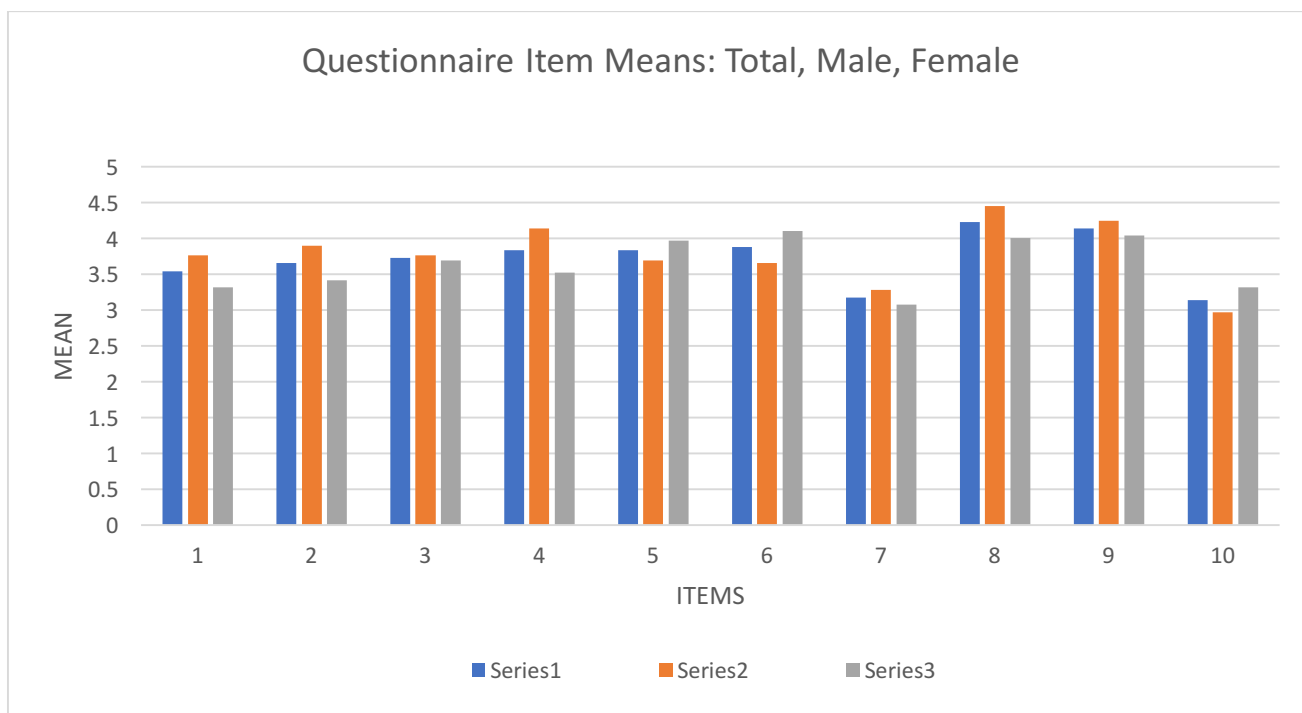
	Males	2-5	3.896	1.113
	Females	1-5	3.413	1.15
<b>3. How athletic do you feel you are?</b>	<b>Total</b>	1-5	3.724	1.088
	Males	2-5	3.758	1.023
	Females	1-5	3.689	1.168
<b>4. How confident are you in catching a ball that is thrown to you in PE?</b>	<b>Total</b>	1-5	3.827	1.244
	Males	1-5	4.137	1.059
	Females	1-5	3.517	1.352
<b>5. How helpful do you feel your body type is to being successful in PE?</b>	<b>Total</b>	2-5	3.827	.861
	Males	2-5	3.689	.929
	Females	3-5	3.965	.778
<b>6. How much value do you put on your own physical health?</b>	<b>Total</b>	2-5	3.879	1.06
	Males	2-5	3.655	1.078
	Females	2-5	4.103	1.012
<b>7. How confident are you in demonstrating skills in front of your classmates during PE?</b>	<b>Total</b>	1-5	3.172	1.326
	Males	1-5	3.275	1.250
	Females	1-5	3.069	1.412
<b>8. How excited are you when walking into PE class?</b>	<b>Total</b>	2-5	4.224	.918
	Males	3-5	4.448	.736
	Females	2-5	4.00	1.035
<b>9. How active are you during Recess?</b>	<b>Total</b>	1-5	4.137	1.016
	Males	2-5	4.241	.912
	Females	1-5	4.034	1.117

10. How comfortable are you being partnered with someone you don't know during a PE activity?	Total	1-5	3.137	1.290
	Males	1-5	2.965	1.295
	Females	1-5	3.310	1.284

Finally, to depict the total sample, males' and females' mean responses to each item on the FBIQ visually, a bar chart is presented below in Figure 1. Overall, it appears the mean responses were similar across the ten items, despite males being higher on seven of them, with questions 7 and 10, which reflect the social demands of testing, recording the lowest total means.

