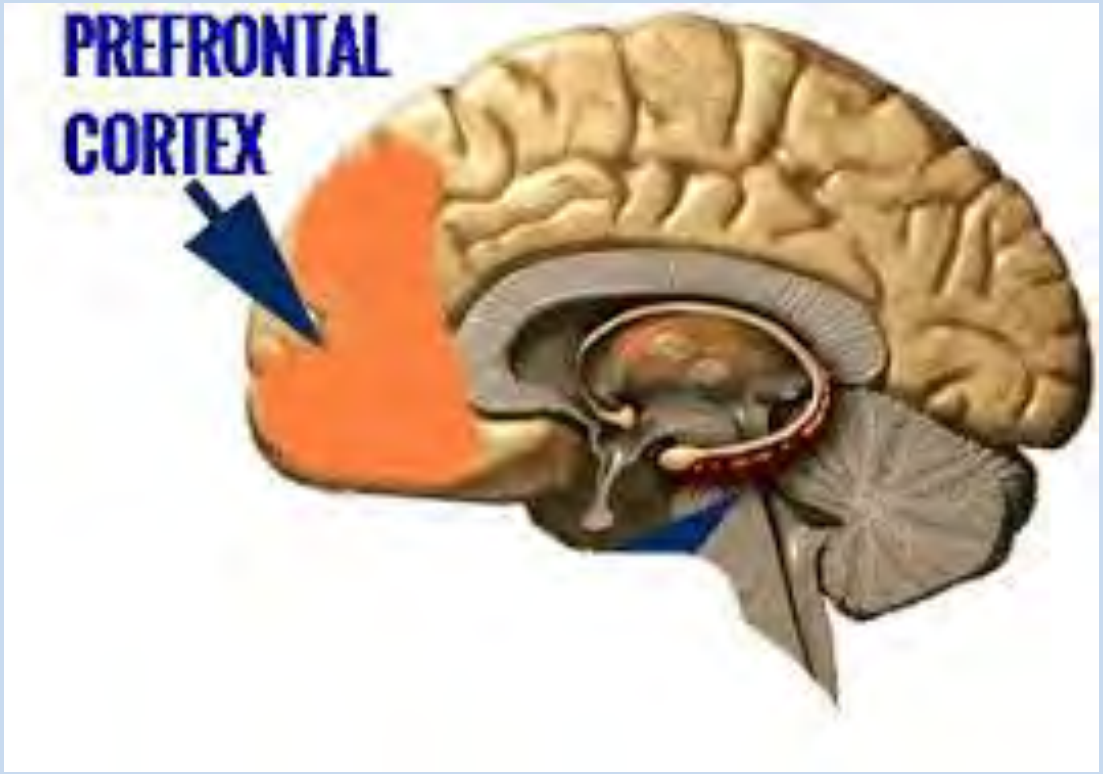
Active Kids Have Active Brains

Julian A. Reed, Ed.D., MPH
Professor of Health Sciences
Furman University
Founder of ActivEd



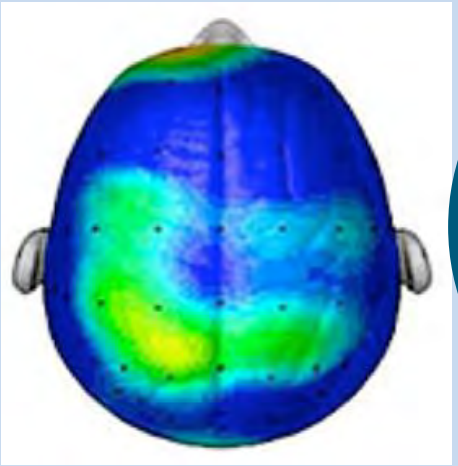
Prefrontal Cortex



EF-Hypothesis

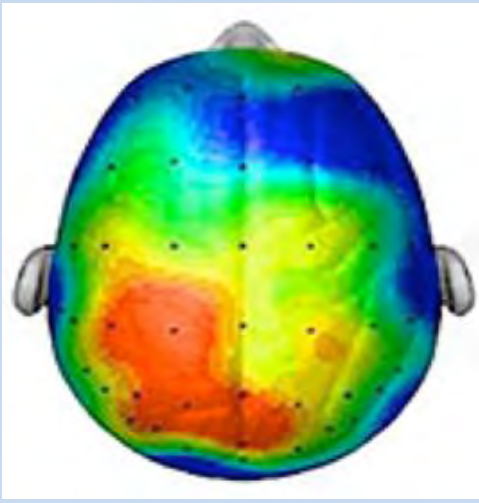
Activity improves:

