

*Examining the Impact of 45 Minutes of Daily Physical
Education on Cognition, Body Composition and
Fitness Performance of
Elementary and Middle School Youth*



Courtesy of Legacy Charter School

Year 6 and Longitudinal Findings (2010-2015)

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EXECUTIVE SUMMARY

The purpose of evaluating the Legacy Charter Physical Activity Program is to examine the impact of 45 minutes of daily physical education on cognition (i.e., Fluid Intelligence & Perceptual Speed), body composition, and fitness performance of elementary and middle school youth in Greenville, South Carolina.

Participating in regular physical activity reduces the risks of developing chronic disease along with providing a variety of health benefits. According to the South Carolina Obesity Action Plan¹ released in the fall of 2014:

- **2 out of 3 South Carolina adults are overweight or obese.**
- **The economic cost of obesity in South Carolina is estimated to be \$8.5 billion per year and growing.**
- **More than 30% of South Carolina high school students are overweight or obese.**
- **1 in 3 low-income children ages 2 – 5 years old are overweight or obese in South Carolina¹.**

South Carolina now has the 10th highest adult obesity rate in the nation, according to *The State of Obesity: Better Policies for a Healthier America*. South Carolina's adult obesity rate is currently 32.1%, up from 21.1% in 2000 and from 12.0% in 1990².

The 2013 South Carolina Children's Health Assessment Survey (CHAS) revealed that few youth are participating in daily physical activity. As high as 75% of youth between the ages of 5 and 17 reported not to exercise, play a sport, or participate in physical activity for at least 60 minutes that made them sweat or breathe hard during the previous 7 days³.

Unfortunately, federal mandates continue to emphasize academic achievement, leading many school districts to provide only curricula to improve test scores, resulting in instruction time reductions for physical education⁴.

The rise in childhood obesity according to the US Surgeon General is attributed to declines in physical activity opportunities in schools, primarily in physical education and recommends all US school systems mandate daily physical education (150 minutes per week) for elementary age youth⁴.

Considering the significant number of total waking hours youth spend at school and in school-related activities, the Institute of Medicine (IOM)⁵ highlights how schools are excellent environments to promote healthy behaviors such as participation in regular physical activity.

Unfortunately only about half of youth are reported to meet the current Physical Activity Guidelines for Americans' recommendation of at least 60 minutes of daily vigorous or moderate-intensity physical activity⁵.

The research agenda investigating the impacts of regular physical activity on cognition, academic performance and academic achievement continues to be understudied, however

promising findings from the IOM document positive associations between participation in regular physical activity and brain health⁵. Physical activity can have both immediate and long-term benefits on academic performance and academic achievement. Youth are often better able to concentrate on classroom tasks, which can enhance learning immediately after a bout of physical activity. Physical activity can have both immediate and long-term benefits on academic performance. Recent research disseminated by Active Living Research supported by the Robert Wood Johnson Foundation revealed that almost immediately after participating in physical activity, children are better able to concentrate on classroom tasks, which can enhance their learning⁶. As youth continue to participate in developmentally appropriate physical activity, their improved physical fitness can possibly have positive effects on academic outcomes⁶. Furthermore there is little to no evidence that increased physical education time negatively impacts academic achievement⁷.

Less than 4% and 8% of US public elementary and middle schools, respectively, provide daily physical education⁸. These low percentages limit the availability of data to identify all of the potential associations between physical activity, and a variety of cognitive measures. Nonetheless, available data from recent studies highlighted by the IOM⁵, Active Living Research⁶ and the Centers for Disease Control and Prevention (CDC)⁹ substantiate that physically active and physically fit children have greater academic performance, academic achievement and enhanced cognition compared to their less active peers. Furthermore, 11 of the 14 studies described in the CDC's report had at least one positive association between physical education and academic outcomes including tests scores and grades. Equally as important to these findings were increased time devoted to physical education did not adversely affect academic outcomes regardless of less time spent on core classroom curriculum⁹.

The Year 6 and longitudinal findings (2010-2015) are consistent with this growing body of evidence.

