

South Carolina FITNESSGRAM Data Report

Statewide Results School Year 2021-2022



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SOUTH CAROLINA FITNESSGRAM

Project Overview

The South Carolina FitnessGram project is a state-wide observational study to evaluate and ultimately improve health-related physical fitness among public school students in South Carolina. Its primary purpose is to describe health-related fitness in students attending public schools across the state. The findings from the project will be used to support planning and implementation of evidence-based programs and policies to improve health-related physical fitness. This report summarizes the findings of the state-wide FitnessGram project for the 2021-2022 school year.

Physical fitness and health in children and youth.

The term physical fitness has been defined as “the ability to perform daily tasks with vigor and alertness, without undue fatigue, and with ample energy to enjoy leisure-time pursuits and meet unforeseen emergencies.” Physical fitness is typically operationalized as the composite of several components, each of which relates to the ability to perform a specific type of physical activity. A sub-set of these components comprises “health-related physical fitness,” and these include cardiorespiratory fitness, muscular strength and endurance, flexibility and weight status. In children and youth, the components of health-related physical fitness have been linked to short and long-term health outcomes.

Weight status and health in children and youth.

In the context of public health surveillance, weight status is typically assessed using body mass index (BMI), an expression of the ratio between weight and height. In children and youth, weight status is evaluated as the age/sex-specific BMI percentile. Children and youth found to be over the 85th percentile for their age/sex group are considered overweight, and those over the 95th percentile are rated as obese. It has been extensively documented that young persons who are overweight or obese, as compared with their normal weight counterparts, manifest less favorable cardiometabolic risk factor profiles, are more likely to be overweight as adults, and are at increased risk for future development of multiple non-communicable diseases.

Project Description.

All South Carolina public schools serving grades K-12 were eligible to participate in the South Carolina FitnessGram project. Each school was asked to conduct fitness testing and record health-related fitness data for students enrolled in physical education class. Physical education teachers implemented six fitness test items in grades 5, 8 and in the high school physical education course required for graduation. Only height and weight were measured for second grade students.

2021-2022 School Year and the COVID Pandemic

During the 2021-2022 school year the schools in South Carolina returned toward normal instructional programming as they emerged from the disruptions caused by the COVID pandemic. During the 2019-2020 and 2020-2021 school years many schools in South Carolina adopted remote instruction protocols during part or all of the school year. Because FitnessGram is typically administered by physical education teachers during regularly scheduled in-person classes, participation in FitnessGram in 2019-2020 and 2020-2021 was reduced from the levels seen in the pre-COVID years. The data summarized in this report for 2021-2022 reflect the schools’ transition back to in-person instruction. Participation in FitnessGram was greater in 2021-2022 than in the previous two years, but still not as great as in the pre-COVID years.

Data Collection & Management.

During school year 2021-2022, FitnessGram data were provided by 514 public schools across 47 school districts in South Carolina. These samples represent approximately 43% of public schools and 60% of school districts in South Carolina. Staff reported students’ performance on the FitnessGram components using a web-based version of the FitnessGram software. All data were loaded into the South Carolina FitnessGram state system and a de-identified research extract file was downloaded by the South Carolina Department of Education. The University of South Carolina received de-identified student data from the South Carolina Department of Education to assess health-related fitness among South Carolina students.

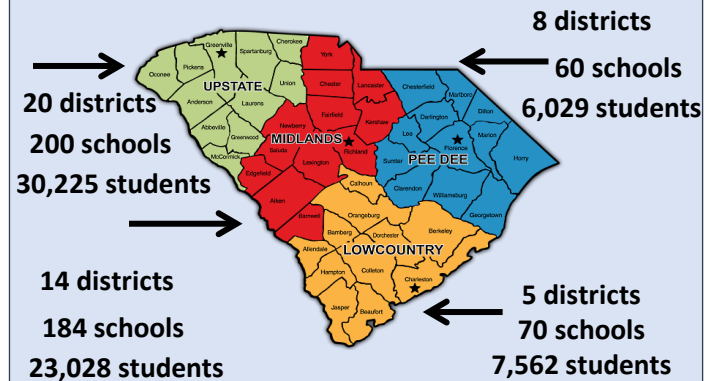
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Description of the Sample - School Year 2021-2022

Background

FitnessGram data for the 2021-2022 school year were provided by 47 school districts distributed across the state of South Carolina. The initial dataset included 178,985 unique entries. During the data cleaning process, the sample was reduced to data for the 2nd, 5th, 8th, and 9th-12th grade students (n=123,246). 5,659 entries were removed because no fitness test item information was provided. Then, 526 entries were removed due to implausible values for age. 2,634 were removed because of self assessment. Next, 47,583 records were deleted for students for whom data were available for more than one test administration. Only data for a student's first test administration was included in the analysis sample. This yielded a final sample of 66,844 students. This sample included students for whom data was provided for at least one test item. In many cases, data was not provided for all test items. In this sample implausible values for some test items were deleted: BMI (n=436), cardiorespiratory fitness (n=23), and the other FitnessGram items (n=240). Deleted values were set to missing.

Analytic Sample

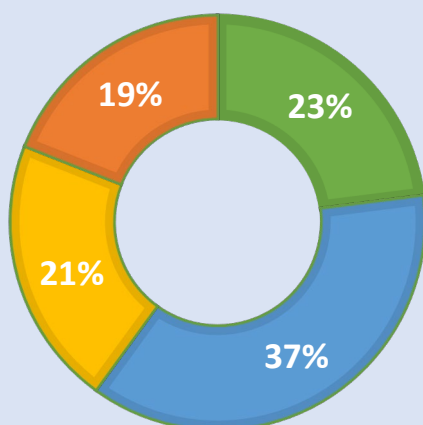


SY2021-2022	Total #:
Districts	47
Schools	514
Students	66,844

Student Characteristics (n=66,844)

GRADE LEVEL

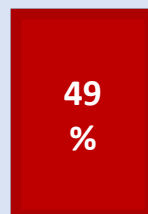
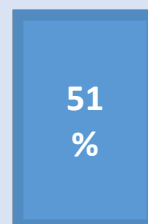
n=66,844



■ 2nd Grade ■ 5th Grade
■ 8th Grade ■ High School

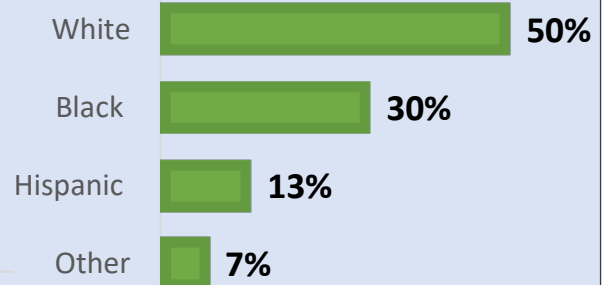
GENDER

n=66,844



RACE/ETHNICITY

n=64,899



POVERTY STATUS

61% - 39%

YES

NO

n=64,902

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Statewide Results - School Year 2021-2022

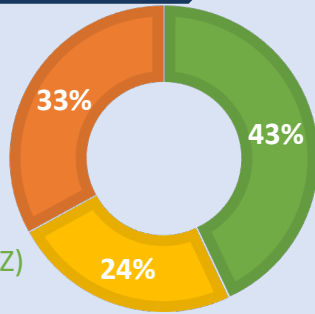
Student performance on each FitnessGram test item was rated categorically. For cardiorespiratory fitness three categories were used: Healthy Fitness Zone, Needs Improvement and Health Risk, and for weight status Healthy Weight, Overweight and Obese were used. For upper body strength/endurance, abdominal strength/endurance, trunk extensor strength/flexibility and low back/hamstring flexibility two categories were used: Healthy Fitness Zone and Needs Improvement. Summarized below are the results for each test item in the statewide sample and for the grade groups.

Cardiorespiratory Fitness

Fitness Test:
PACER / 1-mile run

Healthy Fitness Zone Categories:

- Healthy Fitness Zone (HFZ)
- Needs Improvement (NI)
- Health Risk (HR)



n = 45,117

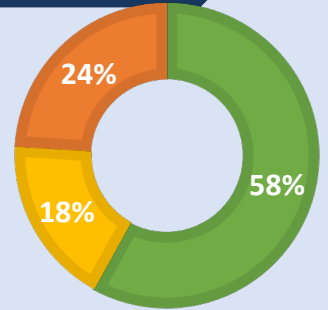
5 th Grade (n=22,555)	8 th Grade (n=12,094)	High School (n=10,468)
48% HFZ	40% HFZ	39% HFZ

Weight Status

Fitness Test:
Body Mass Index (BMI)
(BMI = Height/Weight²)

Weight Status Categories:

- Healthy Weight (HW)
- Overweight (OW)
- Obese (OB)



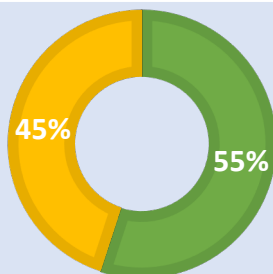
n = 55,092

2 nd Grade (n=14,837)	5 th Grade (n=19,797)	8 th Grade (n=11,231)	High School (n=9,227)
62% HW	56% HW	57% HW	59% HW

Other FitnessGram Components

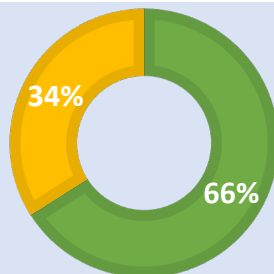
- Healthy Fitness Zone (HFZ)
- Needs Improvement (NI)

Upper Body Strength/Endurance
(n=43,202)



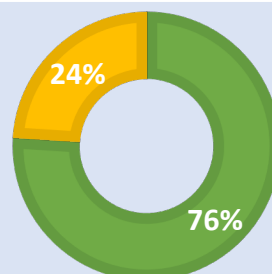
Fitness Test:
Push Ups

Abdominal Strength/Endurance
(n=43,801)



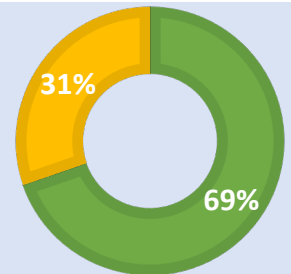
Fitness Test:
Curl Ups

Trunk Extensor Strength/Flexibility
(n=32,522)



Fitness Test:
Trunk Lift

Low Back/Hamstring Flexibility
(n=19,202)



Fitness Test:
Sit & Reach

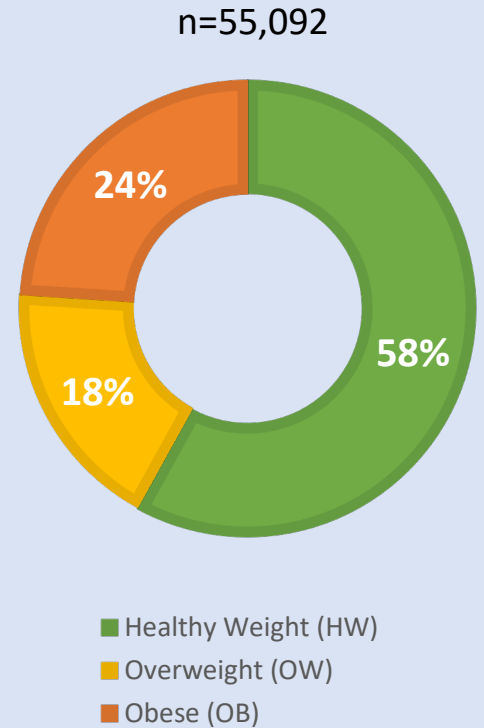
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Weight Status | School Year 2021-2022

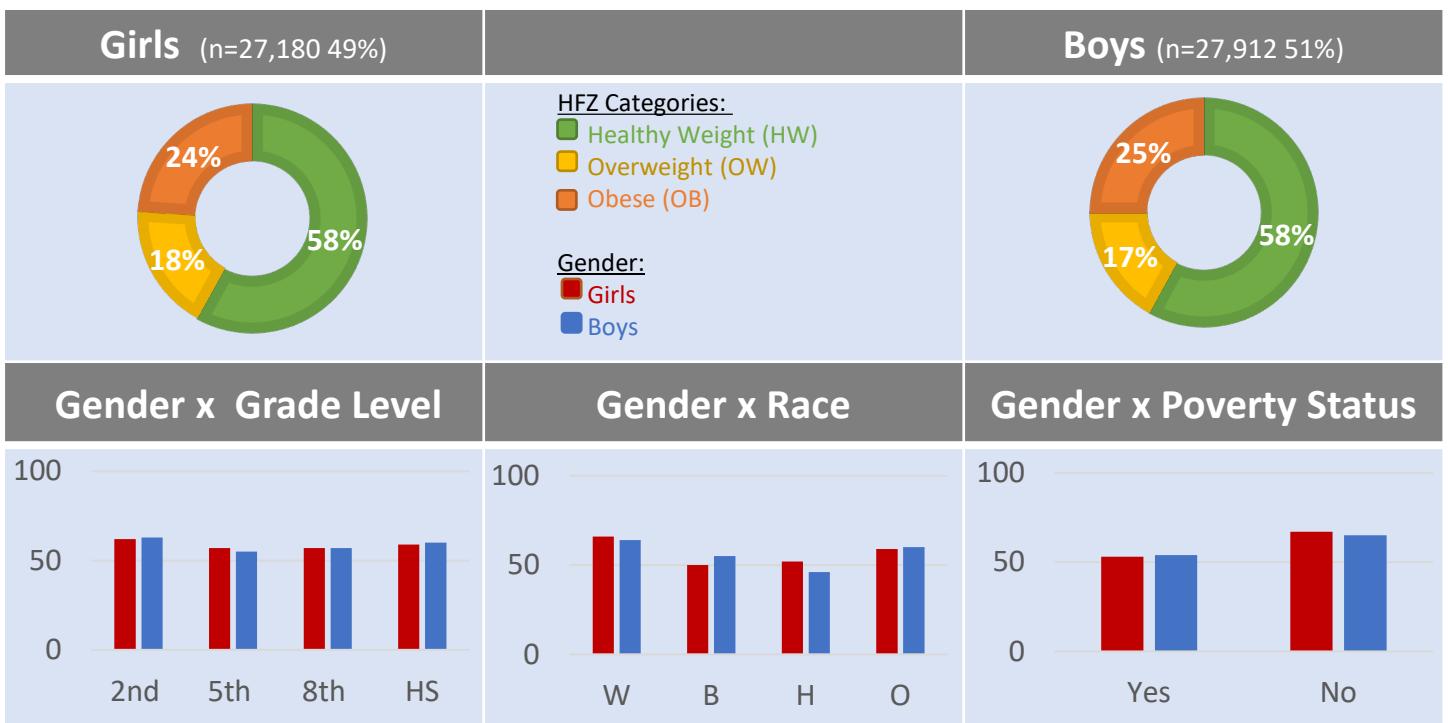
Background

Maintenance of normal weight is an important indicator of good health in persons of all ages. Conversely, elevated levels of body weight and fatness are associated with increased risk for development of non-communicable diseases including cardiovascular disease, type 2 diabetes, and several cancers. In children and adolescents, overweight and obesity are associated with adverse status for cardiometabolic risk factors such as blood pressure, blood lipids and insulin sensitivity. In addition, excessive weight and fatness in youth can negatively affect physical function and can have adverse psychological and social effects. For South Carolina FitnessGram weight status was assessed using BMI. To determine BMI, trained school staff measured height and weight. BMI was then calculated using the following standard equation: $BMI = \text{weight (kg)} / \text{height (m}^2\text{)}$. For youth, BMI is typically reported as a percentile (range: 0-100) relative to other individuals of the same sex and age. Using CDC growth charts, each student's age- and sex-specific BMI percentile was determined and then categorized into one of the following weight status categories: Healthy Weight (normal weight = <85th percentile), Overweight (overweight = 85th percentile to <95th percentile), and Obese (obese = \geq 95th percentile).