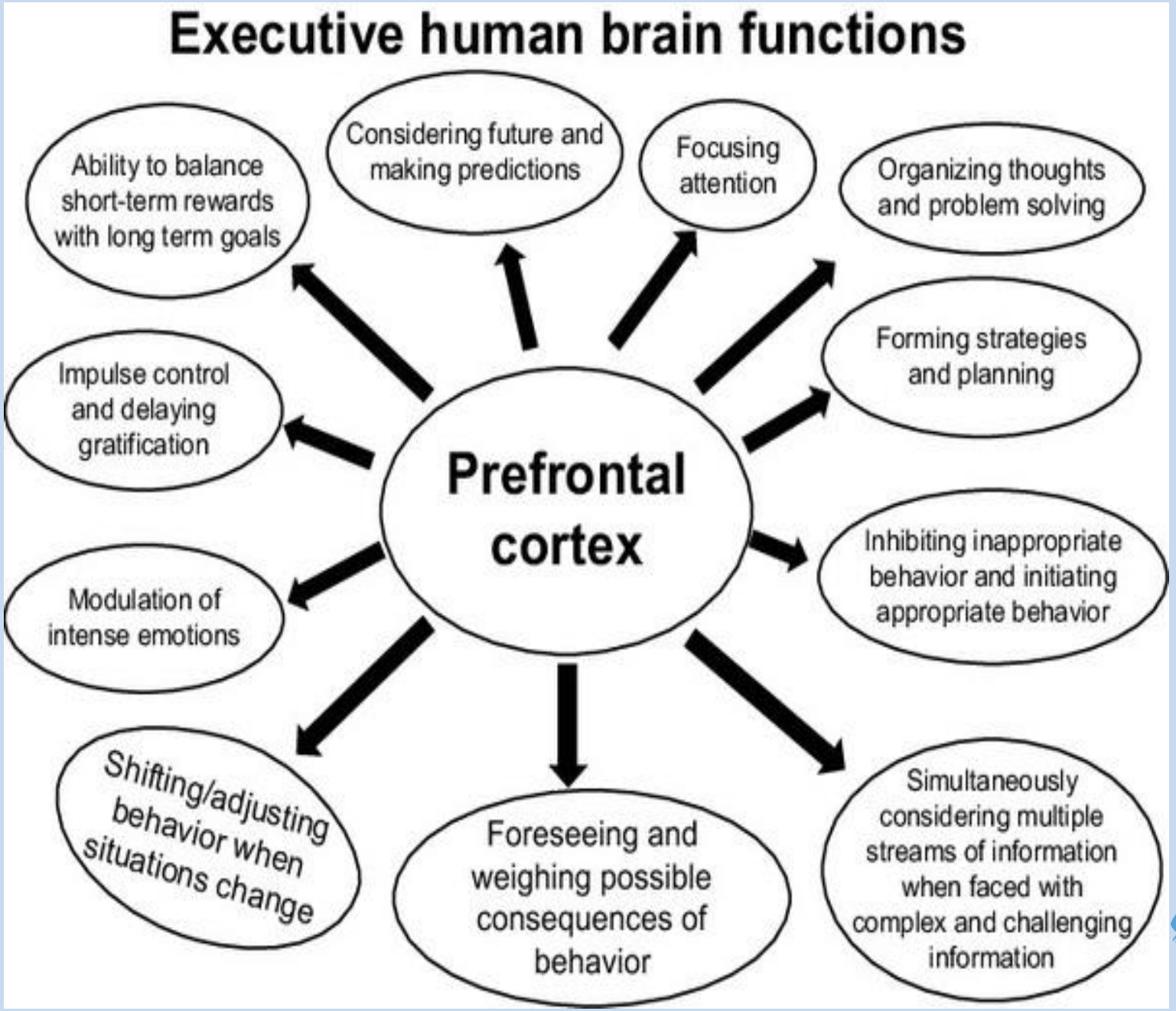
- **Concentration**
- **Memory**
- **Focus**
- **Behavior**
- **Performance**
- **Achievement**



After sitting quietly for 20 minutes.