Participants

Seven hundred and sixty-seven (N=767) students at Legacy Charter School in Year 6 participated in the present study. Two Title I schools were identified as controls (N=571). In previous study years oversampling techniques were utilized to identify a comparison sample of students for both controls similar to Legacy Charter School's demography. In the present study year (i.e., Year 6) the diversity of Legacy Charter School increased, thus all participants in grades 2-8 from Legacy and controls participated in the present study.

Cognitive Findings

- Legacy Charter elementary and middle school students observed a significant increase on 75% of the cognitive measures (i.e., Fluid Intelligence) compared to 45% for control school students in Year 6.
- Legacy Charter elementary school students observed a significant increase on 75% of the cognitive measures (i.e., Perceptual Speed) compared to 0.00% for control elementary school students in Year 6.

- Legacy Charter school males and females observed significant gain increases on 3 of 10 (30%) SPM Fluid Intelligence Sections, compared to 0 of 10 (0.00%) for controls from 2010-2015.
- Legacy Charter middle school students observed significant gain increases on 3 of 5 (60%) SPM Fluid Intelligence Sections, compared to 0 of 5 (0.00%) for controls from 2011-2015.
- Legacy Charter elementary school students observed significant gain increases on 4 of 4 (100%) Perceptual Speed sections (including Total Perceptual Speed), compared to 0 of 4 (0.00%) for controls from 2013-2015.
- Examination of the Perceptual Speed data by age found that Legacy Charter school students observed significant gain increases in Perceptual Speed for 8, 10 and 11 year old students compared to only 12 year old students for controls from 2013-2015

Fitness and Physical Activity Findings

- Legacy Charter School students observed significant improvements on 100% of the fitness measures compared to 0% for control school students in Year 6.
- Legacy Charter elementary school females significantly improved on (3 of 3) 100% of the fitness measures in Year 6.
- Legacy Charter elementary school males significantly improved on (3 of 3) 100% of the fitness measures in Year 6.
- Legacy Charter middle school females and males significantly improved on (6 of 6) 100% of the fitness measures in Year 6.
- Control school students observed a 50% decrease on selected fitness measures in Year 6.
- Control elementary school females observed decreases on (2 of 3) 66% of the fitness measures in Year 6.
- Control elementary school males observed decreases on (2 of 3) 66% of the fitness measures in Year 6
- Control middle school females observed decreases on (1 of 3) 33% of the fitness measures in Year 6.
- Control middle school males observed decreases on (1 of 3) 33% of the fitness measures in Year 6.
- Legacy Charter middle school students observed significant gain increases (3 of 3; 100%) in PACER, muscular strength, muscular endurance from 2010-2015 compared to (0 of 3; 0.00%) for control middle school students.
- Legacy Charter elementary and middle school males observed significant gain increases (6 of 6; 100%) in PACER, muscular strength, muscular endurance from 2011-2015 compared to (0 of 6; 0.00%) for control middle school males.
- Control elementary school males and females observed significant gain decreases (6 of 6; 100%) in PACER, muscular strength, muscular endurance from 2011-2015.
- Control middle school males and females observed significant gain decreases (6 of 6; 100%) in PACER, muscular strength, muscular endurance from 2011-2015.
- Legacy Charter elementary school students accumulated 9,475 steps in a typical week during physical education in Year 6.

- Legacy Charter middle school students accumulated 13,310 steps in a typical week during physical education in Year 6.
- Control elementary school students accumulated 1,661 steps in a typical week during physical education, since control elementary school students only received physical education once per week in Year 6.
- Control middle school students accumulated 10,785 steps in a typical week (fall semester only) in physical education during Year 6.

Body Composition Findings

- The percentage of obese Legacy Charter middle school males significantly decreased in Year 6.
- BMI percentile decreases among Legacy Charter elementary school females and males were significant in Year 6.
- BMI percentile increases were considerably greater among control school females compared to Legacy Charter school females from 2011-2015(9.86 vs. 3.68).
- For control school elementary students the BMI increase was significantly greater compared to Legacy Charter school elementary students from 2011-2015 (6.29 vs. 1.34).



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