



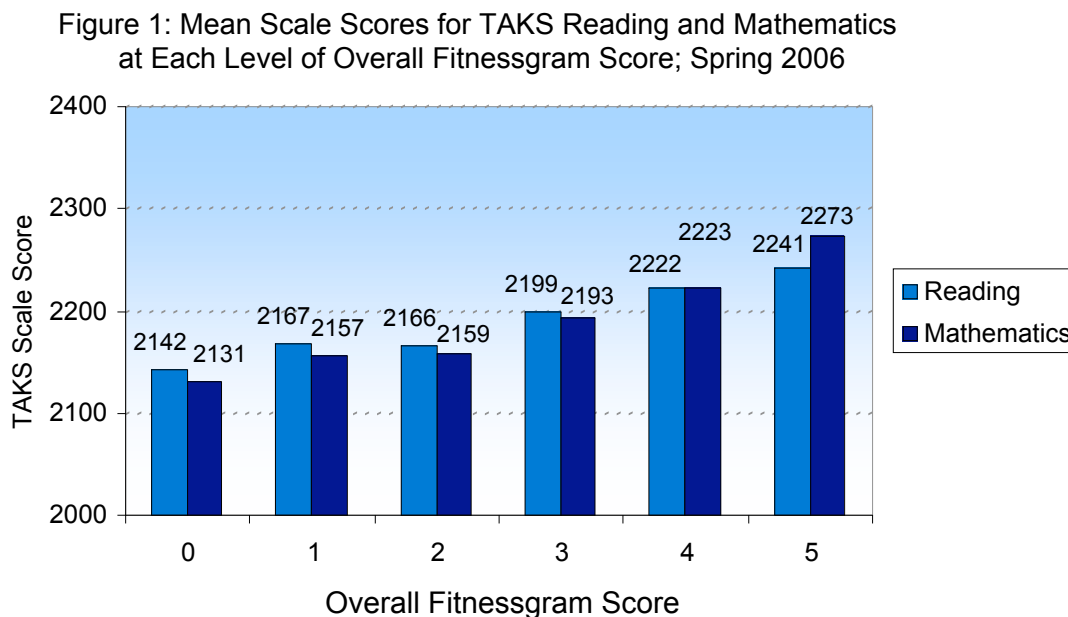
Question: *Is Physical Fitness Related to Academic Achievement?*

Response:

Results of analyses indicate that, for Austin ISD students in grades 5 and 7, there is a small positive association between physical fitness, as measured by the Fitnessgram, and academic achievement, as measured by the Texas Assessment of Knowledge and Skills (TAKS). The Fitnessgram measures body composition, aerobic capacity, abdominal strength, upper body strength, and flexibility.

An overall Fitnessgram score, equal to the total number of standards met in the five areas assessed, was calculated. Students with missing data were excluded from analyses. The Fitnessgram scores were correlated with TAKS Reading and Mathematics scale scores. The resulting correlations were low ($.20$, $n=8189$ for reading and $.15$, $n=8173$, for math) but significant at the $<.001$ level.

To investigate further the relationship between fitness and achievement, TAKS mean scale scores at each level of fitness (0-5) were calculated. As shown in Figure 1, the higher the overall fitness score, the higher the scale score for reading or math¹.



Additional analyses investigated whether this relationship varied across level of family income as indicated by student eligibility for free- or reduced-price lunch. For non-low income students, the modest but statistically significant relationship between reading and mathematics achievement and fitness level remained ($r=.17$ and $r=.22$, respectively; $p<.001$). However, for low-income students there was much less of a relationship between fitness and achievement ($r=.05$ for reading and $r=.11$ for math, $p<.001$). See Figures 2 and 3.

¹ Please note: the range of TAKS scale scores on the x-axis is restricted to 400 points.

Figure 2: Mean TAKS Reading Scale Scores for Low-Income and Non-Low Income Students at Each Level of Overall Fitnessgram Score; Spring 2006