After 20 minutes of light activity.




Executive human brain functions
Prefrontal cortex
Ability to balance short-term rewards with long term goals
Considering future and making predictions
Focusing attention
Organizing thoughts and problem solving
Impulse control and delaying gratification
Forming strategies and planning
Modulation of intense emotions
Inhibiting inappropriate behavior and initiating appropriate behavior
Shifting/adjusting behavior when situations change
Foreseeing and weighing possible consequences of behavior
Simultaneously considering multiple streams of information when faced with complex and challenging information

Current Stats by Grade Division

Only 45% of schools have students participate in regular physical activity during the school day (NOT PE or RECESS). Specifically:

- 43% of elementary schools
- 64% of middle schools
- 27% of high schools



New Model: WSCC

1. Physical education and physical activity.
2. Nutrition environment and services.
3. Health education.
4. Social and emotional school climate.
5. Physical environment.
6. Health services.
7. Counseling, psychological and social services.
8. Employee wellness.
9. Community involvement.
10. Family engagement.

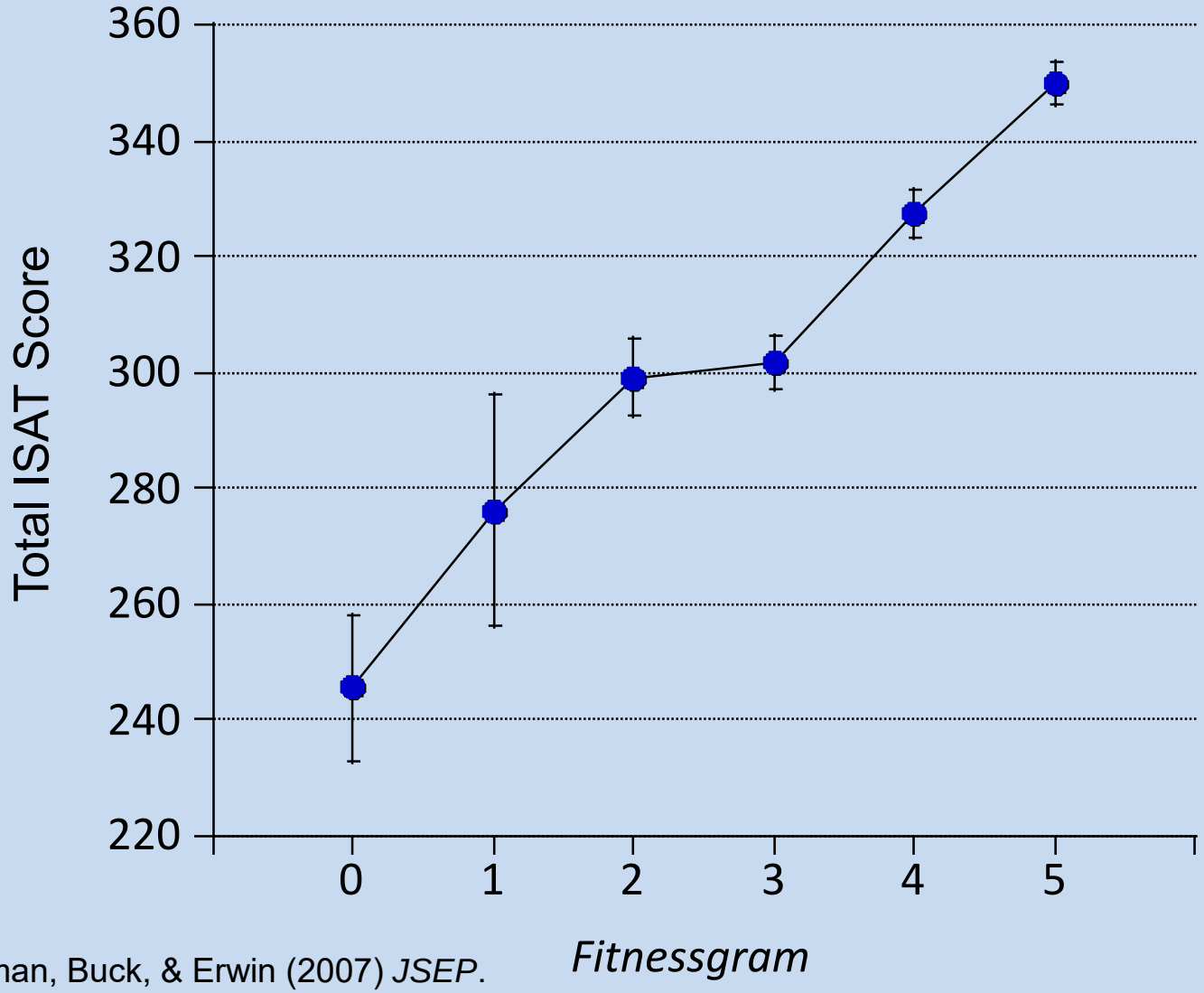


New Model: CSPAP

- Physical Education and Physical Activity
  - Schools create an environment with opportunities
    - Students can be physically active throughout the day
  - Comprehensive School Physical Activity Program (CSPAP)
    - Physical education
    - Physical activity during, before, and after school
    - Staff involvement
    - Family and community engagement