**Figure 1**

*Bar chart of Mean Item responses on the Confidence Survey*



Results are discussed in Chapter V.

## CHAPTER V

### DISCUSSION

#### **Descriptive Statistics**

The wide range of scores in Table 1 for the Functional Body Image Questionnaire and the four FitnessGram test results shows glaring variability in the fitness and physical confidence of intermediate elementary students. The mean scores in Push-up and Curl-up suggest males in the 10 to 11-year-old range tend to have more upper-body muscular strength and core muscular endurance than females. However, the Sit and Reach test for flexibility yielded scores which were relatively higher for females than males. This data could help a physical educator design fitness instruction around the supported idea that females may need more practice in muscular strength and endurance, while males could benefit from spending more time on flexibility. Given the insignificant predictions, it is unclear if confidence is related to these differences.

#### **Relationships between predictors and FBIQ results**

The Null Hypothesis that there was no statistically significant relationship between FitnessGram test scores and the functional body image of 5<sup>th</sup> grade students in PE class was retained. This meant that the four FitnessGram scores used as a whole were unable to accurately predict the confidence of 5<sup>th</sup> grade students in PE. Only the Pushup scores related significantly to the FBIQ total scores. These results may suggest to physical educators that students with higher fitness levels are not necessarily the most confident, and that lower fitness scores don't necessarily indicate students lack confidence in their physical abilities. Due to this suggestion, PE teachers will be more likely to give attention and positive feedback to students that perform at a high level.

### **Correlations between the Single Predictor and Criterion Variables**

The four significant correlations in Table 6 are informative results from the study. The only significant correlation between the Confidence score and a single predictor from FitnessGram was the Push-up test, which might imply that upper-body strength most accurately predicts confidence in PE class between the health-related fitness components. The Push-up test was most strongly correlated with the Pacer and Curl-up test. This suggests upper-body muscular strength in intermediate students is often accompanied by high cardiovascular endurance and core muscular endurance. These results are not particularly surprising when looking at the overall scope of fitness in children. Flexibility relies heavily on genetics and body composition and is very difficult to make significant improvements in through practice, so the Sit and Reach test's lack of significant correlation to other FitnessGram scores is understandable.

### **Descriptive Statistics for the Criterion (FBIQ) Items**

The mean scores for each of the 10 Questionnaire items showed small differences between males and females. However, the three items that females scored higher than males on had a common theme. Questions five and six each addressed feelings about one's body and health, while question ten addressed their social confidence. The seven questions on which the males' mean scores exceed the females' means each asked about athleticism and confidence in performing specific PE skills. This implies that males may relate their confidence in PE to their participation and success in sports and activities, whereas females view fitness and health separately from physical skills in PE. This should be considered when designing a fitness unit so that health is the focus, whereas skill-based units can include fitness as a secondary outcome.

### **Threats to Validity**

One threat to the validity of this study was the convenience method of sampling that was used. As an elementary school PE teacher, the researcher had access to three 5<sup>th</sup> grade classes in which 58 of the 66 students participated by completing the FBIQ. This sample represents just a portion of the 5<sup>th</sup> grade population at the school of the researcher, and therefore may not accurately represent all students from a variety of socioeconomic backgrounds.

Since the study was correlational and not experimental, the threats to validity came primarily from the assessment tools. The Functional Body Image Questionnaire (FBIQ) was created by the researcher using a Likert scale to rate confidence, but some of the FBIQ items likely related more strongly to confidence than others. Pilot testing and revisions might have identified and minimized this potential issue. The FBIQ was also administered during virtual learning sessions where the students had been participating in PE from their homes for almost a year due to the pandemic, so the items asking about PE scenarios specific to in-person learning may have confused some participants.

Also, the FitnessGram test scores used for each student were gathered nearly a year before the FBIQ scores were gathered. Fitness levels may have significantly improved or worsened during that year.

Questions were also raised in Chapter II about the validity of FitnessGram tests' for reflecting fitness levels of elementary students, as health-risk factors, such as student's dislike of fitness testing or resistance from parents were, not considered when scoring the Fitnessgram or FBIQ.

