

# Relationships Between Specific Health-Related Fitness Components and Standardized Academic Achievement Tests

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## Abstract

Guided by self-efficacy theory, this study assessed the impact of optimal versus minimal physical fitness on student academic achievement. Independent variables were optimal and minimal physical fitness based upon completing 6 or 5 FITNESSGRAM components, respectively. Optimally fit students scored significantly higher ( $p < 0.05$ ) in math and ELA tests.

## Problem

In an attempt to increase student academic achievement, districts have decreased student physical activity and physical education time during the school day to make room in the curriculum for more core academic class time. Research suggests that this may be counterintuitive to the improvement of student academic achievement scores. As Southern California academic achievement scores continue to decline, so do physical education programs in all grades. With this decline also comes the decline in quality physical fitness promotion opportunities in our students.

## Purpose

The purpose of this study was to investigate how optimal and minimal physical fitness relate to the California Standards Test (CST) achievement test performance in math and English Language Arts (ELA).

## Relevant Literature

Members of the National Association for Sport and Physical Education (NASPE) advocate for quality daily physical education programs for all students. They have also stated that reducing physical education in schools is detrimental to the health of the nation's students, their capacity to learn, and the economic health of the nation as a whole (NASPE, 2013).

Ismail and Gruber (1967) attempted to develop a fitness test that would predict IQ. The authors found that there was no correlation between the physical fitness improvement program and IQ; however, a large improvement was seen in certain subject areas of academic achievement scores.

Grissom (CDE, 2003) and his repeated study (Grissom, 2005) found that the higher the number of physical fitness tests a student passed, the higher the students also scored academically.

Roberts et al. (2008) found that for each additional minute slower than the aerobic fitness standard for the mile run, reading decreased by 1.1 points, and math achievement decreased by 1.9 points out of a possible 99 total points. Increasing quintiles of BMI were correlated with progressively lower academic scores in each achievement test.

Many authors have since shown that there is a positive relationship between academic achievement and physical fitness, though the direction of causation remains elusive

## Research Questions

**RQ1:** Are there significant differences in academic achievement in the areas of math and/or ELA between optimal and minimal physical fitness levels?

**RQ2:** If RQ1 is true, are there significant differences in academic achievement in the areas of math and/or ELA within the minimal fitness group based on any specific weakness

## Procedures

### Design

This was a correlational study using *t*-test, ANOVA, and ANCOVA in order to assess for differences between groups.

### Sample

5416 ninth graders from the same school district in San Diego, California who passed at least 5 of the 6 FITNESSGRAM tests and took both California Standards Tests (CSTs) in math and English Language Arts (ELA).

### Instrumentation

The CSTs in math and ELA were used as the academic achievement indicators for this study. The FITNESSGRAM was utilized as the physical fitness test in this study.

### Procedure

Academic score and FITNESSGRAM data were obtained and compiled from the school district database using a query for physical fitness variables, CST variables, gender, and ethnicity. Scores were collected from 5416 ninth grade students whom either passed all six FITNESSGRAM tests (optimally fit) or any five FITNESSGRAM tests (minimally fit). All academic achievement scores were scaled to *t* scores with a mean of 50 and standard deviation of 10.

## Data Analysis

An independent samples *t*-test was performed to determine if there was a significant difference between minimal and optimal fitness with regards to academic achievement.

ANOVA was utilized to determine if differences within the minimal fitness group was attributed to any specific fitness test weakness.

Further analyses were performed by separating gender and ethnicity via ANCOVA.

## Findings

Academic achievement scores in math and ELA were significantly different between optimally and minimally fit students ( $p < .05$ ).

Significant differences were observed within the minimal fitness group based upon weakness category ( $p < .05$ ).

Further analysis revealed some additional insights.

- Girls trended toward higher scores than boys in ELA in minimally fit groups as well as the optimally fit group.
- Girls also trended toward higher scores than boys in math.
- Sporadic differences in both math and ELA were observed regarding ethnicity as the covariate, but was not statistically significant.

## Limitations

The sample may not have been completely representative of other school districts, counties, or states

As groups were further delineated by ethnicity and gender, it became statistically unfeasible to calculate differences within specific groups due to diminishing group sample totals.

## Conclusions

Optimally fit students tended to perform better than minimally fit students in both the math and ELA CST. Differences appear between genders as well. Differences appear within the minimally fit group with regards to academic achievement. Optimal physical fitness showed the greatest influence concerning academic achievement regardless of gender or ethnicity.

## Social Change Implications

These outcomes may contribute to positive social change in that healthy and successful students become more productive and health-conscious citizens of society as they become adults.

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