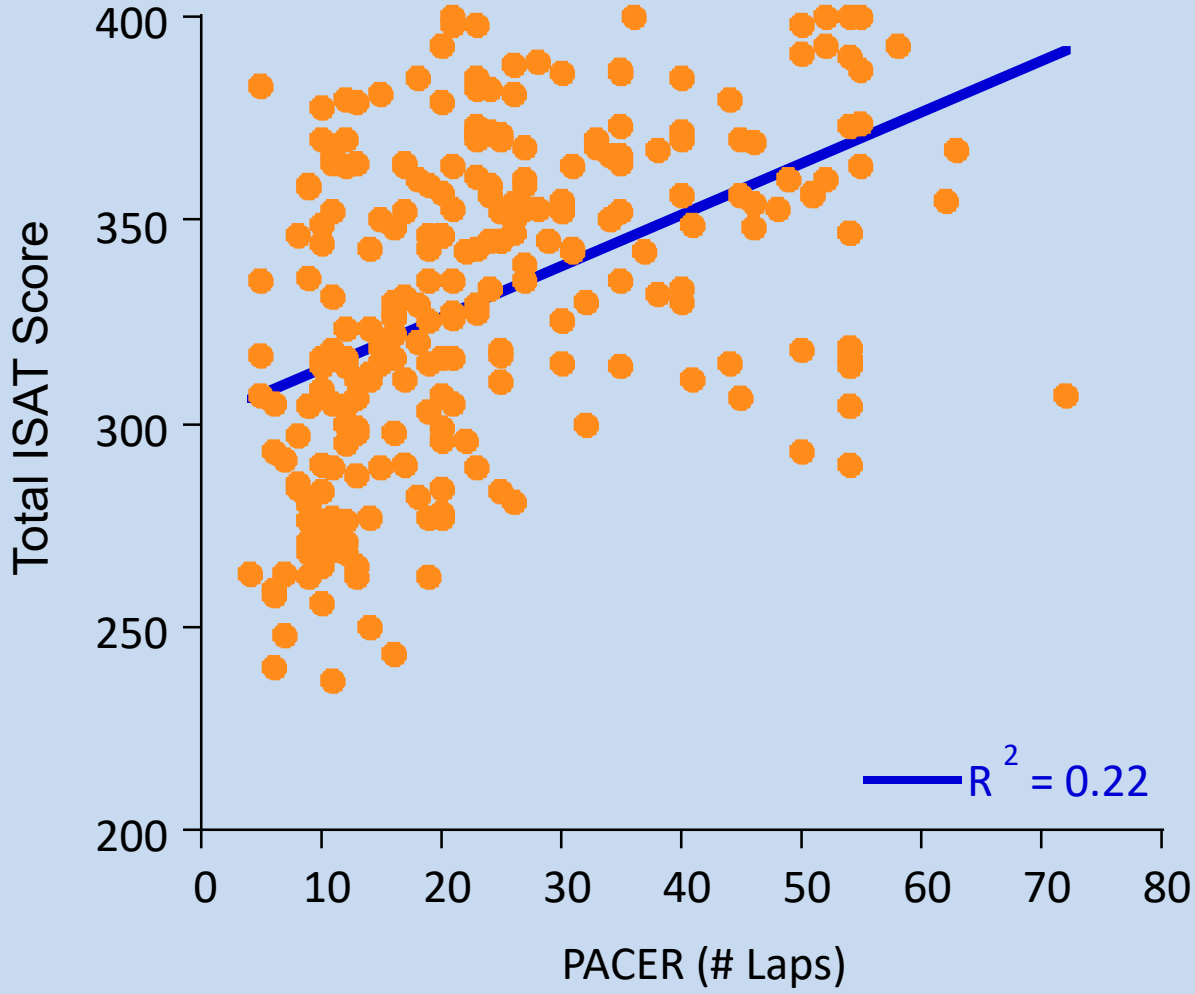


Physical Fitness & Achievement Test Performance