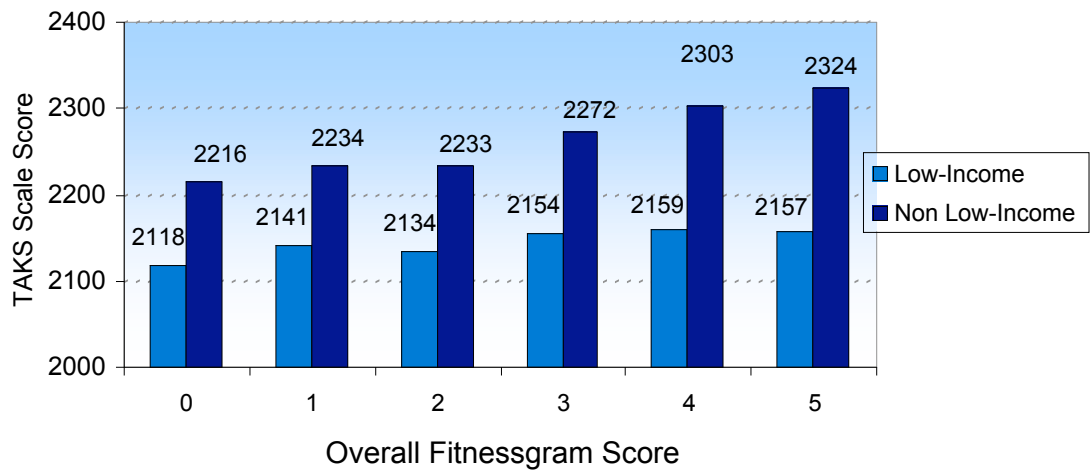
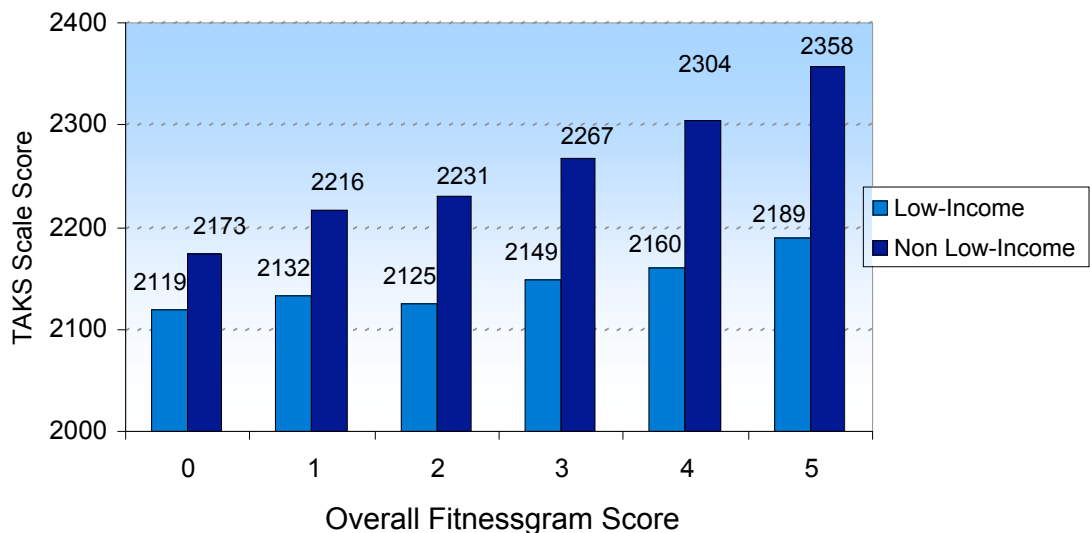


Figure 3: Mean TAKS Mathematics Scale Scores for Low-Income and Non Low-Income Students at Each Level of Overall Fitnessgram Score; Spring 2006



For students from a low-income family, the relationship between fitness level and academic achievement is less apparent. A student from a low-income family, regardless of fitness level, is more likely than a student from a non low-income family to have low TAKS scores. However, a student from a low-income family, who is more fit, is slightly more likely to have a higher TAKS Mathematics scale score than his or her less-fit counterpart. (Increased variability makes the relationship more apparent in mathematics scores.) Finally, for a student who does not come from a low-income family, fitness is related to academic achievement: the fitter the student, the higher that student's level of academic achievement.

