



Key Findings from Student Fitness Research

Manuscripts published by the Children's Physical Activity Research Group at the University of South Carolina based on data available through South Carolina FitnessGram.

Clennin, MN, M Dowda, X Sui, and RR Pate. Area-level socioeconomic environment and cardiorespiratory fitness in youth. *Medicine & Science in Sports & Exercise*. 51 (12): 2474-2481, 2019.

Study Design:

- This study examined the relationship between area-level socioeconomic environment (SES) and cardiorespiratory fitness (CRF) in South Carolina students.
- The study determined the extent to which grade level, sex, race/ethnicity and student poverty status moderated that relationship.
- Analyses were conducted in a sample of over 44,000 students who completed the FitnessGram test protocol during the 2015-16 school year.
- Cardiorespiratory fitness was measured with either PACER or mile run tests, and performance was categorized as meeting a health-related standard (Healthy Fitness Zone – HFZ) or not meeting that standard.

Key Findings:

- Approximately **one-half** of the students **did not** achieve the HFZ for CRF.
- The odds of achieving the HFZ for CRF were **significantly lower** among students attending schools that were located in **lower SES** areas.
- The odds of achieving the HFZ for CRF were **lower in girls vs. boys, Hispanics vs. Non-Hispanic whites, students living in poverty vs. those not living in poverty, 8th graders and high school students vs. 5th graders, and those who were overweight or obese vs. those who were normal weight.**

Key Takeaways:

- Special actions may be needed to promote CRF among students who live in lower SES areas.
- Such actions are particularly needed for girls, Hispanics, students in middle and high school, those who are overweight or obese.



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Pate, RR, M Clennin, ER Shull, JA Reed, and M Dowda. Poverty status moderates the relationship between cardiorespiratory fitness and academic achievement. Journal of School Health. 909: 630-640, 2020.

Study Design:

- The purpose of this study was to examine the associations between students' cardiorespiratory fitness (CRF), weight status and academic achievement. In addition, the study determined if those relationships were influenced by students' poverty status.
- The sample included over 27,000 South Carolina students who were 5th graders, and over 16,000 8th graders who completed tests of CRF and weight status in the 2016-17 school year.
- CRF was measured with either PACER or mile run tests, and performance was categorized as either meeting or not meeting a health-related standard (Healthy Fitness Zone – HFZ). Weight status was assessed by calculating BMI from height and weight, and categories (normal weight, overweight, or obese) were based on CDC procedures. Academic achievement was determined from state standardized tests of mathematics and English language arts.

Key Findings:

- Weight status was **not associated** with academic achievement after adjustment for demographic factors and cardiorespiratory fitness (CRF).
- However, the odds of **meeting or exceeding academic standards** for both math and English were **significantly greater among students who achieved the Healthy Fitness Zone (HFZ) for CRF**.
- This pattern was **consistent for both 5th and 8th graders**, in both **students living in and not living in poverty**, and **after adjustment for demographic factors and weight status**.

Key Takeaways:

- These findings suggest that schools can promote academic achievement by providing students with physical activity opportunities that will enhance CRF.



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Clennin, MN, ER Shull, M Dowda, and RR Pate. Longitudinal associations of cardiorespiratory fitness and poverty with academic performance among youth. *Journal of School Health*. 93: 115-122, 2022.

Study Design:

- This study examined the longitudinal relationships between cardiorespiratory fitness (CRF) and academic achievement in a large (N=11,013), diverse cohort of students transitioning from 5th grade to 8th grade.
- South Carolina students' CRF was assessed as maximal aerobic power (VO₂max) estimated from performance on the PACER or one-mile run tests. Academic achievement was measured as standard scores on tests of mathematics and English language arts.

Key Findings:

- Change in CRF between 5th and 8th grades was found to be **positively associated with academic achievement** in the 8th grade after adjusting for demographic factors.
- Students **living in poverty showed lower levels of academic achievement** than students not living in poverty.
- However, **poverty status did not mediate the influence of CRF on academic achievement**. Rather, **CRF influenced academic achievement similarly in both students living in poverty and those not living in poverty**.

Key Takeaways:

- These findings point to the need for schools to implement evidence-based policies and programs that optimize the quantity and quality of physical activity throughout the school day.