Overall Findings



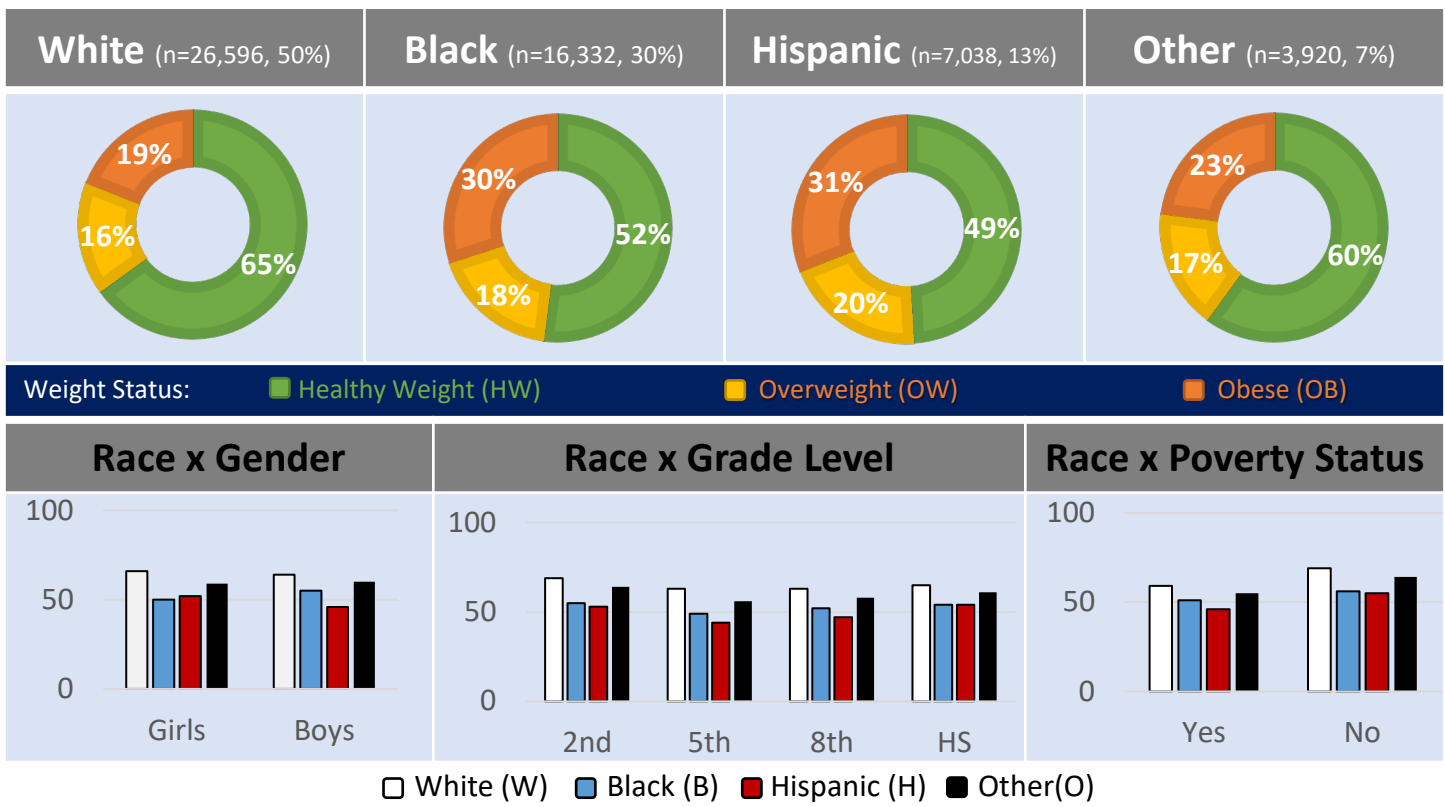
Weight Status by Gender



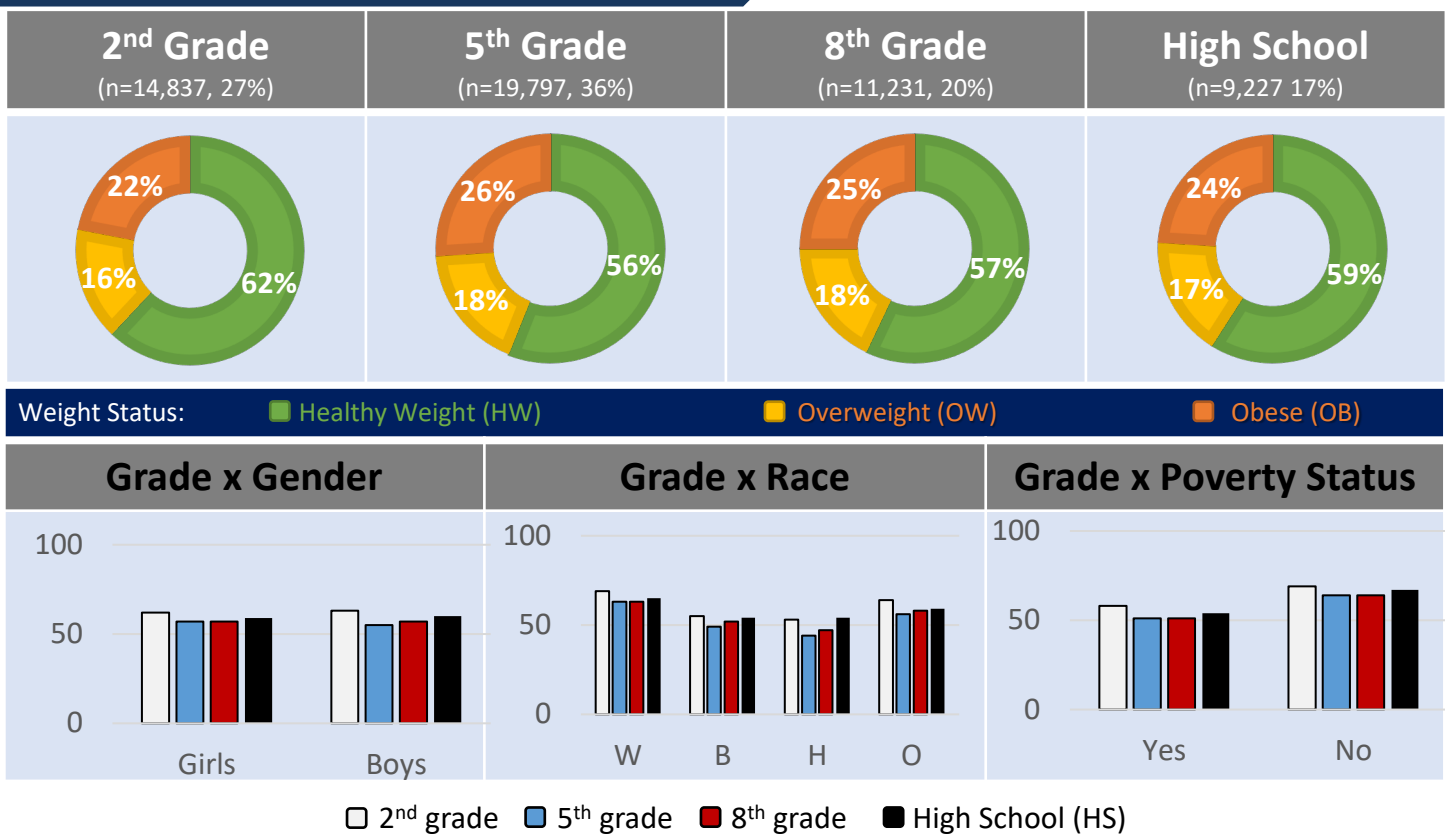
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Weight Status | School Year 2021-2022

Weight Status by Race/Ethnicity



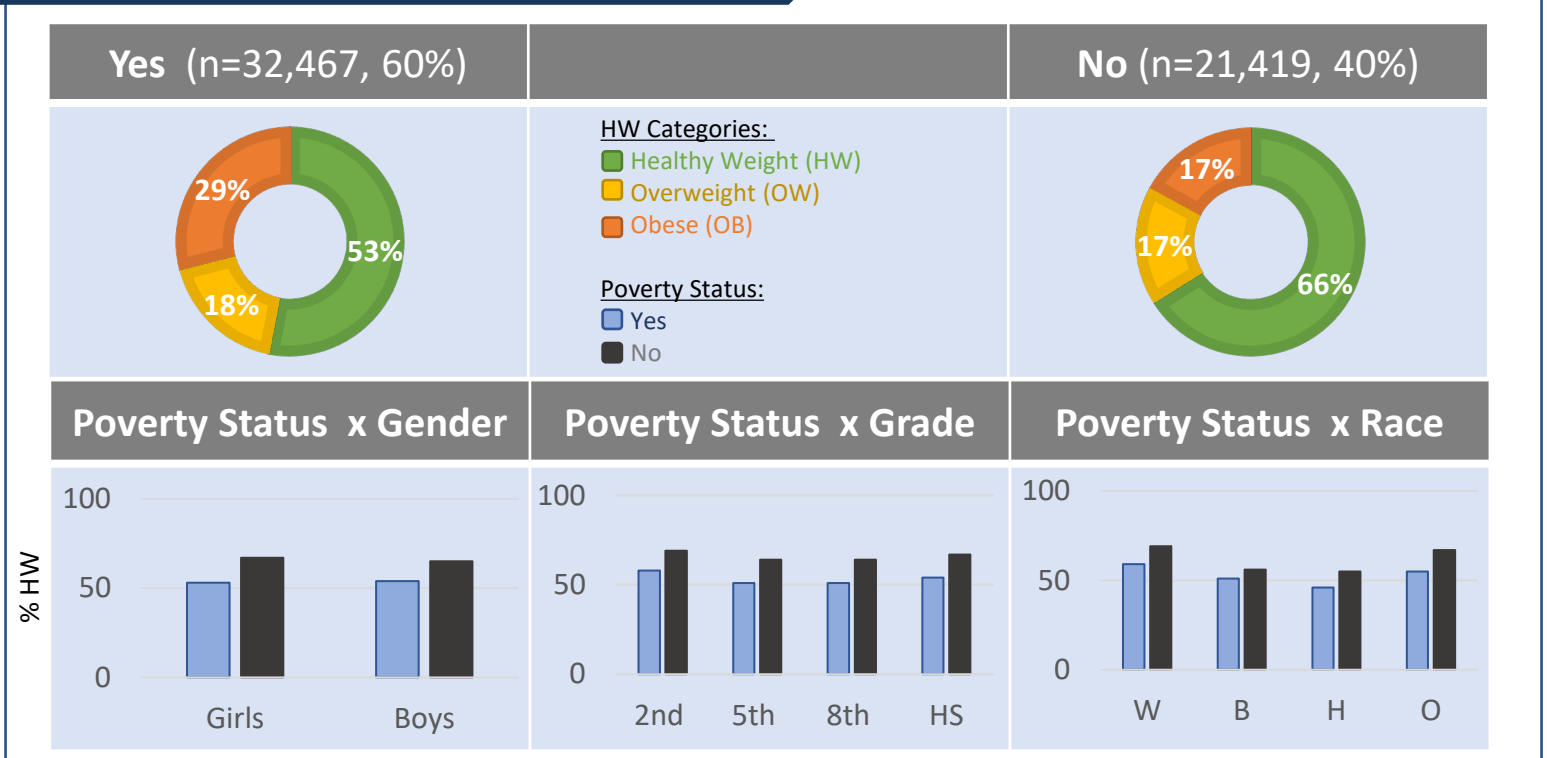
Weight Status by Grade Level



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Weight Status | School Year 2021-2022

Weight Status by Poverty Status



Weight Status - Conclusions

A key finding is that nearly **2 out of 5 South Carolina** students are overweight or obese. Rates of overweight and obesity are high with 42% failing to achieve Healthy Weight for weight status.

The following patterns were observed for weight status:

- The percentage of students achieving HW was **the same** in girls and boys (58% vs. 58%, respectively).
- The percentage of students achieving HW was **lower** in Black and Hispanic students than in White and other race/ethnicity students.
- The percentage of 2nd grade students achieving HW was **greater** than the percentage among students at the other grade levels.
- The percentage of students achieving HW was **lower** among students in poverty compared to students not in poverty (53% vs. 66%, respectively).