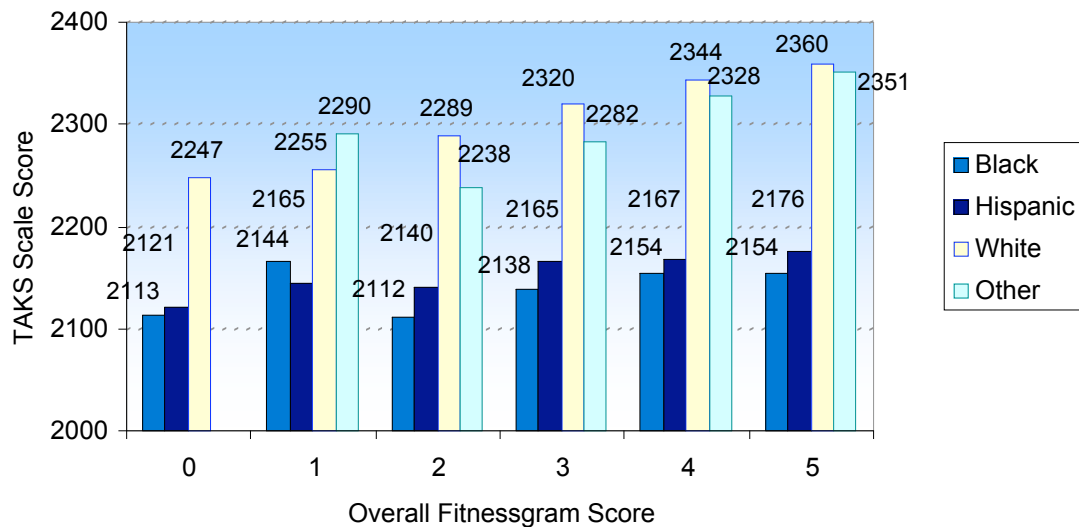
The relationship between fitness level and academic achievement for students of different ethnicities was investigated. Correlations between TAKS Scale Score and Overall Fitnessgram Score for each ethnicity are provided in Table 1. As shown in Figures 4 and 5, the direction of the relationship remained the same but the relationship was less apparent in ethnicities other than White (and Other for reading, only).

Table 1: Correlation* of TAKS Reading and Mathematics Scale Scores with Overall Fitnessgram Score by Ethnicity²

Ethnicity	Reading	Mathematics
Black	r=.05	r=.13
Hispanic	r=.04	r=.12
White	r=.17	r=.22
Other	r=.21	r=.14

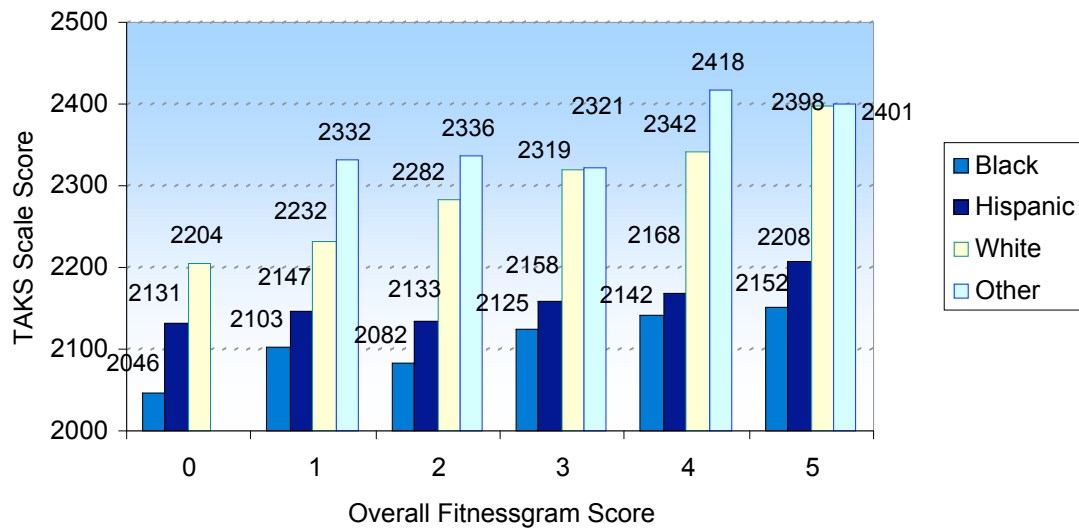
*p<.001 for each correlation

Figure 4: TAKS Reading Mean Scale Scores at Overall Fitnessgram Score Levels by Ethnicity²



² The category of other includes American Indian, Asian, and Pacific Islander.

Figure 5: TAKS Mathematics Mean Scale Scores at Overall Fitnessgram Score Levels by Ethnicity³



The relationship between fitness level and achievement by gender was investigated, as well. Correlations between TAKS Reading and Mathematics Scale Score and Overall Fitnessgram Score for male and female students are provided in Table 2. Although the correlations are low, as shown in Figures 6 and 7, the relationship is positive and significant for males and for females. Also, the relationship tends to be more pronounced for females than males and more pronounced in mathematics for both groups.