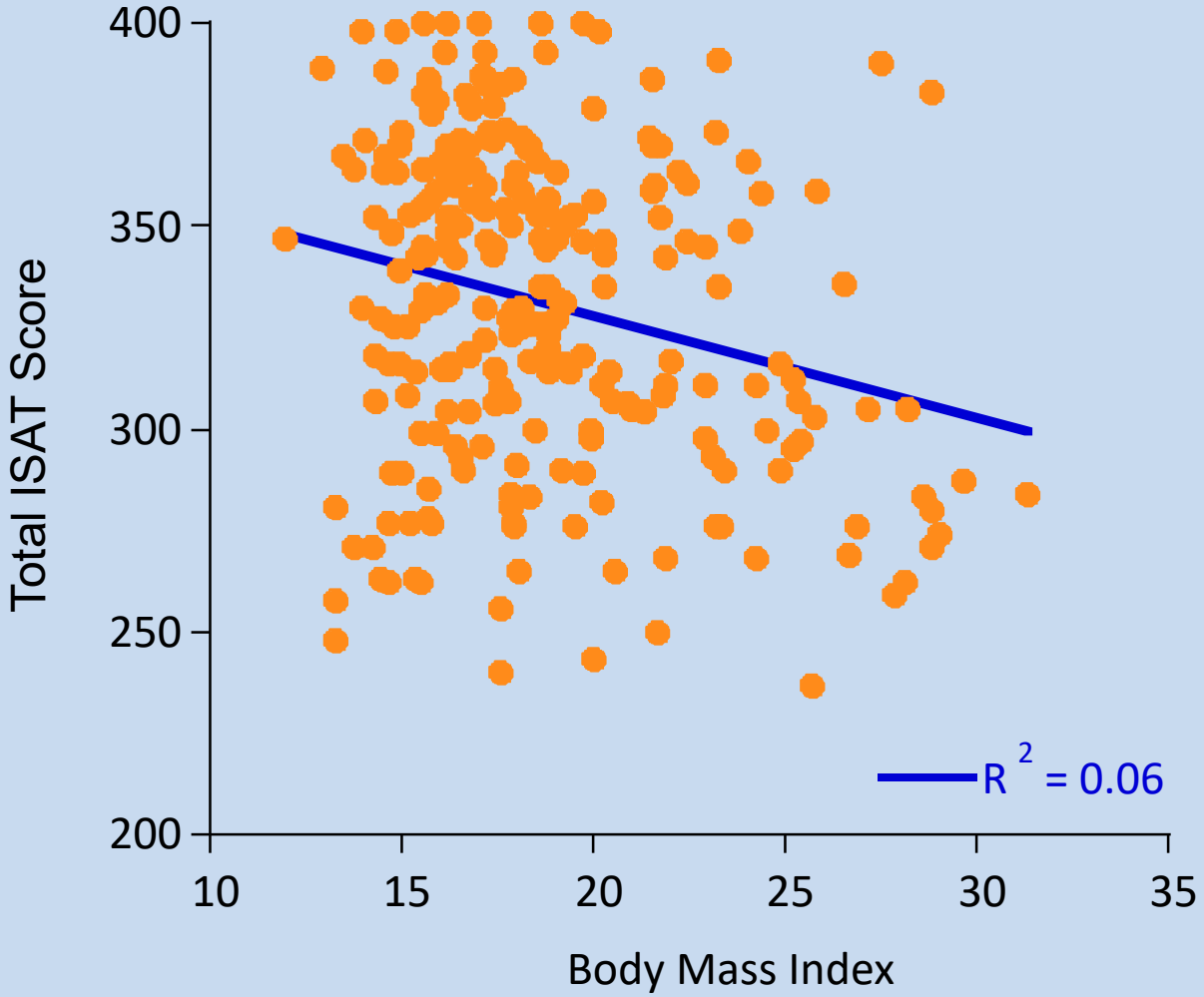
Castelli, Hillman, Buck, & Erwin (2007) *JSEP*.