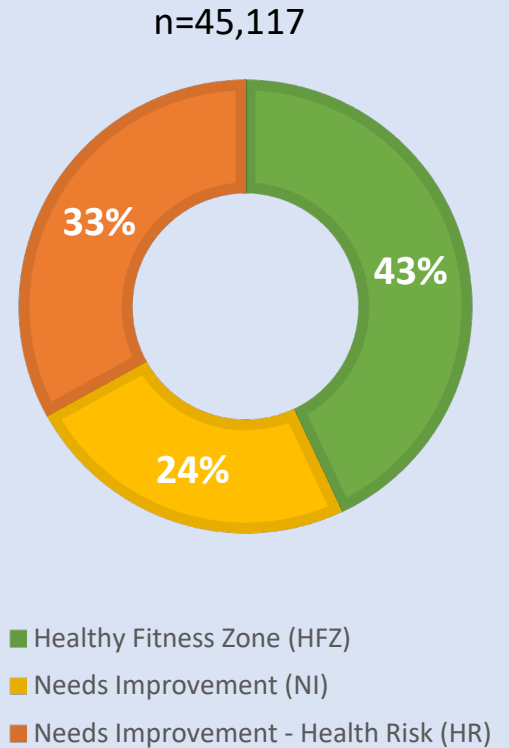
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Cardiorespiratory Fitness | School Year 2021-2022

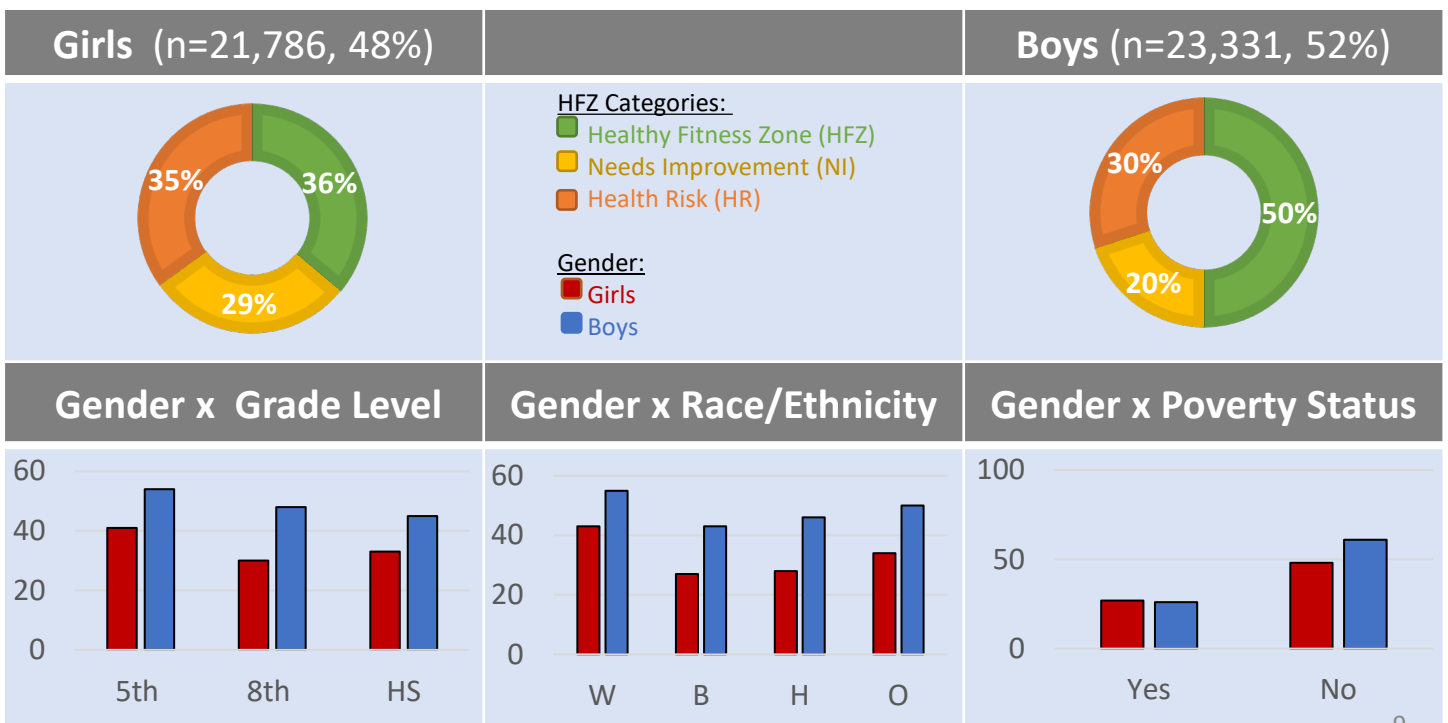
Background

Cardiorespiratory fitness refers to a person’s ability to perform large-muscle, whole-body physical activity for extended periods of time. Cardiorespiratory fitness depends on the functional capacity of the body’s cardiovascular, respiratory, and muscular systems. Maintaining good levels of cardiorespiratory fitness is important to health during childhood, adolescence, and adulthood. During all life stages, higher cardiorespiratory fitness is associated with lower risk for future development of conditions such as heart disease, type 2 diabetes, and certain cancers. In the FitnessGram protocol cardiorespiratory fitness is measured with one of three optional field tests: 1) Progressive Aerobic Cardiovascular Endurance Run (PACER) test; 2) 1-mile run test; or 3) a walk test. Most students completing the FitnessGram protocol in South Carolina completed the PACER test. Performance on each of the cardiorespiratory fitness tests can be used to estimate the student’s maximal aerobic power (VO2max). Each student’s performance is scored as the corresponding VO2max value, and that score is placed in one of three categories that are based on age- and sex-specific criteria. The categories are: 1) Healthy Fitness Zone; 2) Needs Improvement; 3) Needs Improvement – Health Risk.

Overall Findings



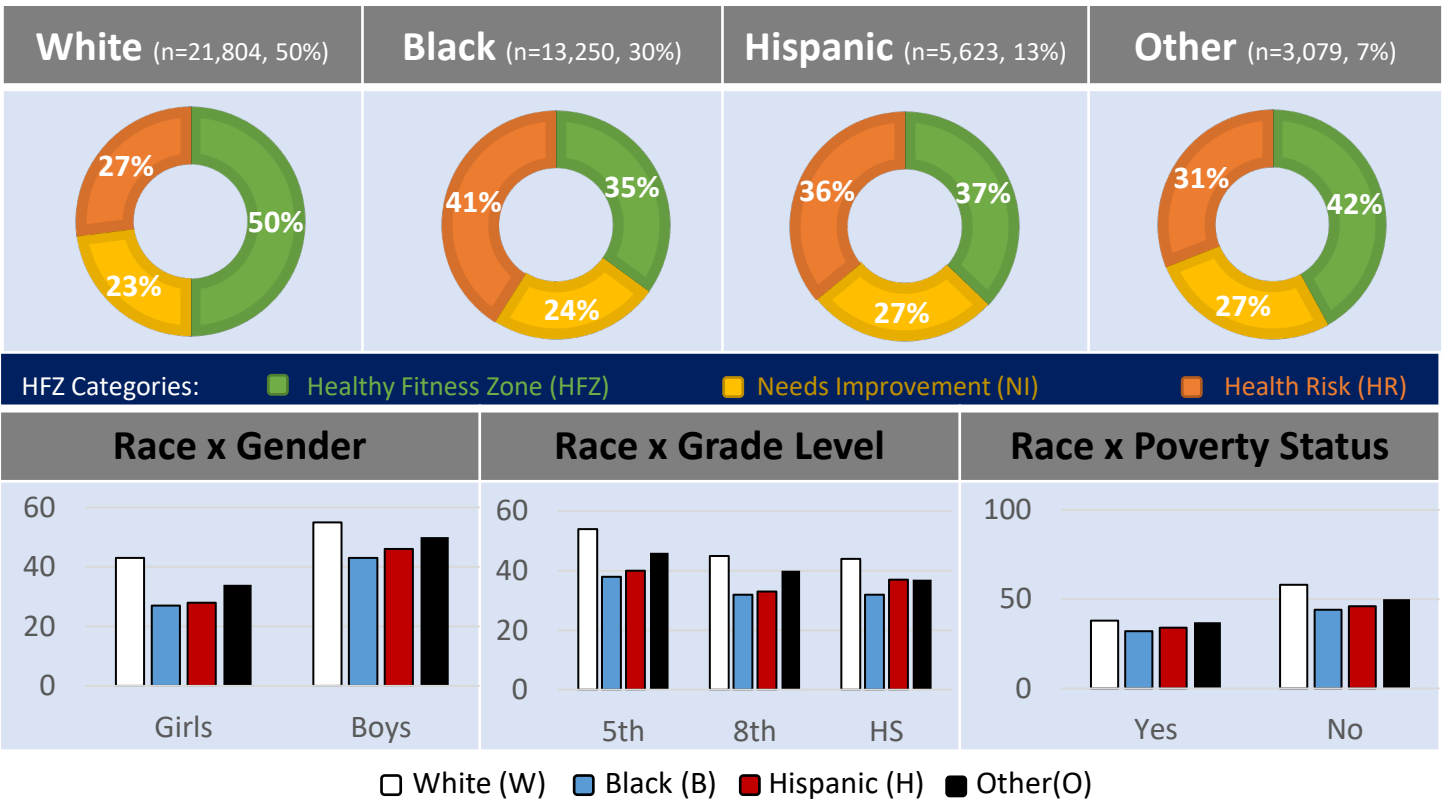
Cardiorespiratory Fitness by Gender



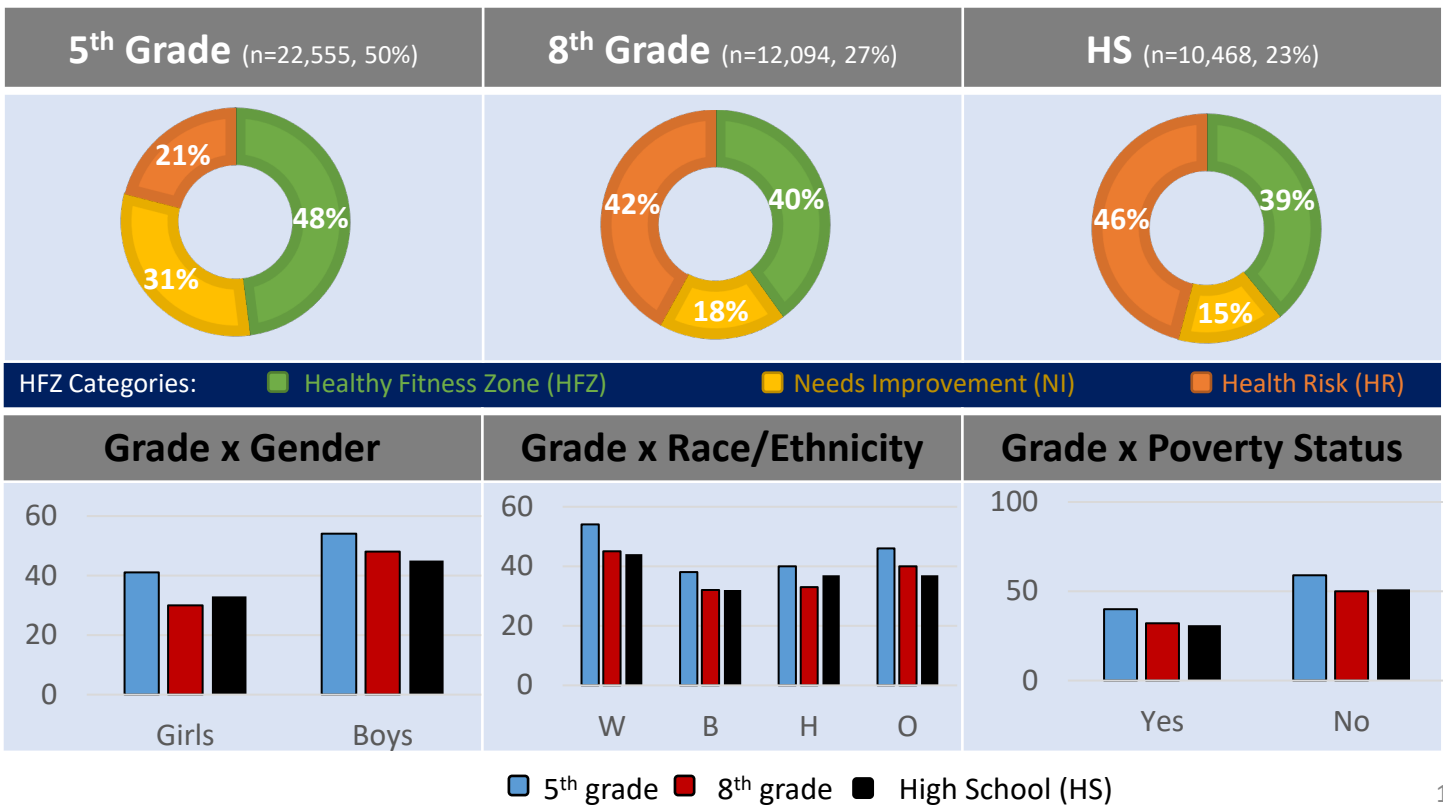
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Cardiorespiratory Fitness | School Year 2021-2022

Cardiorespiratory Fitness by Race/Ethnicity



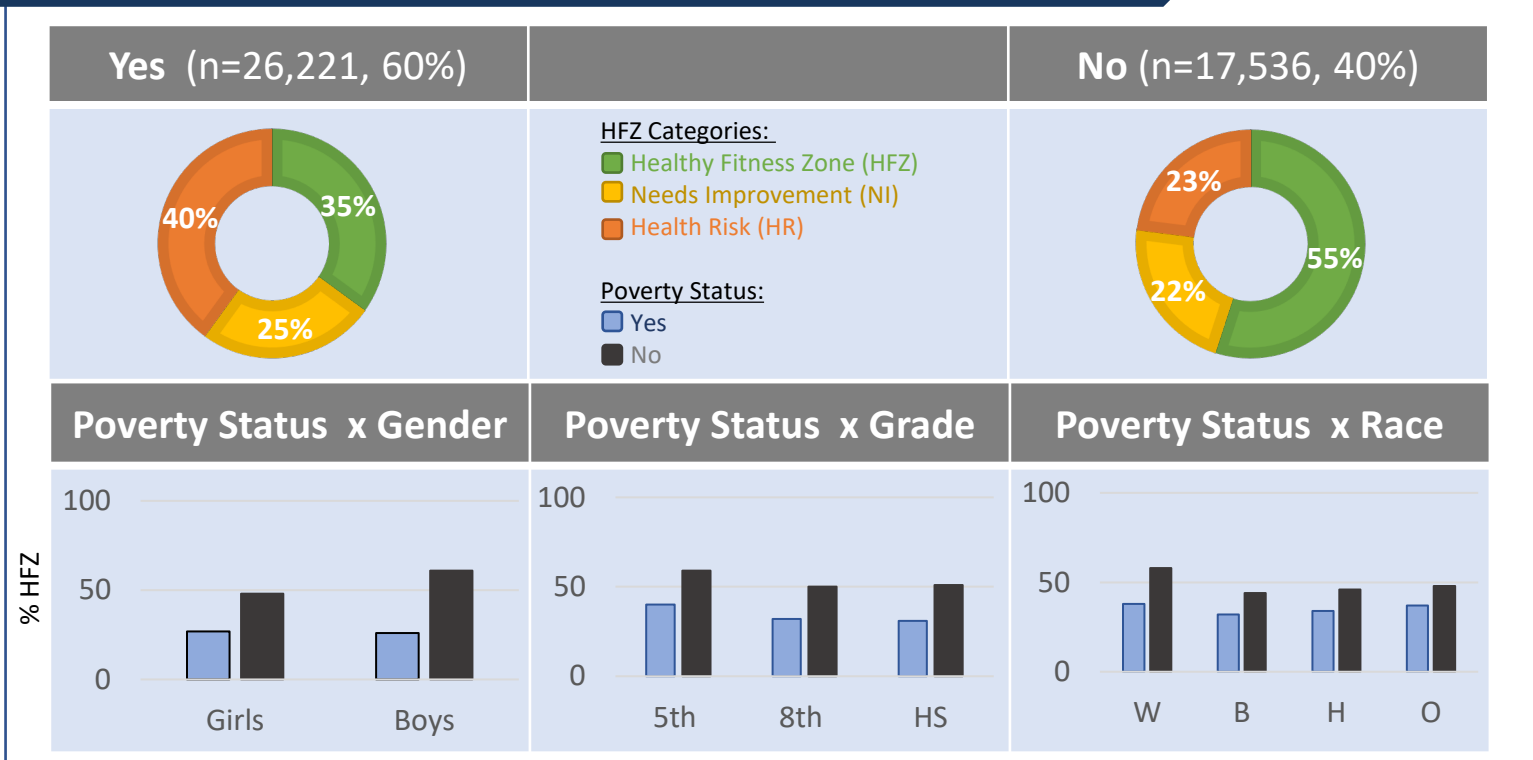
Cardiorespiratory Fitness by Grade Level



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Cardiorespiratory Fitness | School Year 2021-2022

Cardiorespiratory Fitness by Poverty Status



Cardiorespiratory Fitness - Conclusions

A key finding was that less than **half** of South Carolina students attained the Healthy Fitness Zone for cardiorespiratory fitness.

