



The Effects of Texas Fitness Now and Student Health and Achievement

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What We Studied

There is growing evidence that physical education (PE) has health and education benefits for elementary-aged children, yet much less is known on the effectiveness of such programs for older children.

In this study, we focus on the effects of PE on adolescents by analyzing the impact of Texas Fitness Now (TFN), a four-year \$37 million grant program that mandated daily PE for middle-school students in low-income schools. To identify effects, we leverage the cutoff in school eligibility and compare student outcomes in a regression discontinuity design. We find that daily PE mandates do not lead to overall improvements in student fitness, including cardiovascular endurance, strength, and flexibility, as measured by the FITNESSGRAM© test administered in the spring. While we find that the program was ineffective at changing average student body composition or fitness, additional estimates indicate a reduction in the proportion of obese students.

Using individual-level school records from the Texas Education Research Center, we also show that TFN did not lead to positive spillover effects in the classroom, including improvements in standardized test scores, attendance, or student misbehavior. Instead, we provide some evidence to suggest that daily PE mandates reduce attendance and increase disciplinary incidents for middle-school students.

Childhood obesity has continued to rise in the United States over the past few decades and is becoming an urgent issue. This is particularly relevant in low-income households where children experience obesity at twice the rates than their higher-income counterparts (Center for Disease Control 2019).

The CDC and White House recommends regular physical activity as a way to combat obesity, and schools are uniquely positioned to help address this in children. Indeed, physical education in elementary schools is shown to be effective for young children (e.g., Cawley, Frisvold, and Meyerhoefer 2013). However, it is unclear how effective these programs are, particularly for middle school students.

In 2007, Texas enacted Texas Fitness Now (TFN), a grant program supporting physical education programs for middle schools with a focus on reaching low-income students. The goal was to improve child health outcomes with the potential for positive spillovers on student performance. The purpose of our study is to identify the effect of physical education programs in middle school on student fitness and achievement in the context of Texas Fitness Now.

The Texas legislature passed Texas Fitness Now in 2007, which at the time was the second-largest physical activity grant program in the United States. Total funding was roughly \$37 million for the program over the four years with the average funding per school being \$11,000, shown in Table 1. Middle schools comprised of at least 75% (60%) of economically disadvantaged students in the prior school year were eligible to apply for the grant in the first (last) two years of the program. Texas Fitness Now required PE for at least 30 minutes per day (or 225 minutes every two weeks if on a block schedule) for schools receiving these funds.

Table 1: Texas Fitness Now Funding Schedule

School Year	ED Cutoff	Schools Eligible	Amount Granted
2007-2008	75%	605	\$10,000,000
2008-2009	75%	575	\$9,378,914
2009-2010	60%	981	\$8,875,670
2010-2011	60%	1125	\$8,500,000

Notes: Data on TFN funding and grantee awards is from the Texas Education Agency, Grants Division. “ED cutoff” represents the percent of economically disadvantaged students required in the previous school year to be eligible for TFN funding.

How We Analyzed the Data

It is difficult to disentangle the causal impact of physical fitness investments for several reasons. First, student outcomes reflect general changes in trends over time, which makes pre-post comparisons difficult to interpret or attribute to a specific program. Second, schools often apply or opt into these programs creating selection concerns as schools with more motivated faculty, parents, or students may be more likely to participate in TFN as well as other school initiated activities.

To isolate the causal impacts of TFN, we use a design feature of the policy that required schools to have above a particular threshold of economically disadvantaged students, shown in Table 1. The idea is that schools are similar just on either side of the cutoff in terms of overall funding, student performance, and demographics, which we can empirically verify. Additionally, other characteristics that may be unobservable to researchers are also likely smooth through this threshold, such a faculty motivation. Since nothing changes across this specific cutoff other than grant eligibility, any discontinuous jumps in outcomes across the threshold during program years can be attributed to grant funding.

Given the two thresholds, we “stack” the cutoffs by normalizing each threshold to zero and tracking distance from the threshold. In our primary estimates, we allow schools within 15 percentage points on each side of the threshold to be included. This strategy is implemented through the following equation:

$$Outcome_s = \theta EDcutoff_s + f(EDpct)_s + \lambda_t + \psi_g + \psi_s \quad (1)$$

where outcomes of interest include the average measure of student fitness for school s , or academic performance, attendance, and discipline outcomes for student s . EDcutoff is an indicator for whether a school s meets the eligibility requirements for the given year, as defined in the 2006-2007 school year prior to the start of the program. Thus, θ measures any discontinuous jump at the threshold and identifies the effect of the program. Differences across years and grades are controlled for by year and grade fixed effects, λ_t and ψ_g .