Aerobic Fitness & Achievement Test Performance



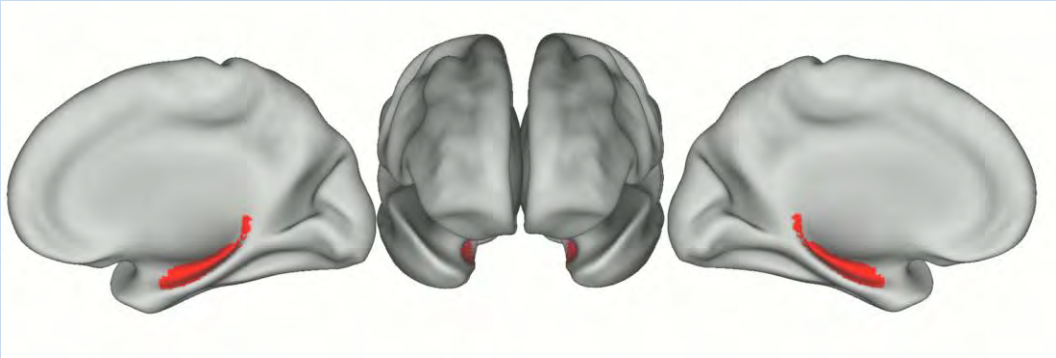
Castelli, Hillman, Buck, & Erwin (2007) *JSEP*.

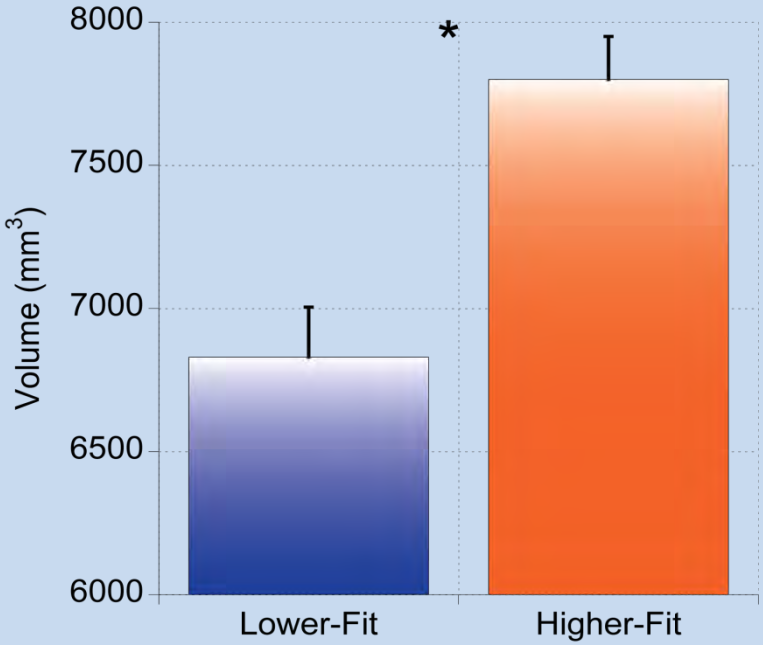
Body Mass Index & Achievement Test Performance