### **Connections to previous studies**

This study furthers the research on factors affecting fitness levels and fitness-related confidence in elementary students. The 2020 study by Allen, Telford, Telford and Olive referenced in Chapter 2 used a Likert scale survey tool (similar to the FBIQ)



and found significant relationships between functional body image and positive attitudes towards physical education as well as extracurricular sports participation. The current study did not directly support those findings, but physical educators looking to improve confidence in their students might encourage them to participate in sports outside of school. Chen, Hammond-Bennett, and Zalmout (2016) found that children who were proficient in motor skills spent more time being physically active than students who were less sufficient in those skills. Since confidence proved to be a poor predictor of FitnessGram scores in this current study, a PE teacher may focus on motor skill units versus fitness units in order to promote moderate to vigorous physical activity outside of school. Cleveland et al. (2016) found a significant negative correlation between self-perceived body weight and Curl-up, Push-up, and Pacer FitnessGram scores. Cleveland's findings align at least partially with the current results, which showed a significant correlation between Confidence and Push-up scores.

### **Conclusion**

The Null Hypothesis that combining the four FitnessGram test scores would not significantly explain variance in the functional body image of 5<sup>th</sup> grade students in PE class was retained. However, there were data derived from the study that may help Physical Educators better plan instructional fitness content. For example, in order to engage more with students in PE who may not be as confident in their skills, fitness should be taught as its own unit to avoid intimidating those who relate fitness to athletic prowess. Students proficient in cardiovascular endurance and muscular strength/endurance can benefit from spending time learning about flexibility. Building upper-body muscular strength, which many elementary students have not developed yet, could provide a confidence boost to low-motivation or weaker students.

Although the FitnessGram scores as a whole did not predict confidence in PE significantly, PE instructors should still explore factors that might influence student's

confidence. Aesthetic body image, which was addressed in Item 5 of the Functional Body Image Questionnaire, can be further studied as a predictor of physical confidence. Diving deeper into confidence in the PE setting can only further our knowledge of how we can engage with students of all abilities so they can live a healthier lifestyle with confidence.

## REFERENCES

- Allen, C.P., Telford, R.M., Telford, R.D. & Olive, L.S. (November 2019). Sport, physical activity and physical education experiences: Associations with functional body image in children. *Psychology of Sport and Exercise, Volume 45*. <https://doi.org/10.1016/j.psychsport.2019.101572>
- An, R., Liu, J. & Liu, R. (September 2020). State laws governing school physical education in relation to attendance and physical activity among students in the USA: A systematic review and meta-analysis. *Journal of Sport and Health Science*. <https://doi.org/10.1016/j.jshs.2020.09.004>
- Chen, W., Mason, S., Hammond-Bennett, A. & Zalmout, S. (December 2016). Manipulative skill competency and health-related physical fitness in elementary school students. *Journal of Sport and Health Science, Volume 5* (Issue 4), pages 491-499. <https://doi.org/10.1016/j.jshs.2015.03.007>
- Clark, B.R., Uhrich, M.L., Dill, T.C., White, M.L., Milam, L., Ackermann, N., Arroyo, C. & Racette, S.B. (December 2018). Failure to meet aerobic fitness standards among urban elementary students. *Preventive Medicine Reports, Volume 12*, pages 330-335. <https://doi.org/10.1016/j.pmedr.2018.10.011>
- Cleveland, A., Boeckne, L., Takahashi, S. & Fischer, J.A. (September 2016). The Relationship among Fifth Grade Students' Body Size Perception, FITNESSGRAM Scores, and Physical Activity Level in PE Class. *Journal of the Academy of Nutrition and Dietetics, Volume 116* (Issue 9), Page A32. <https://doi.org/10.1016/j.jand.2016.06.109>

- Courturier, L., Chepko, S., Holt, S., Persse, D., Rettig, B. & Roberts, G. (2013).  
Grade-Level Outcomes for K-12 Physical Education. Society of Health and  
Physical Educators (SHAPE).  
<https://www.shapeamerica.org/standards/pe/upload/Grade-Level-Outcomes-for-K-12-Physical-Education.pdf>
- Guijarro-Romero, S., Mayorga-Vega, D., Casado-Robles, C., Viciano, J.  
(November 2020). Does students' self-determined motivation toward Physical  
Education influence the effectiveness of a fitness teaching unit? *Psychology of  
Sport and Exercise, Volume 51*.  
<https://doi.org/10.1016/j.psychsport.2020.101768>
- Hales, C.M, Carroll, M.D, Fryar, C.D. & Ogden C.L. (October 2017). Prevalence  
of obesity among adults and youth: United States, 2015–2016. NCHS data brief,  
no 288. <https://www.cdc.gov/nchs/data/databriefs/db288.pdf>
- Heatly, M.C. & Votruba-Drzal, E. (February 2019). Developmental precursors of  
engagement and motivation in fifth grade: Linkages with parent- and teacher-  
child relationships. *Journal of Applied Developmental Psychology, Volume 60*,  
pages 144-156. <https://doi.org/10.1016/j.appdev.2018.09.003>
- Kalajas-Tilga, H., Koka, A., Hein, V., Tilga, H. & Raudsepp, L. (September 2020).  
Motivational processes in physical education and objectively measured physical  
activity among adolescents. *Journal of Sport and Health Science, Volume 9*  
(Issue 5), pages 462-471. <https://doi.org/10.1016/j.jshs.2019.06.001>