Table 2: Correlation* between TAKS Reading and Mathematics Scale Score and Overall Fitnessgram Score by Gender

Ethnicity	Reading	Mathematics
Male	r=.12	r=.17
Female	r=.18	r=.22

*p<.001

³ The category of other includes American Indian, Asian, and Pacific Islander.

Figure 6: TAKS Reading Mean Scale Scores at Overall Fitnessgram Score Levels by Gender

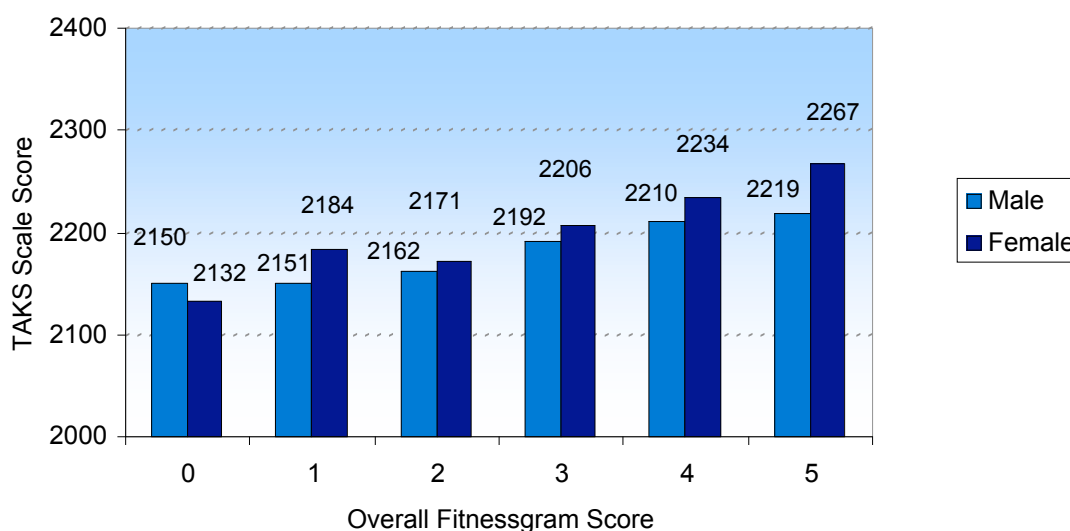
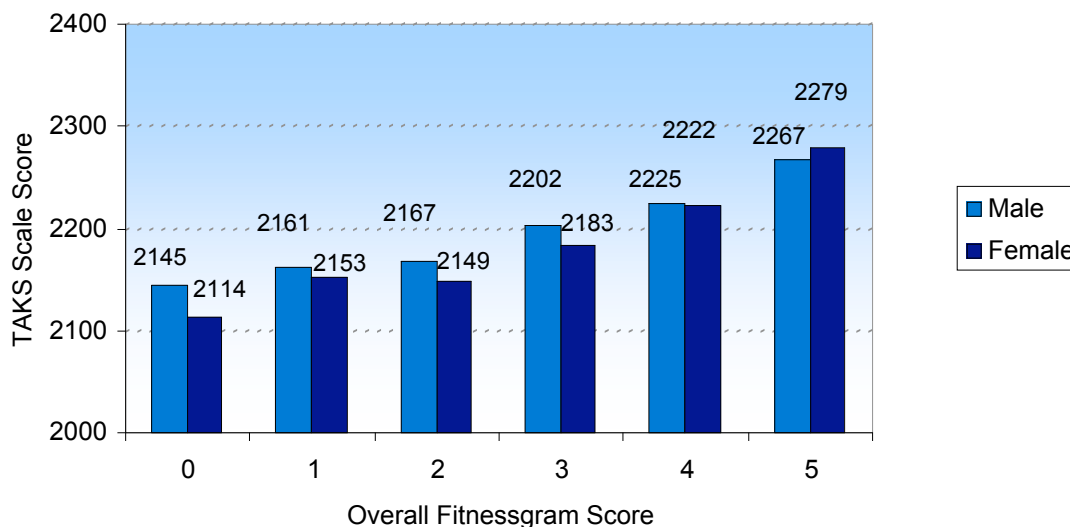


Figure 7: TAKS Mathematics Mean Scale Scores at Overall Fitnessgram Score Levels by Gender



Summary and Conclusions

For Austin ISD grade 5 and grade 7 students there is a modest relationship between fitness and academic achievement. This relationship varies by level of income, ethnicity, and gender but persists across all areas. It is most pronounced in non-low-income, white, and female student groups and is more apparent in mathematics than in reading. However, the relationship is overshadowed by the stronger relationship between level of income and academic achievement.