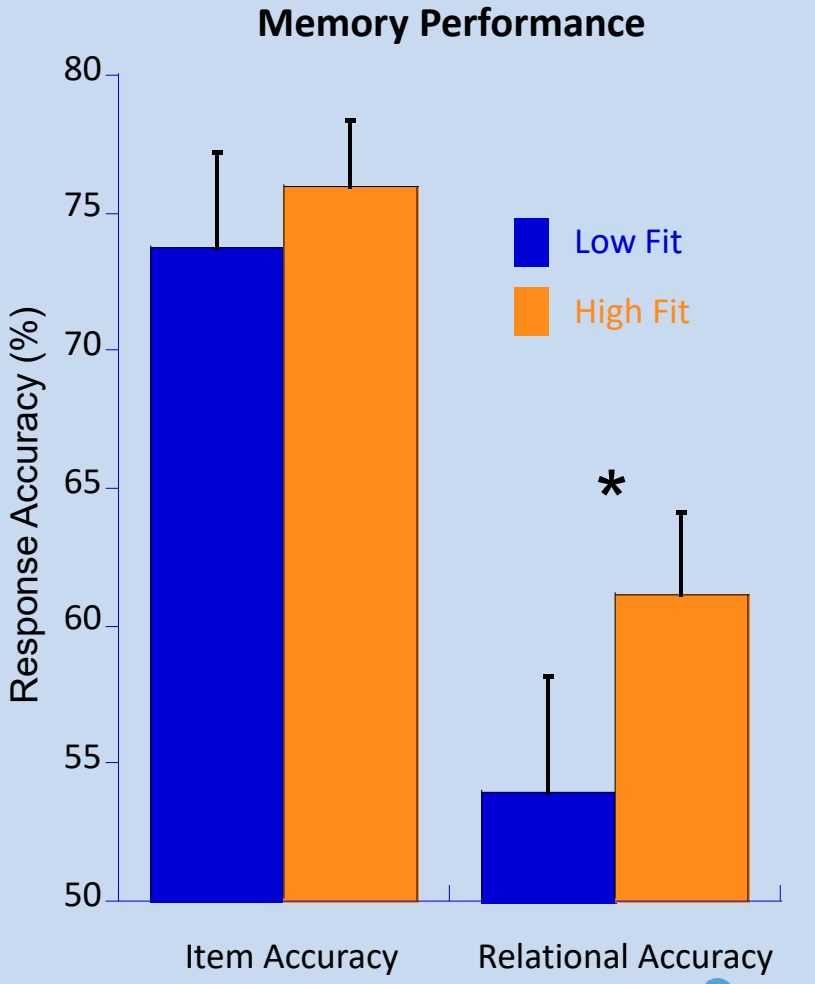


Castelli, Hillman, Buck, & Erwin (2007) *JSEP*.

Fitness, Hippocampus, & Memory







Chaddock et al. (2010). *Brain Research*, 1358, 172-183

Greenville Data

Original Investigation

The Association between Aerobic Fitness and Academic Achievement among Elementary School Youth

Melissa L. Fair,[1,2] Julian A. Reed,[3] S. Morgan Hughey,[1] Alicia R. Powers,[4] and Sarah King[1]

ABSTRACT

Physical activity (PA) and fitness are important for both healthy physical and mental development in youth, including positive effects for academic achievement. Several studies have shown positive associations between PA and academic achievement or cognitive function. However, fewer studies have examined these associations with large representative samples of youth with objective measurement of aerobic fitness and body composition. Therefore, the present study examined the association between aerobic fitness and academic achievement in a large sample of fourth and fifth grade youth from a large southeastern school district. In 2013, objectively measured aerobic capacity via FitnessGram® Progressive Aerobic Cardiovascular Endurance Run was collected for all fourth and fifth grade youth (n = 8641) in a southeastern US county, along with several demographic characteristics. Students also completed the Palmetto Assessment of State Standards test for the following subjects: writing, English/language arts, math, science, and social studies. Multilevel linear regression models were used to examine associations between aerobic fitness and all subject test scores while controlling for demographic characteristics. Results from multilevel linear regression indicate that even after controlling for important covariates, including sex, race/ethnicity, school lunch status, grade level, and youth body mass index, there was a significant positive association between aerobic fitness and academic achievement in writing, English/language arts, math, science, and social studies. Further analysis indicated that the association between increased aerobic fitness and subject test scores was not modified by sex. In conclusion, these findings are supported by previous research highlighting the important role that aerobic fitness for elementary school youth plays in healthy brain development during this rapid period of growth and acquisition of cognitive skills, thus impacting lifelong academic achievement and educational attainment.

INTRODUCTION

Health promotion research has long documented the healthful benefits of regular participation in physical activity (PA) for youth, including enhanced aerobic fitness, reduction in chronic disease risk factors, maintaining a healthy weight status, and improved mental health (19,26,35). Despite this knowledge of the numerous health benefits of PA, data from the 2012 National Health and Nutrition Examination Survey National Youth Fitness Survey indicate that as few as one quarter of US youth meet the Centers for Disease Control and Prevention's (CDC) recommendations for 60 min or more of moderate-to-vigorous PA each day (17).