The following patterns were observed:

- A smaller percentage of girls than boys attained the Healthy Fitness Zone (36% vs. 50%, respectively).
- The percentage of students attaining the Healthy Fitness Zone was **lower** in Black students than in White students, and these trends were more pronounced in girls than boys.
- The percentage of students attaining the Healthy Fitness Zone was **lower** in students in 8th grade and high school compared to 5th grade students, and this trend was particularly pronounced in girls.
- The percentage of students attaining the Healthy Fitness Zone for cardiorespiratory fitness was **consistently lower** among students in poverty (35% vs 55%).

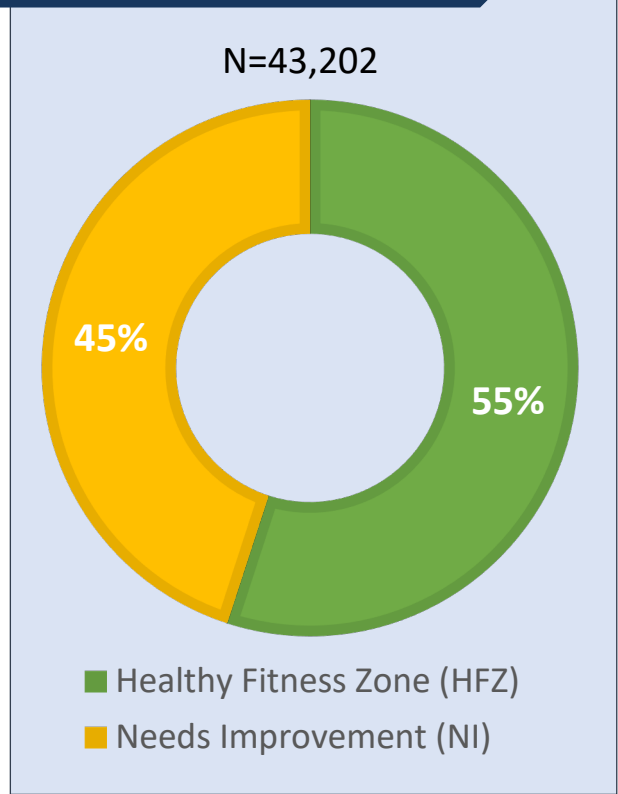
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Upper Body Strength and Endurance (Push-Ups) | School Year 2021-2022

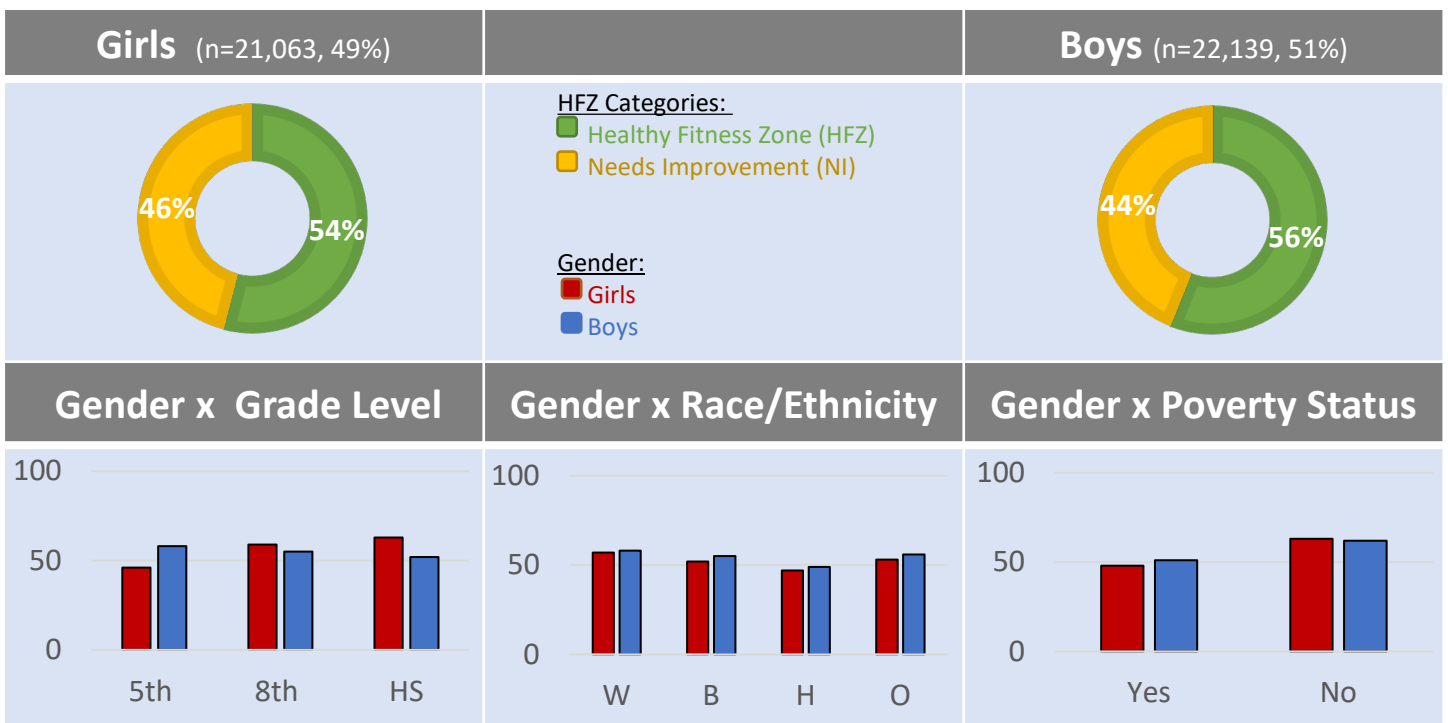
Background

Muscular strength is the ability to generate force through contraction of the skeletal muscles and to apply that force to the body or to external objects. Upper body muscular strength and endurance is a person's ability to generate force and to perform repeated muscular contractions against resistance using the musculature of the upper arm girdle. Upper body muscular strength and endurance is related to health through its impact on daily function. Persons with adequate upper body muscular strength and endurance can perform household and occupational tasks safely, appropriately and without undue stress. The 90° push-up is the recommended test item to assess upper body strength and endurance in the FitnessGram protocol. The objective of the test is to complete as many push-ups as possible at a rhythmic pace (cadence = 20 push-ups per minute or 1 push-up every 3 seconds). Performance on the push-up test for upper body strength and endurance is scored by counting the number of 90° push-ups performed. Each student's score is then placed in one of two Healthy Fitness Zone categories using age- and sex-specific criteria. The categories are: 1) Healthy Fitness Zone; 2) Needs Improvement.

Overall Findings



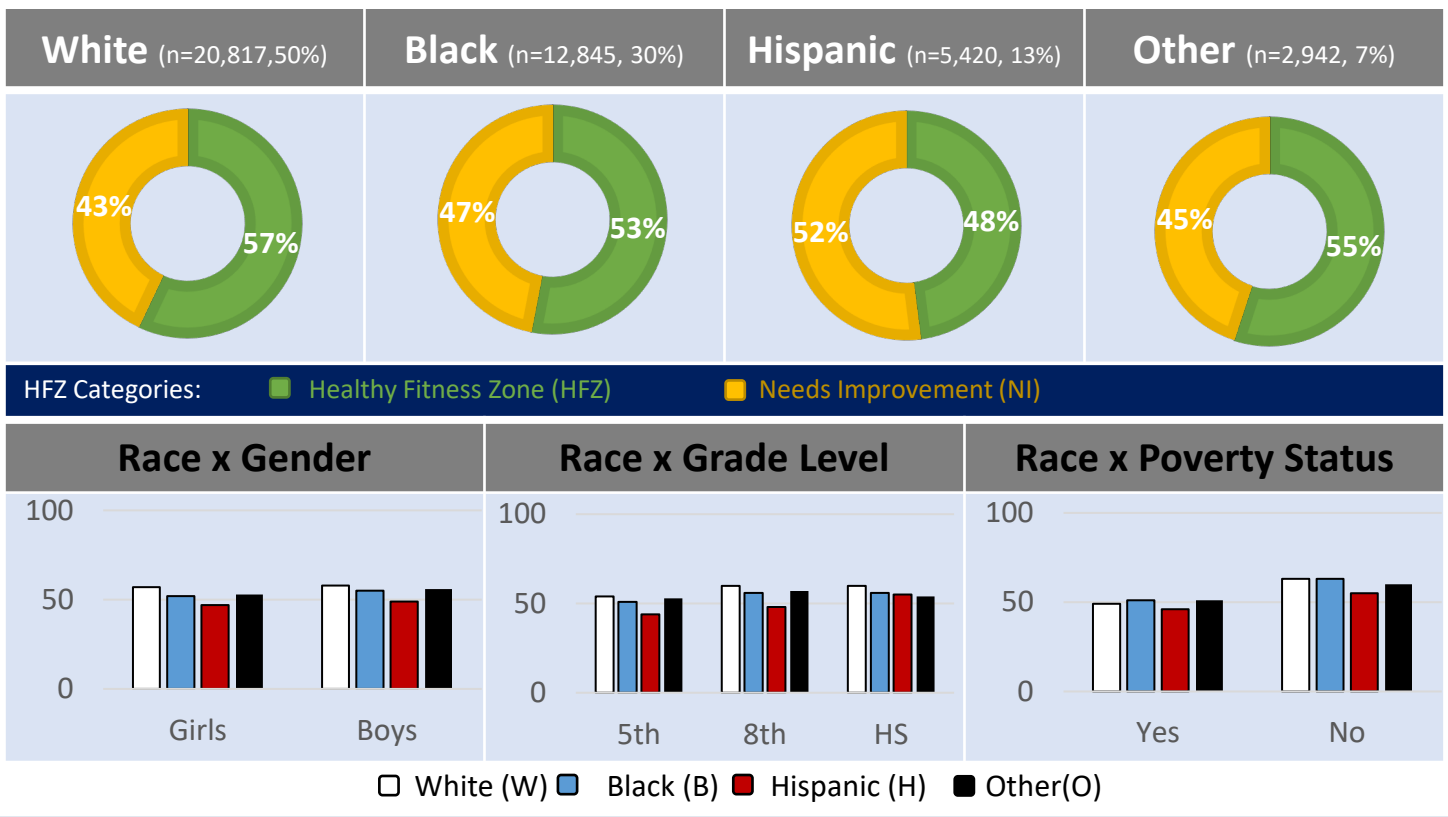
Upper Body Strength and Endurance by Gender



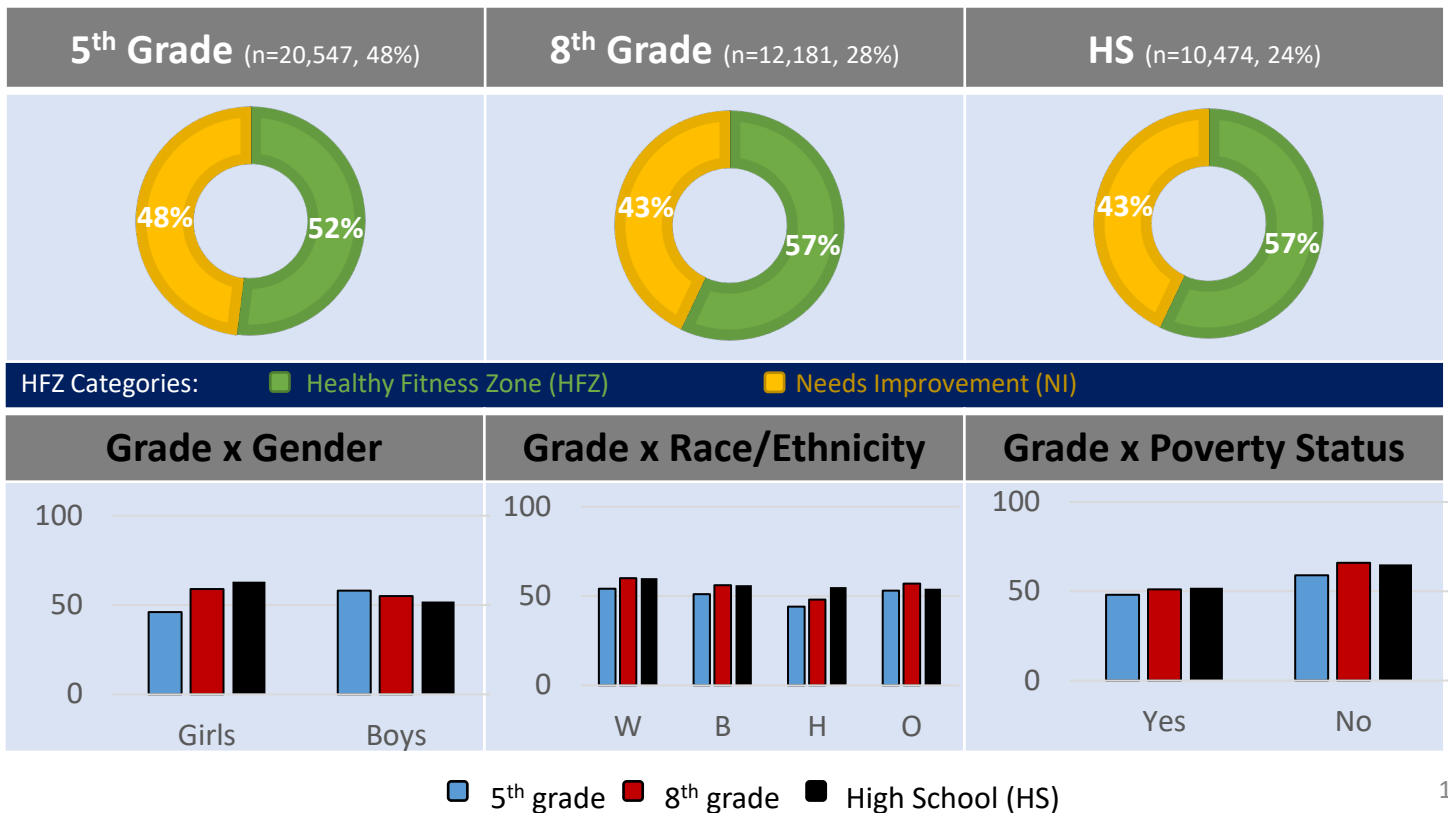
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Upper Body Strength and Endurance (Push-Ups) | School Year 2021-2022