Lee, E.Y., Barnes, J.D., Lang, J.J., Silva, D.A., Tomkinson, G.R. & Tremblay, M.S. (September 2020). Testing Validity of FitnessGram in Two Samples of US Adolescents (12-15 years). *Journal of Exercise Science & Fitness, Volume 18* (Issue 3), Pages 129-135. <https://doi.org/10.1016/j.jesf.2020.04.002>

Patki, K., Parasher, R.K. & Bhatnagar, B. (May 2015). Relation between nutrition, socioeconomic status and fitness in elementary school children: a review of literature. *Physiotherapy, Volume 101*, pages e1181-e1182. <https://doi.org/10.1016/j.physio.2015.03.2104>

Appendix A

Name: \_\_\_\_\_ Homeroom: \_\_\_\_\_

Functional Body Image Questionnaire

**1.) How confident are you in running the Pacer test during PE?**

1 Not Confident                      2                      3                      4                      5 Very Confident

**2.) How involved do you get in team games, such as basketball, during PE?**

1 Not Involved                      2                      3                      4                      5 Fully Involved

**3.) How athletic do you feel you are?**

1 Not Athletic                      2                      3                      4                      5 Very Athletic

**4.) How confident are you in catching a ball that is thrown to you in PE?**

1 Not Confident                      2                      3                      4                      5 Very Confident

**5.) How helpful do you feel your body type is to being successful in PE?**

1 Not Helpful                      2                      3                      4                      5 Very Helpful

**6.) How much value do you put on your own physical health?**

1 No Value                      2                      3                      4                      5 Very Valuable

**7.) How confident are you in demonstrating skills in front of your classmates during PE?**

1 Not Confident                      2                      3                      4                      5 Very Confident

**8.) How excited are you when walking into PE class?**

1 Not Excited                      2                      3                      4                      5 Very Excited

**9.) How active are you during Recess?**

1 Not Active                      2                      3                      4                      5 Very Active

**10.) How comfortable are you being partnered with someone you don't know during a PE activity?**

1 Not Comfortable                      2                      3                      4                      5 Very Comfortable

## Appendix B

## Fitnessgram HFZ Standards Chart

FITNESSGRAM® Standards for the Healthy Fitness Zone™														
GIRLS														
Age	VO <sub>2</sub> max (ml · kg <sup>-1</sup> · min <sup>-1</sup> )		20-meter PACER (Enter # laps in software)		15-meter PACER (Use conversion chart; enter in software)†		One-mile run (min:sec)		Walk test (VO <sub>2</sub> max)		Percent fat		Body mass index	
5			Participation in run.				Completion of distance.				32	17	21	16.2
6			Lap count standards not recommended.				Time stan- dards not re- commended.				32	17	21	16.2
7											32	17	22	16.2
8											32	17	22	16.2
9											32	13	23	13.5
10	39	47	7	41	9	54	12:30	9:30			32	13	23.5	13.7
11	38	46	15	41	19	54	12:00	9:00			32	13	24	14.0
12	37	45	15	41	19	54	12:00	9:00			32	13	24.5	14.5
13	36	44	23	51	30	67	11:30	9:00	36	44	32	13	24.5	14.9
14	35	43	23	51	30	67	11:00	8:30	35	43	32	13	25	15.4
15	35	43	32	51	42	67	10:30	8:00	35	43	32	13	25	16.0
16	35	43	32	61	42	80	10:00	8:00	35	43	32	13	25	16.4
17	35	43	41	61	54	80	10:00	8:00	35	43	32	13	26	16.8
17+	35	43	41	72	54	94	10:00	8:00	35	43	32	13	27.3	17.2