Considering the significant number of total waking hours youth spend at school and in school-related activities (23), schools are an excellent environment to promote healthy behaviors such as participation in regular PA; however, less than 4% of elementary schools nationwide provide access to daily physical education (PE), and less than half offer regular recess (25). One of the possible barriers to increasing the time youth spend in PE or recess each day is the emphasis of the federal government on ac-



Greenville Data

- Even after controlling for important covariates including youth *BMI, sex, grade level, race/ethnicity, and school lunch status* ***there is a significant and positive relationship*** between youth ***aerobic fitness and academic achievement*** across all subject area tests.

- ***With academic achievement increasing*** as levels of aerobic fitness increase.

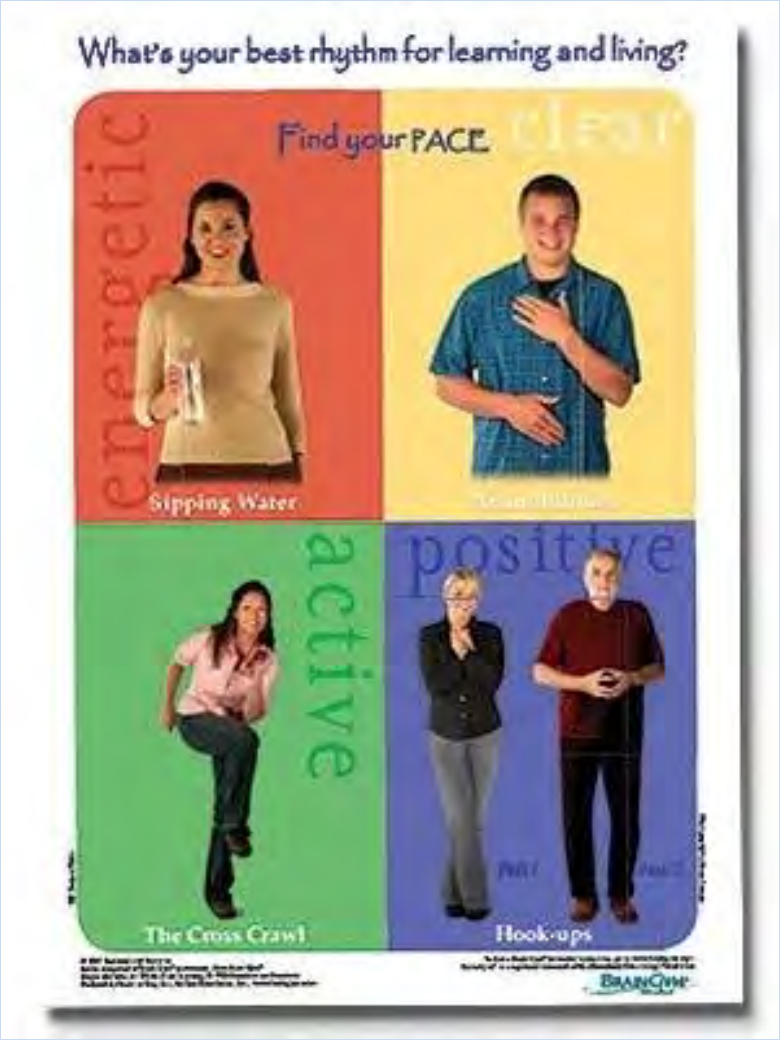


Strategies

- Embodied learning: true integration with content (Math, ELA, SS, Science, etc.)
- Let students stand during tests or throughout class.
- Standing desks.
- Stretching.
- Brain Gym-
  - Cross Crawl, Hook-ups, etc.
- Fit-desks in classroom, media room?
- Stepper desks in classroom?



Strategies for HS



Standing Desk



Strategies for HS



Strategies for HS



Case Study: Naperville

- *Zero Hour P.E.* where they scheduled time to work out before class.
- This program not only turned their 19,000 students into the fittest in the nation but also, in some categories, the smartest in the world.
- Academically, Naperville High School is currently in the top 10 in the state–despite the fact that they spend less money per pupil than other high schools in their district.
- The students at Naperville took the Trends in International Mathematics and Science Study (TIMSS) given around the world. The United States has done notoriously poorly on this test. Whereas in Asian countries nearly half of the students score in the top tier, only 7 percent of U.S. students hit that mark.
- In Naperville, On the science section, they finished just ahead of Singapore, number one in the world. And on the math section, they were number six in the world.

All this because of their innovative exercise program.





Walkabouts