Upper Body Strength and Endurance by Race/Ethnicity



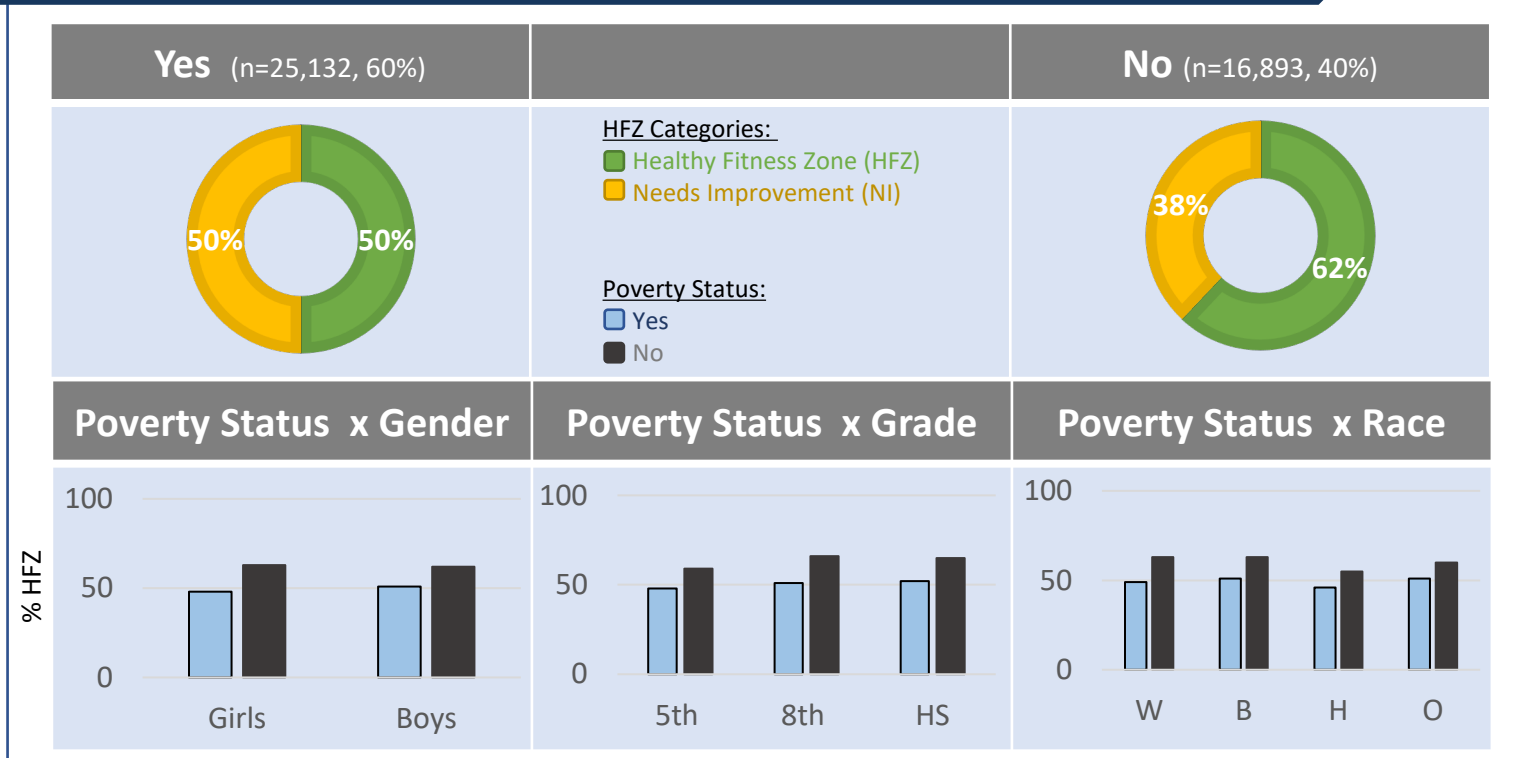
Upper Body Strength and Endurance by Grade Level



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Upper Body Strength and Endurance (Push-Ups) | School Year 2021-2022

Upper Body Strength and Endurance by Poverty Status



Upper Body Strength and Endurance (Push-Ups) - Conclusions

Overall, nearly **3 out of 5 South Carolina** students attained the Healthy Fitness Zone for upper body strength and endurance.

The following patterns were observed:

- The percentage of girls and boys that attained the Healthy Fitness Zone was **similar** (54% vs. 56%, respectively).
- The percentage of students attaining the Healthy Fitness Zone was **lower** among Black and Hispanic students than in White and other race/ethnicity students.
- The percentage of students attaining the Healthy Fitness Zone was **lower** in students in 5th grade, then increased in 8th grade and high school (52% vs. 57% vs. 57%, respectively). This trend was similar in girls but differed among boys.
- The percentage of students attaining the Healthy Fitness Zone for upper body strength and endurance was consistently **lower** among students in poverty (50% vs 62%).

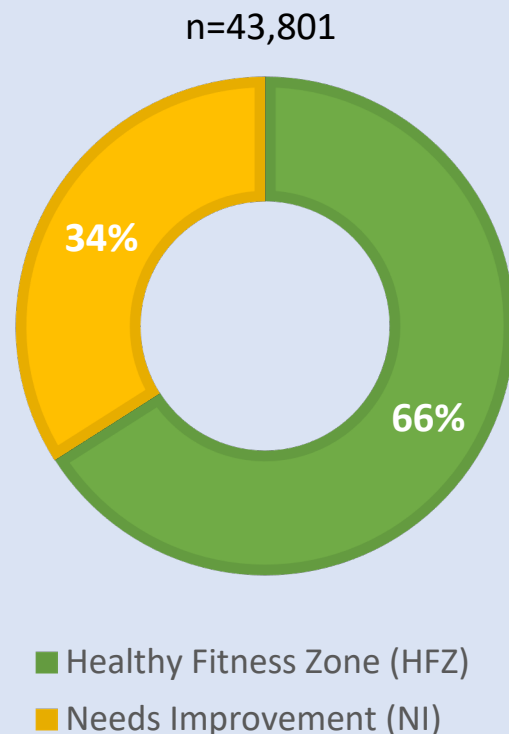
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Abdominal Strength and Endurance (Curl-Ups) | School Year 2021-2022

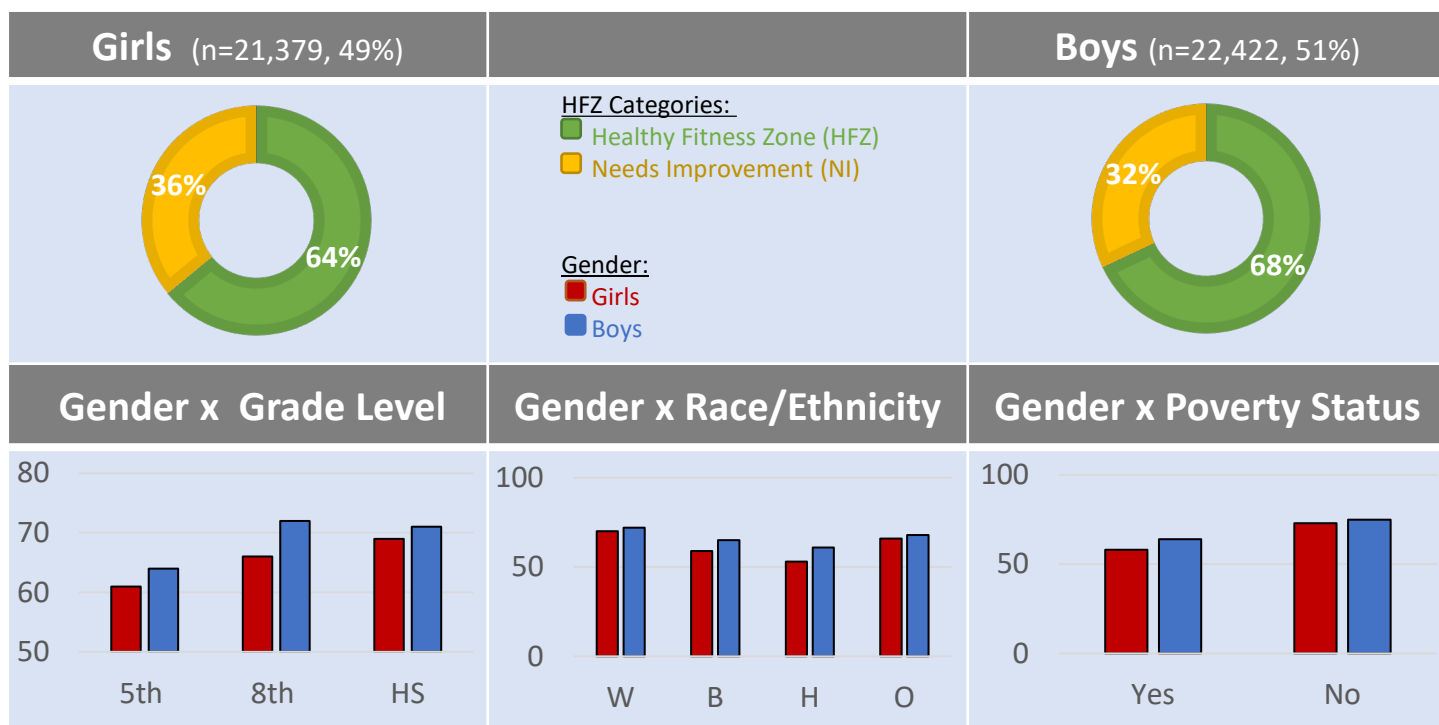
Background

Abdominal muscular strength and endurance is a person's ability to generate force and to perform repeated muscular contractions against resistance using the musculature of the abdomen. Abdominal muscular strength and endurance is important in promoting good posture and alignment of the pelvis and spine. An adequate level of abdominal strength and endurance is important and impacts health through maintenance of lower back health. The curl-up is the recommended test item to assess abdominal muscular strength and endurance in the FitnessGram protocol. The objective of the curl-up test is to complete as many curl-ups as possible at a specified pace of one curl-up every three seconds (max 75 curl-ups). Performance on the curl-up test for abdominal muscular strength and endurance is scored by counting the number of curl-ups performed with correct form. Each student's score is then categorized into one of two Healthy Fitness Zone categories using age- and sex-specific criteria. The categories are: 1) Healthy Fitness Zone; 2) Needs Improvement.

Overall Findings



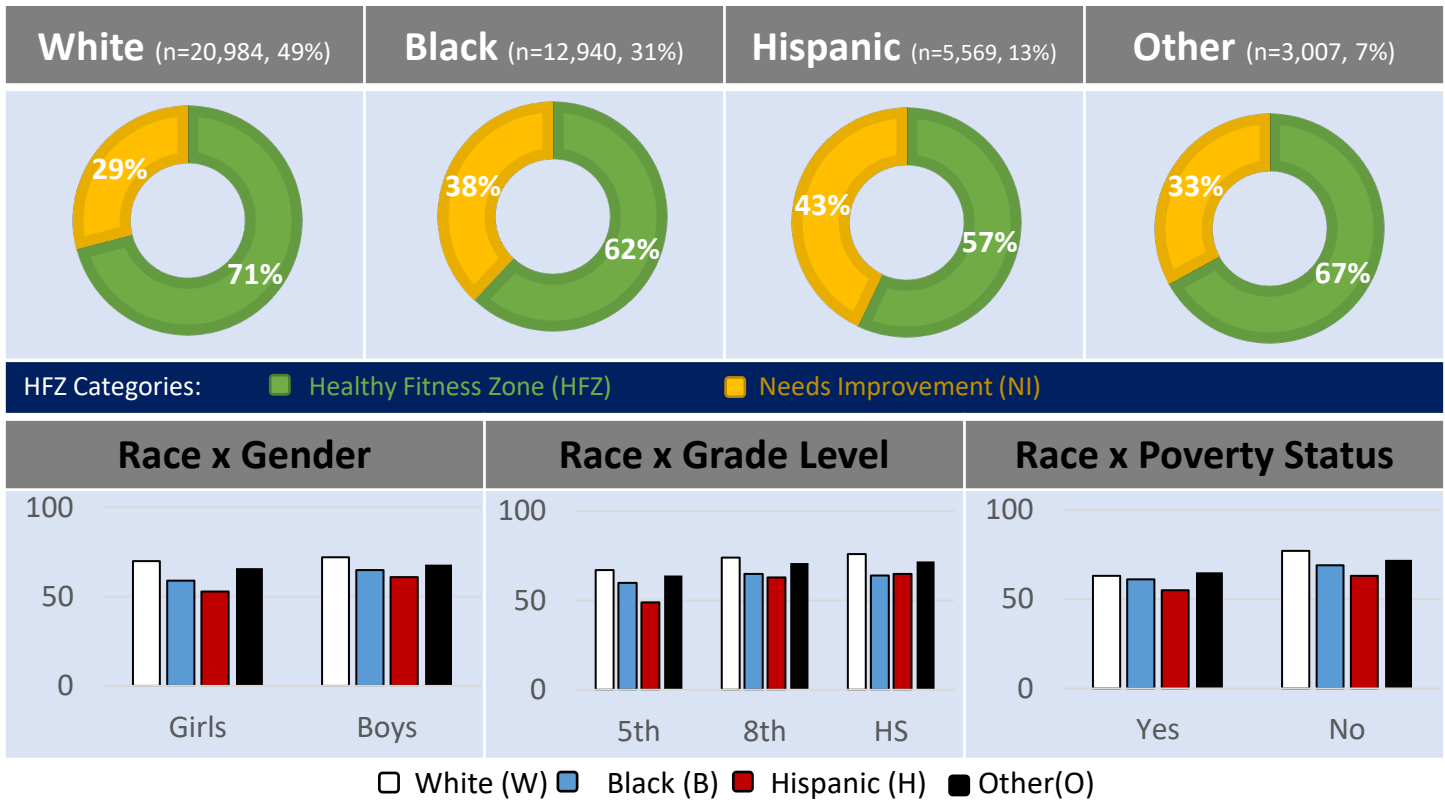
Abdominal Strength and Endurance by Gender