Age	Curl-up (no. completed)		Trunk lift (Inches)		90° push-up (no. completed)		Modified pull-up (no. completed)		Flexed arm hang (seconds)		Back-saver sit and reach* (Inches)		Shoulder stretch
5	2	10	6	12	3	8	2	7	2	8	9	Healthy Fitness Zone = touching fingertips together behind the back on both the right and left sides.	
6	2	10	6	12	3	8	2	7	2	8	9		
7	4	14	6	12	4	10	3	9	3	8	9		
8	6	20	6	12	5	13	4	11	3	10	9		
9	9	22	6	12	6	15	4	11	4	10	9		
10	12	26	9	12	7	15	4	13	4	10	9		
11	15	29	9	12	7	15	4	13	6	12	10		
12	18	32	9	12	7	15	4	13	7	12	10		
13	18	32	9	12	7	15	4	13	8	12	10		
14	18	32	9	12	7	15	4	13	8	12	10		
15	18	35	9	12	7	15	4	13	8	12	12		
16	18	35	9	12	7	15	4	13	8	12	12		
17	18	35	9	12	7	15	4	13	8	12	12		
17+	18	35	9	12	7	15	4	13	8	12	12		

Number on left is lower end of HFZ; number on right is upper end of HFZ.  
 \*Test scored Pass/Fail; must reach this distance to pass.  
 †Conversion chart on page 94.  
 © 1992, 1999, 2004, The Cooper Institute, Dallas, Texas.

From *FITNESSGRAM/ACTIVITYGRAM Test Administration Manual, Fourth Edition*, by The Cooper Institute, 2007, Champaign, IL: Human Kinetics

© The Cooper Institute, 2007. All rights reserved. No further reproduction, duplication or distribution allowed without the express written permission of The Cooper Institute and Human Kinetics, Inc.

**TABLE 9.1 FITNESSGRAM Standards for Healthy Fitness Zone**

BOYS														
Age	VO <sub>2</sub> max (ml · kg <sup>-1</sup> · min <sup>-1</sup> )		PACER (no. of laps)		One-mile run (min:sec)		Walk test (VO <sub>2</sub> max)		Percent fat		Body mass index		Curl-up (no. completed)	
5			Participation in run. Lap count standards not recommended.		Completion of distance. Time standards not recommended.				25	10	20	14.7	2	10
6									25	10	20	14.7	2	10
7									25	10	20	14.9	4	14
8									25	10	20	15.1	6	20
9									25	10	20	15.2	9	24
10	42	52	23	61	11:30	9:00			25	10	21	15.3	12	24
11	42	52	23	72	11:00	8:30			25	10	21	15.8	15	28
12	42	52	32	72	10:30	8:00			25	10	22	16.0	18	36
13	42	52	41	72	10:00	7:30	42	52	25	10	23	16.6	21	40
14	42	52	41	83	9:30	7:00	42	52	25	10	24.5	17.5	24	45
15	42	52	51	94	9:00	7:00	42	52	25	10	25	18.1	24	47
16	42	52	61	94	8:30	7:00	42	52	25	10	26.5	18.5	24	47
17	42	52	61	94	8:30	7:00	42	52	25	10	27	18.8	24	47
17+	42	52	61	94	8:30	7:00	42	52	25	10	27.8	19.0	24	47

Age	Trunk lift (inches)		90° push-up (no. completed)		Modified pull-up (no. completed)		Pull-up (no. completed)		Flexed arm hang (seconds)		Back-saver sit and reach* (inches)	Shoulder stretch
5	6	12	3	8	2	7	1	2	2	8	8	Healthy Fitness Zone = touching fingertips together behind the back on both the right and left sides.
6	6	12	3	8	2	7	1	2	2	8	8	
7	6	12	4	10	3	9	1	2	3	8	8	
8	6	12	5	13	4	11	1	2	3	8	8	
9	6	12	6	15	5	11	1	2	4	10	8	
10	9	12	7	20	5	15	1	2	4	10	8	
11	9	12	8	20	6	17	1	3	6	13	8	
12	9	12	10	20	7	20	1	3	6	13	8	
13	9	12	12	25	8	22	1	4	12	17	8	
14	9	12	14	30	9	25	2	5	15	20	8	
15	9	12	16	35	10	27	3	7	15	20	8	
16	9	12	18	35	12	30	5	8	15	20	8	
17	9	12	18	35	14	30	5	8	15	20	8	
17+	9	12	18	35	14	30	5	8	15	20	8	

Number on left is lower end of HFZ; number on right is upper end of HFZ.

\*Test scored Pass/Fail; must reach this distance to pass.

© 1992, 1999, 2004 The Cooper Institute, Dallas, Texas.