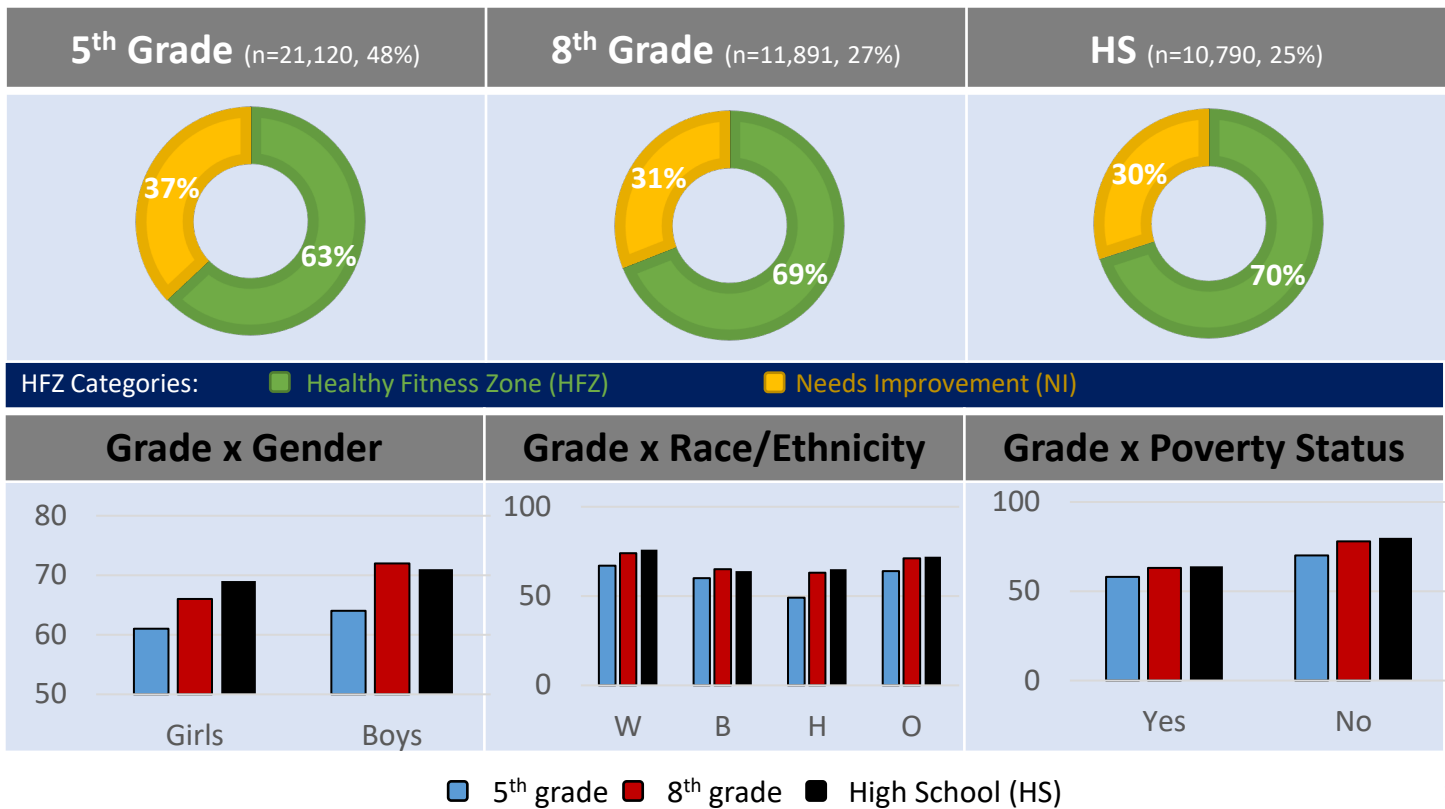
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Abdominal Strength and Endurance (Curl-Ups) | School Year 2021-2022

Abdominal Strength and Endurance by Race/Ethnicity



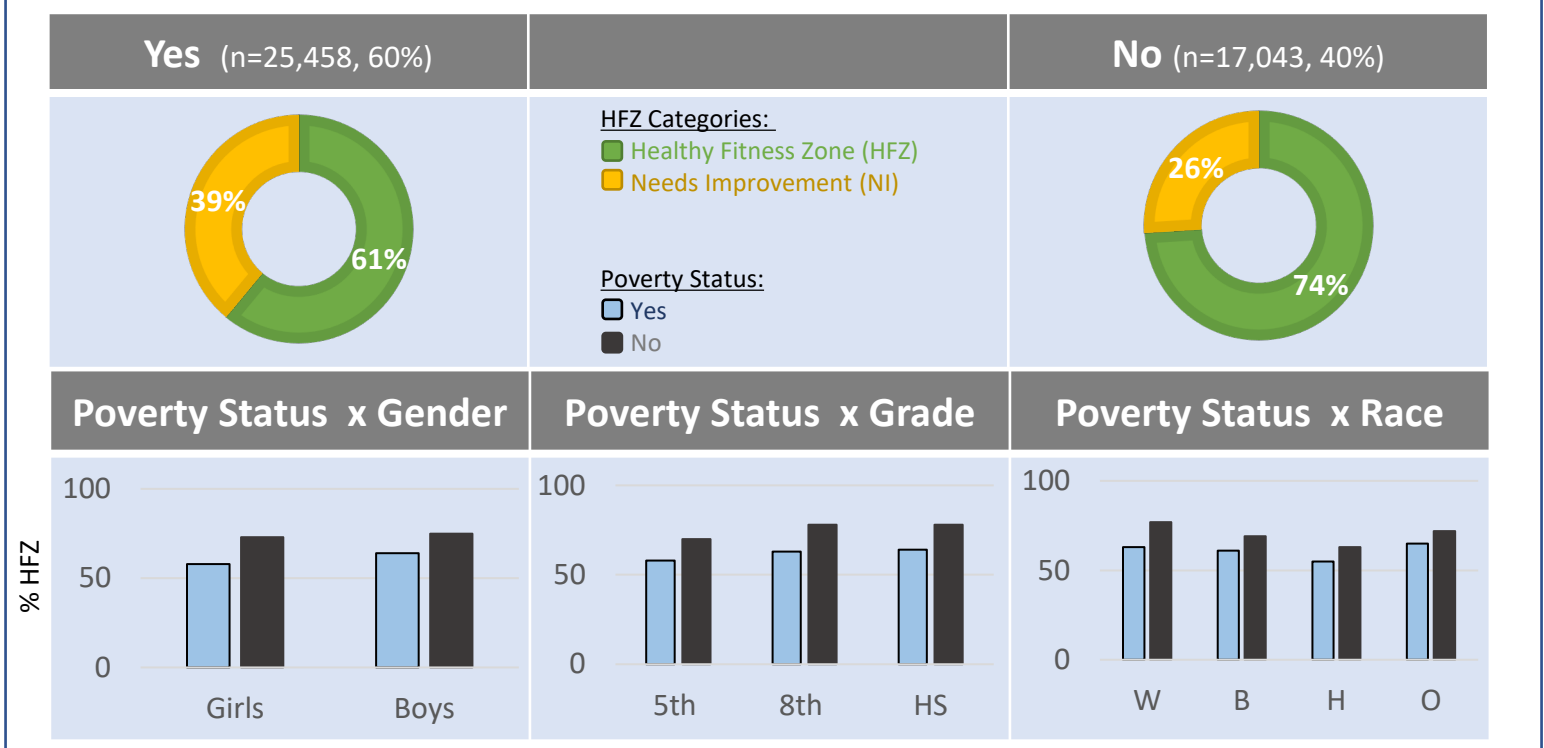
Abdominal Strength and Endurance by Grade Level



SOUTH CAROLINA FITNESSGRAM

Abdominal Strength and Endurance (Curl-Ups) | School Year 2021-2022

Abdominal Strength and Endurance by Poverty



Abdominal Strength and Endurance (Curl-Ups) - Conclusions

A key finding was that over 65% of South Carolina students attained the Healthy Fitness Zone for abdominal strength and endurance.

The following patterns were observed:

- The percentage of girls that attained the Healthy Fitness Zone was **lower** compared to boys (64% vs. 68%, respectively).
- The percentage of students attaining the Healthy Fitness Zone was **lower** among Black and Hispanic students than in White and other race/ethnicity students.
- The percentage of students attaining the Healthy Fitness Zone **increased** from 5th grade to 8th grade and from 8th grade to high school (63% vs. 69% vs. 70%, respectively).
- The percentage of students attaining the Healthy Fitness Zone for abdominal strength and endurance was **consistently lower** among students in poverty (61% vs 74%).

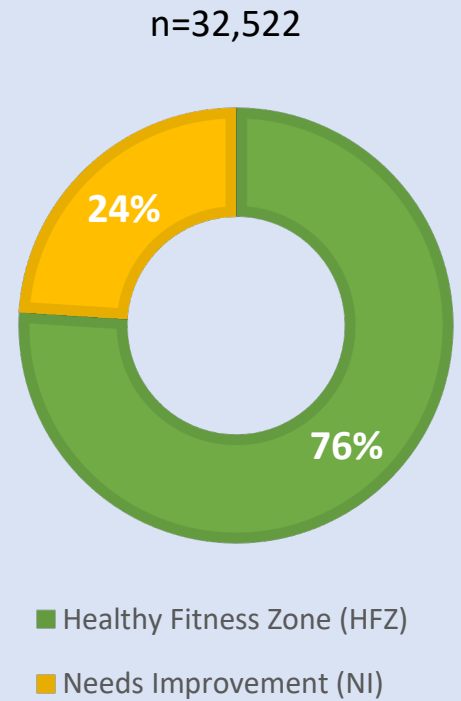
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Trunk Extensor Strength and Endurance (Trunk Lift) | School Year 2021-2022

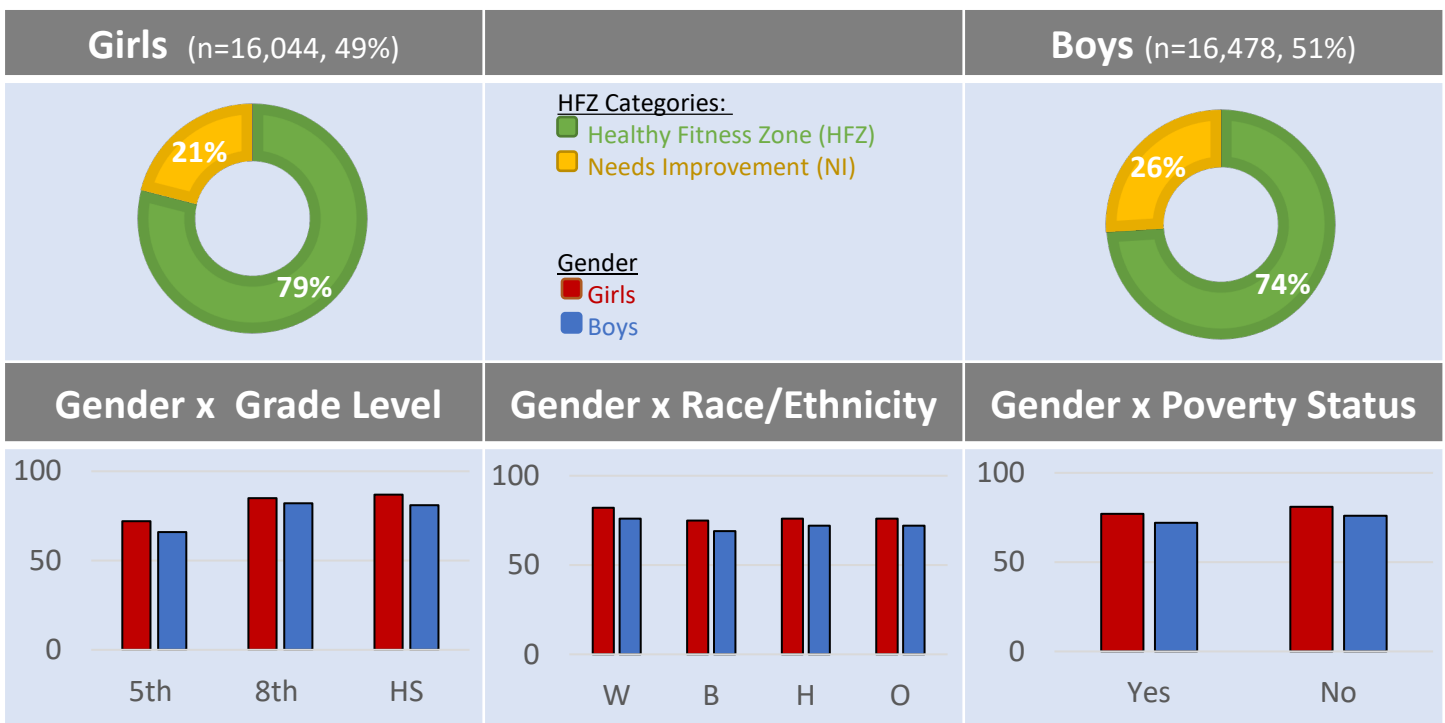
Background

Trunk extensor strength and flexibility is a person's ability to contract the musculature of the low back and hamstrings while having adequate flexibility in the abdominal and hip flexor muscles to extend the torso. Trunk extensor strength and flexibility is important in maintaining correct posture and lower back health. The strength and flexibility of the trunk extensor muscles affect an individual's ability to perform activities of daily living such as picking up and carrying objects. The trunk lift is the recommended test item to assess trunk extensor strength and flexibility in the FitnessGram protocol. The objective of the trunk lift is to use the muscles of the back to lift the upper body off the floor in a controlled manner while keeping the neck in a neutral position. Performance on the trunk lift test for trunk extensor strength and flexibility is scored by measuring in inches the distance the student lifts her/his chin from the floor. Each student's score is then categorized into one of two Healthy Fitness Zone categories using age- and sex-specific criteria. The categories are: 1) Healthy Fitness Zone; 2) Needs Improvement.

Overall Findings



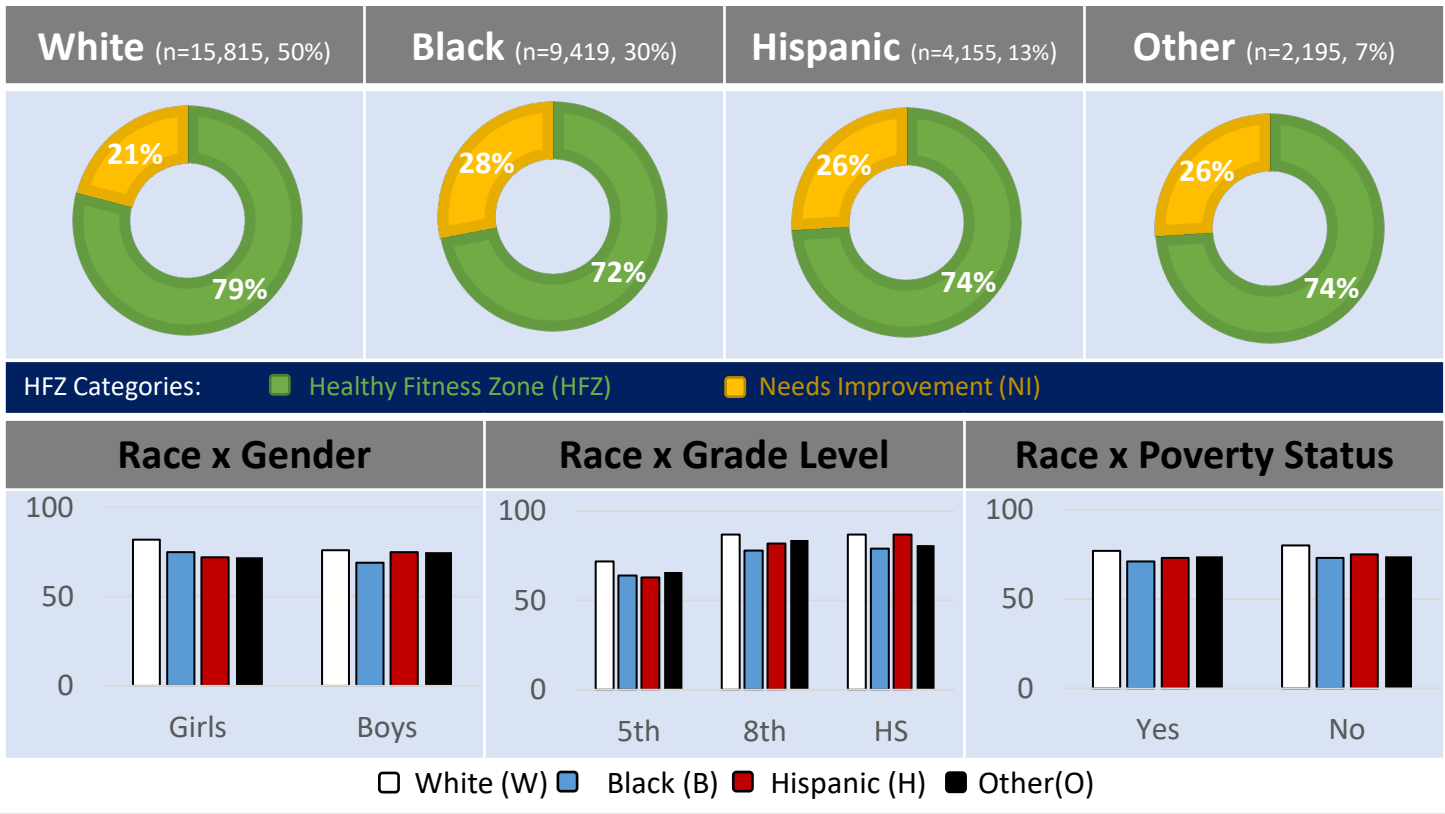
Trunk Extensor Strength and Endurance by Gender



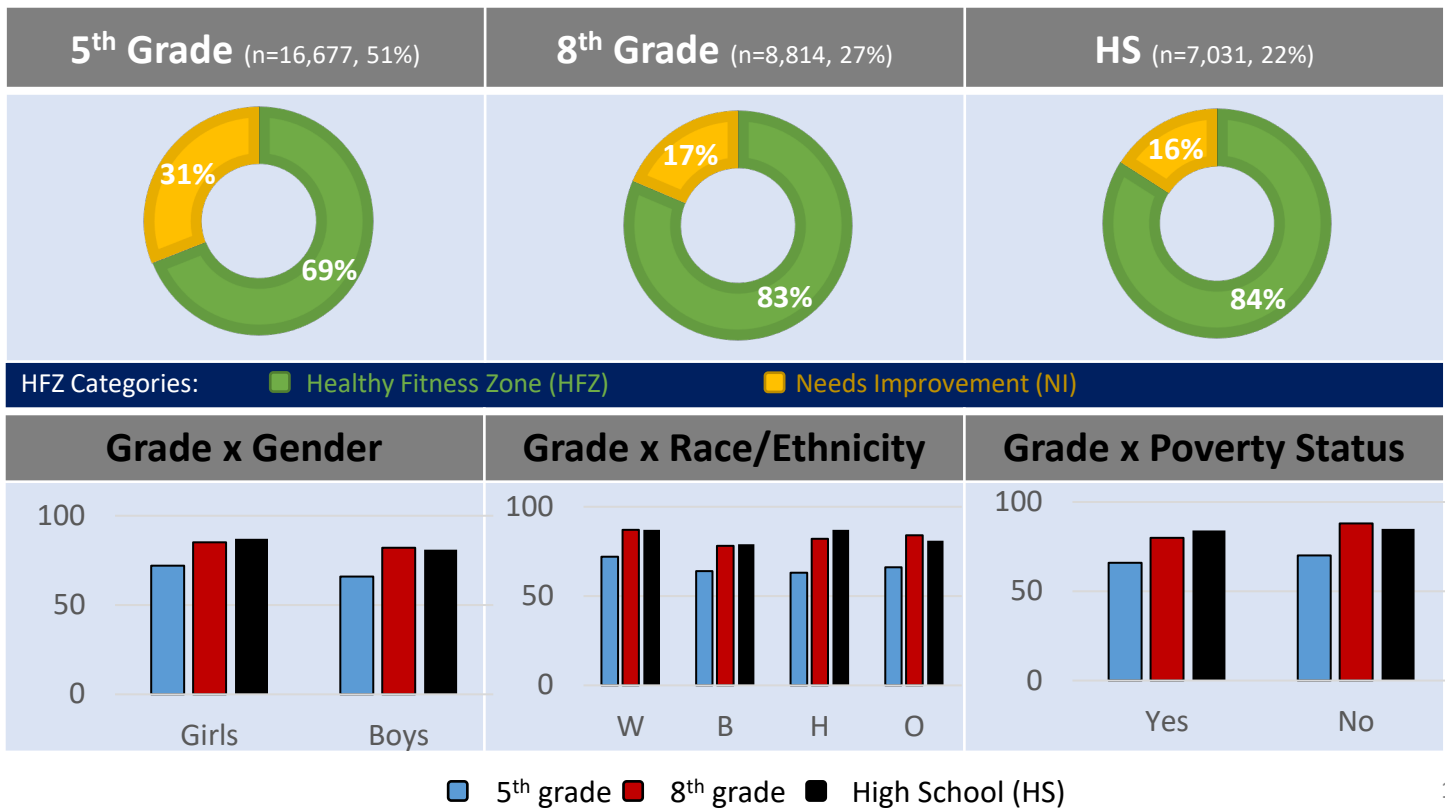
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Trunk Extensor Strength and Endurance (Trunk Lift) | School Year 2021-2022

Trunk Extensor Strength and Endurance by Race/Ethnicity



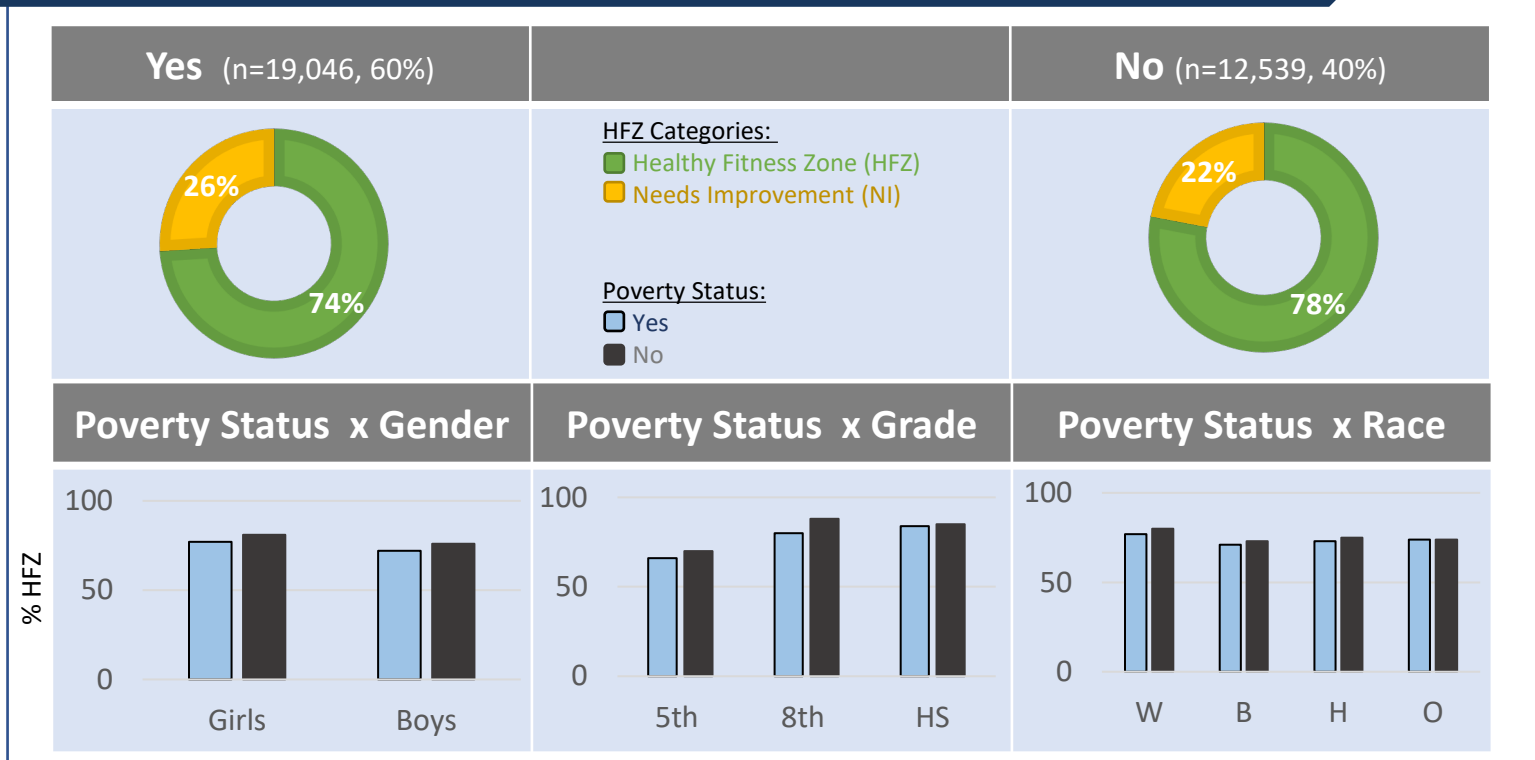
Trunk Extensor Strength and Endurance by Grade Level



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Trunk Extensor Strength and Endurance (Trunk Lift) | School Year 2021-2022

Trunk Extensor Strength and Endurance by Poverty Status



Trunk Extensor Strength and Endurance (Trunk Lift) - Conclusions

Approximately **4 out of 5** South Carolina students attained the Healthy Fitness Zone for trunk extensor strength and endurance.

The following patterns were observed:

- The percentage of girls that attained the Healthy Fitness Zone was **higher** compared to boys (79% vs. 74%, respectively).
- The percentage of students attaining the Healthy Fitness Zone was **lower** among Black students than in White, Hispanic and other race/ethnicity students.
- The percentage of students attaining the Healthy Fitness Zone was **lower** among 5th grade students compared to 8th grade and to high school students (69% vs. 83% vs. 84%, respectively).
- The percentage of students attaining the Healthy Fitness Zone for abdominal strength and endurance was **lower** among students in poverty (74% vs 78%).

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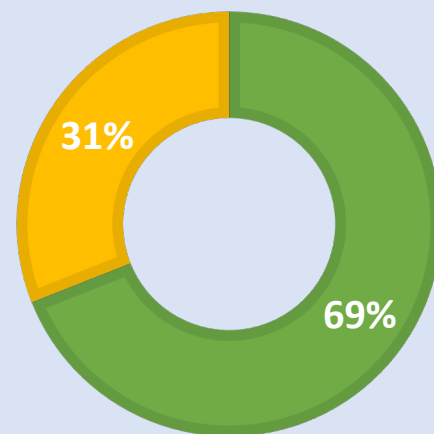
Low Back/Hamstring Flexibility | School Year 2021-2022

Background

Flexibility refers to the range of motion in a joint or series of joints and is influenced by the length and extensibility of the muscles that cross the joint. The back-saver sit and reach test predominately is a measure of flexibility of the hamstring muscles. Some major benefits of adequate flexibility include reduced risk of injury and improved performance of daily activities. The back-saver sit and reach is the recommended test item to assess flexibility in the FitnessGram protocol. To perform the test, a student sits down at the test apparatus with one leg bent and the other fully extended. The arms are then extended forward over the measuring scale. Performance on the sit and reach test for flexibility is scored by measuring in inches the distance the student is able to reach forward towards the extended foot. Two scores are taken; one for the right side of the body and one for the left side of the body. Each student's scores are then categorized into one of two Healthy Fitness Zone categories using age- and sex-specific criteria. The categories are: 1) Healthy Fitness Zone; 2) Needs Improvement.

Overall Findings

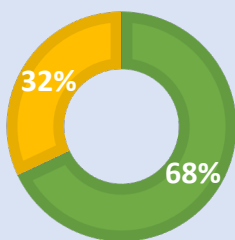
n=41,593



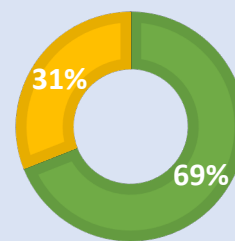
■ Healthy Fitness Zone (HFZ)
■ Needs Improvement (NI)

Low Back/Hamstring Flexibility by Gender

Girls (n=20,277, 49%)



Boys (n=21,316, 51%)



HFZ Categories:

■ Healthy Fitness Zone (HFZ)
■ Needs Improvement (NI)

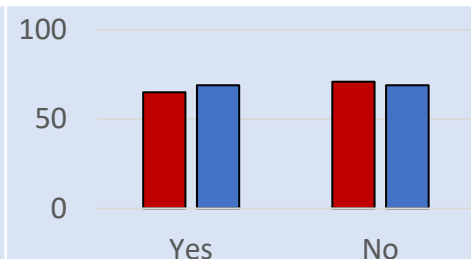
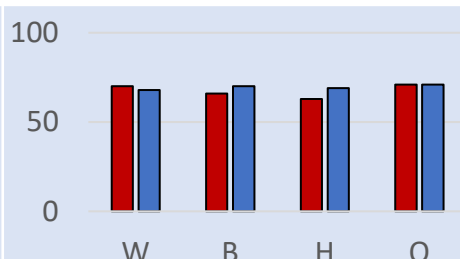
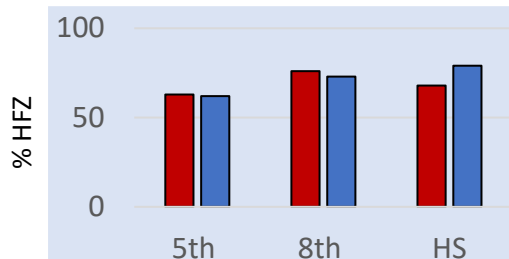
Gender:

■ Girls
■ Boys

Gender x Grade Level

Gender x Race/Ethnicity

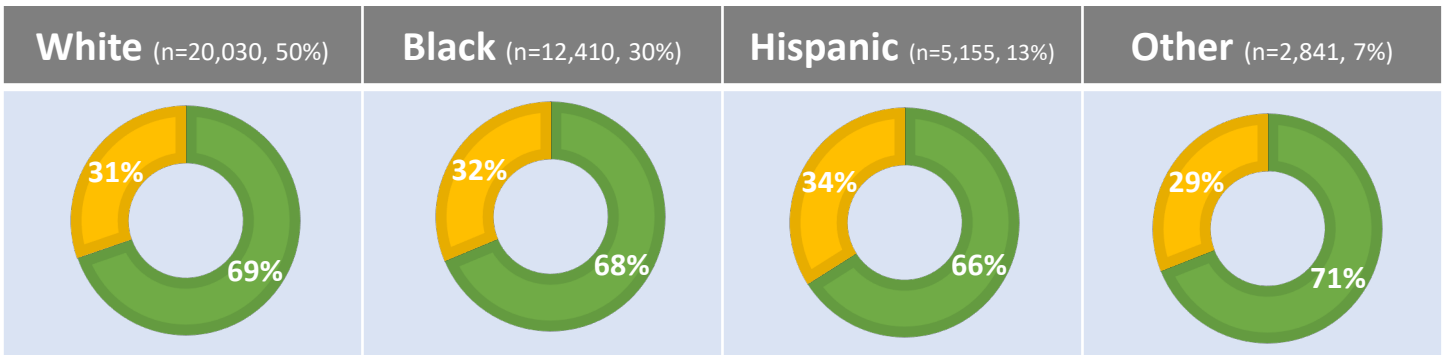
Gender x Poverty Status



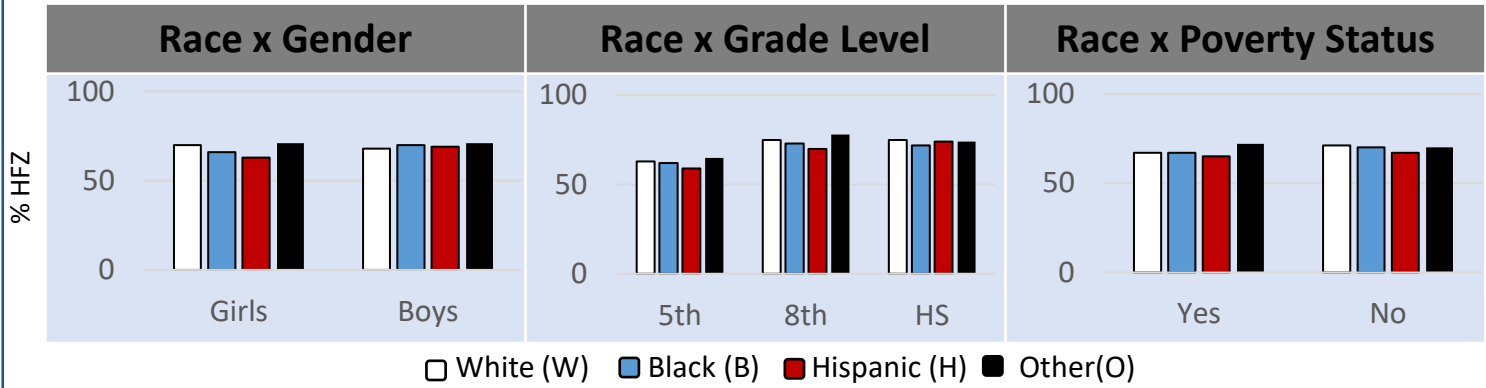
SOUTH CAROLINA FITNESSGRAM

Flexibility (Sit and Reach) | School Year 2021-2022

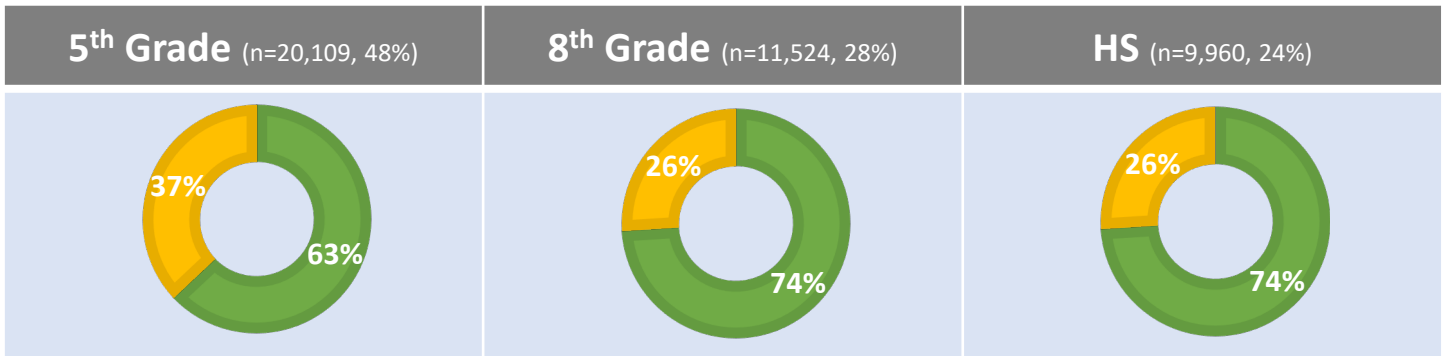
Low Back/Hamstring Flexibility by Race/Ethnicity



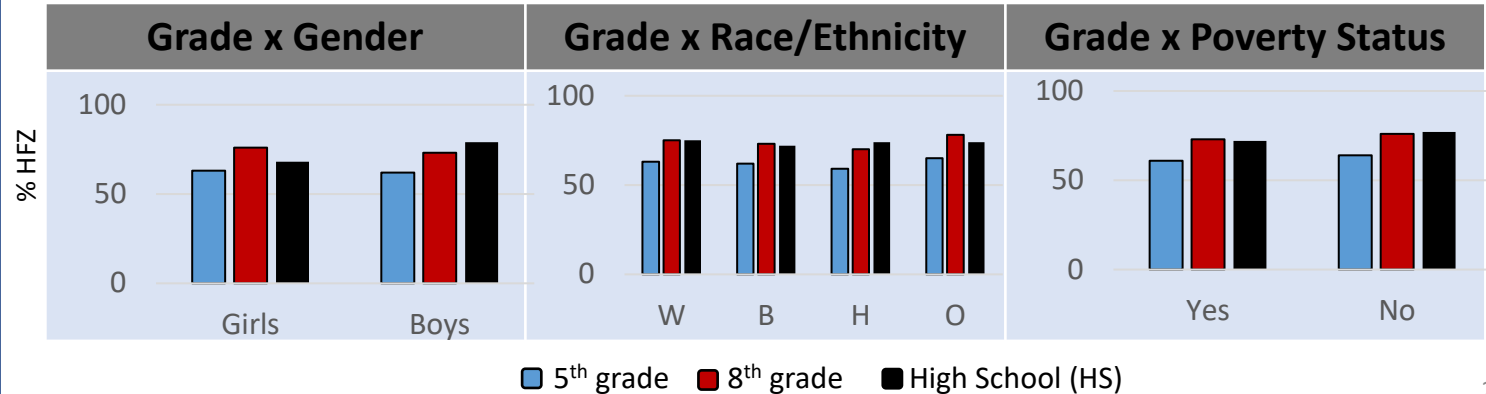
HFZ Categories: ■ Healthy Fitness Zone (HFZ) ■ Needs Improvement (NI)



Low Back/Hamstring Flexibility by Grade Level



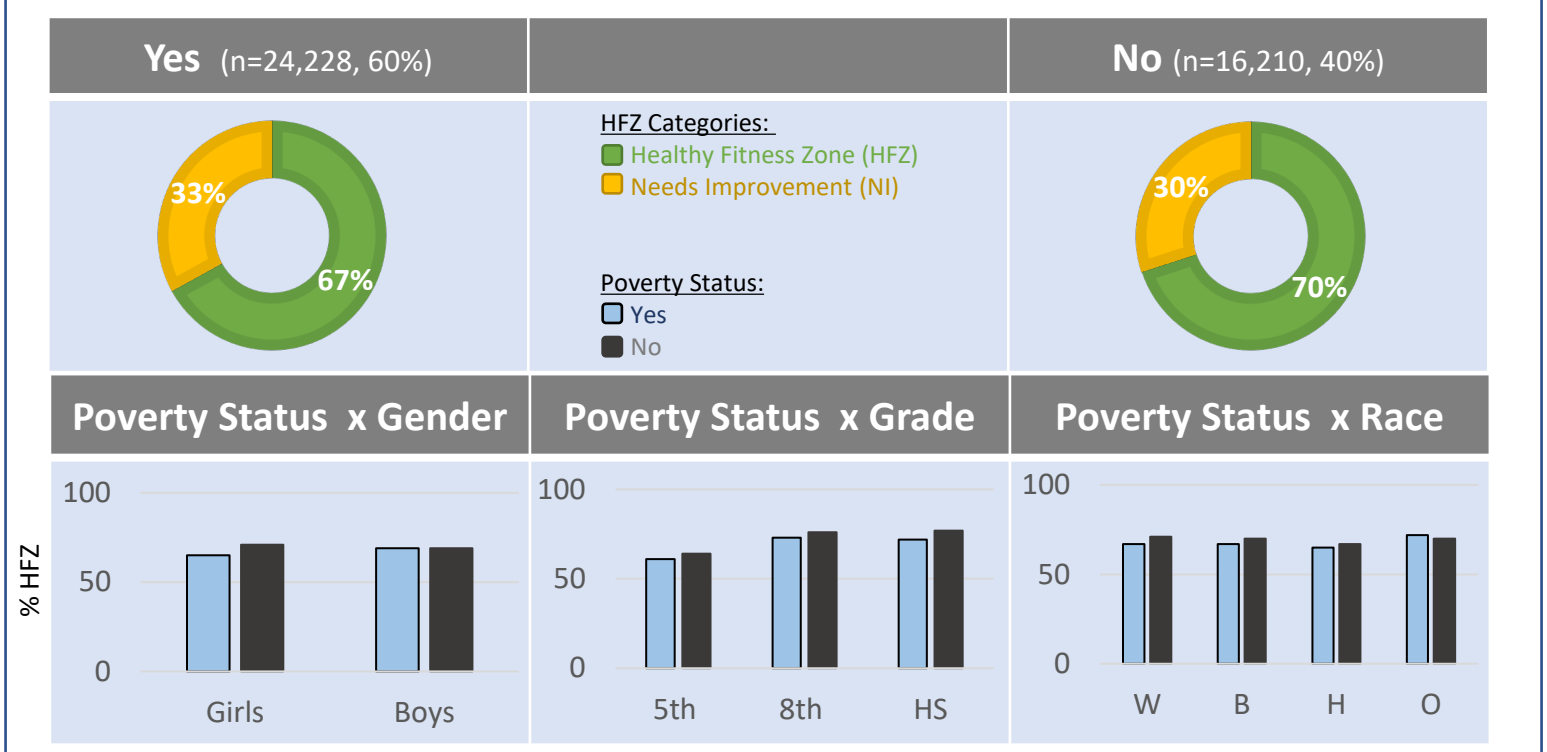
HFZ Categories: ■ Healthy Fitness Zone (HFZ) ■ Needs Improvement (NI)



SOUTH CAROLINA FITNESSGRAM

Flexibility (Sit and Reach) | School Year 2021-2022

Low Back/Hamstring Flexibility by Poverty



Low Back/Hamstring Flexibility - Conclusions

A key finding was that nearly 70% of South Carolina students attained the Healthy Fitness Zone for lower back/hamstring flexibility.

The following patterns were observed:

- The percentage of girls and boys that attained the Healthy Fitness Zone was **similar** (68% vs. 69%, respectively).
- The percentage of students attaining the Healthy Fitness Zone was **similar** among all race/ethnicity groups.
- The percentage of students attaining the Healthy Fitness Zone was **lower** among 5th grade students compared to 8th grade and to high school students (63% vs. 74% vs. 74%, respectively).
- The percentage of students attaining the Healthy Fitness Zone for lower back/hamstring flexibility was **lower** among students in poverty (67% vs 70%).

SOUTH CAROLINA FITNESSGRAM

Summary

The SC FitnessGram project is a state-wide effort to evaluate and ultimately improve health-related fitness among public school students in South Carolina. The project involves aggregation of health-related fitness data from public schools using a statewide FitnessGram software system. FitnessGram is the most widely used fitness test protocol in U.S. schools and it is completed annually by over 10 million children nationwide.

While all South Carolina public schools serving grades K-12 are eligible to participate in the SC FitnessGram project, during the 2021 – 2022 school year 66,844 students from 514 public schools in 47 school districts participated. FitnessGram was administered by physical education teachers to South Carolina public school students in 2nd, 5th, 8th and high school grades. The demographic characteristics of the sample were similar to the population of students attending public schools in South Carolina: 49% female; 50% white, 30% black, 13% Hispanic; 61% living in poverty.

FitnessGram assesses components of fitness that are known to be related to health outcomes in children and youth. Health-related criteria were applied in assigning performance for cardiorespiratory fitness to one of three categories: Healthy Fitness Zone, Needs Improvement, or Needs Improvement – Health Risk. Weight status categories include Healthy Weight, Overweight, and Obese. Upper body strength, abdominal strength, trunk extensor strength, and low back/hamstring flexibility performances were assigned to two categories: Healthy Fitness Zone or Needs Improvement.

In the complete sample, the following percentages of South Carolina students scored in the **Healthy Fitness Zone** or **Healthy Weight** categories on the tests of the specified components:

Cardiorespiratory Fitness	43%	Weight Status	58%
Upper Body Strength	55%	Abdominal Strength & Endurance	66%
Trunk Extensor Strength & Endurance	76%	Flexibility	69%

The percentage of students achieving the Healthy Fitness Zone tended to decline with increasing age for cardiorespiratory fitness, but increased with age for upper body strength, abdominal strength, trunk extensor strength, and low back/hamstring flexibility. The percentage of students meeting the Healthy Fitness Zone standard for all test items was lower among students in poverty as compared to students not in poverty. Given the particularly important effects of weight status and cardiorespiratory fitness on the current and future health of students, it is a great concern that 2 out of 5 South Carolina students were found to be overweight or obese, and less than half of South Carolina students attained the Healthy Fitness Zone for cardiorespiratory fitness.

The percentages of students achieving the Healthy Fitness Zone varied across the components of fitness and, in many cases, across groups formed on the basis of grade, sex, race/ethnicity and poverty status. The following trends were observed:

- **Grade Level** – The percentage of students achieving the Health Fitness Zone for cardiorespiratory fitness decreased with increasing grade level, but the opposite trend was observed for flexibility and upper body, abdominal and trunk muscular strength and endurance. For weight status, a greater percentage of 2nd graders achieved Healthy Weight than observed in students in the higher grades.
- **Sex** – Comparable percentages of boys and girls achieved Healthy Weight for weight status, and the Healthy Fitness Zone for flexibility and the indicators of upper body and abdominal muscular strength/endurance. A greater percentage of boys met the Healthy Fitness Zone standard for cardiorespiratory fitness, and a greater percentage of girls met that standard for trunk strength/endurance.
- **Race/Ethnicity** – A consistent pattern was observed with a greater percentage of White students achieving the Healthy Fitness Zone than observed for Black or Hispanic students. This was seen for all six components of fitness.
- **Poverty Status** – Students living in poverty, as compared with their counterparts not living in poverty, were less likely to achieve the Healthy Fitness Zone. A smaller percentage of students living in poverty achieved the Healthy Fitness Zone (or Healthy Weight) for all six components of fitness. That trend was particularly pronounced for weight status and cardiorespiratory fitness.