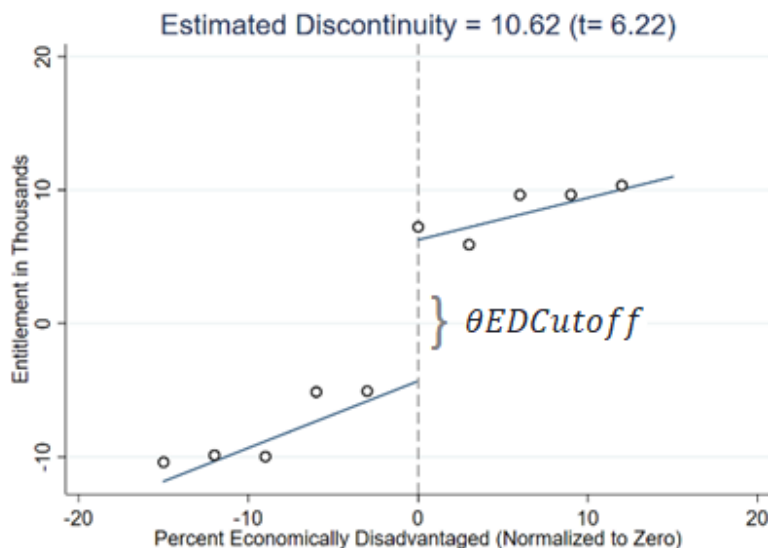
We use data from the FITNESSGRAM© test administered in the spring of each school year to Texas middle schools measuring BMI, aerobic capacity (pacer test or mile run), strength (push-up and sit-up test), and flexibility (sit and reach test) aggregated by school, grade, and gender. For educational outcomes, we use student-level data from the Education Research Center on reading and math TAKS performance, attendance, and disciplinary infractions. The primary sample used for this analysis includes Texas students in grades 6, 7, or 8 during the four years of the program in schools existing in the 2006-2007 school year, the year prior to the start of TFN.

What We Discovered

First, we document that the threshold was used when allocating grant resources. Schools on the left side of the threshold had a high proportion of economically disadvantaged students enrolled, but not enough to meet the grant eligibility. Schools just to the right of the threshold were very similar in a variety of ways, including student

composition, but were much more likely to receive grant funding due to being above the eligibility threshold, as shown in Figure 1. Specifically, we estimate an average increase of \$11,000 in grant funding for eligible schools.

Figure 1: Entitlement in Thousands of Dollars



Notes: Funding data for the Texas Fitness Now (TFN) program from 2007–2011 is from the Texas Education Agency, grants division. Entitlement is calculated as the total grant allowance per school year. Each figure plots means of residuals (after differencing out year and grade fixed effects) in 3 percentage point bins and linear fits of the outcome listed. “Estimated Discontinuity” reports Θ as specified in Equation 1. The sample includes all Texas schools with students in grades 6, 7, and/or 8.

In a similar manner, we compare outcomes of students in schools just to the left of threshold outcomes of students in schools just to the right of the threshold. The variable %ED>cutoff measures the discontinuous jump in outcomes attributable to TFN eligibility. For space, we report the estimated coefficients in Table 2, although the corresponding graphs similar to Figure 1 are reported in the published manuscript.

Table 2: Effects on Student Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)
	Healthy BMI	Number of Tests Passed	Math TAKS	Reading TAKS	Attendance Rate	Total Disciplinary Incidents
%ED> Cutoff	-1.22	-0.00	0.004	0.003	-0.003**	0.149*
Standard errors	(0.77)	(0.04)	(0.010)	(0.006)	(0.001)	(0.090)
N	3473	3555	1,289,442	1,289,364	1,297,023	1,299,744

*Notes: *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. Each coefficient is generated by a separate regression of Equation 1 using the listed outcome as the outcome variable, controlling for year and grade fixed effects.*

We use BMI and the number of fitness tests passed as measures of student fitness, recognizing that it may be easier to improve on fitness tests than achieve meaningful changes in BMI through physical education. We find that the program did not improve fitness on average, as shown in Columns 1 and 2. And, we can rule out even small increases, effects larger than 0.46% and 1.9%, in the proportion of students reporting a healthy BMI or in the number of fitness tests passed, respectively. Although, we report evidence of a reduction in the number of obese students in the paper, indicating that TFN may have improved fitness for some of the heaviest students.

Additionally, we do not find that TFN created positive spillovers in the classroom as measured by an increase in students meeting the TAKS standard of passing, as shown in Columns 3 and 4. Similarly, we do not find an increase in students achieving commended recognition on TAKS or an increase in the number of questions answered correctly, which is shown in the paper. Notably, the estimates on math and reading pass rates are precise enough to rule out effects larger than 0.56% and 0.36%, respectively. Rather, additional evidence suggests unintended consequences of daily physical education mandates.

Specifically, we find a reduction in the attendance rate and an increase in the number of disciplinary incidents in Columns 5 and 6, with similar increases in the proportion of students disciplined and the numbers of days suspended also shown in the paper. These estimates correspond to a 0.31% decrease in attendance, and a 15% increase in disciplinary incidents.

Policy Recommendations

To the extent that we can extrapolate the effects of Texas Fitness Now, these findings can provide insight into the effects of physical education programs in low-income middle schools that require daily attendance more broadly. Specifically, TFN did not lead to overall improvements in fitness or student performance, and may have had unintended consequences in the form of reduced attendance and increased disciplinary infractions.

It is possible that the dynamics of middle school aged children such as changing interests, puberty, and/or bullying could be channels through which physical education is not as effective for middle school students, although disentangling these mechanisms is outside the scope of this paper.

Finally, we note that we are analyzing schools with a high proportion of economically disadvantaged students, which is ideal for speaking to policies that often target disadvantaged populations; however, it does not necessarily represent the effect for other schools.

The full version of this published paper is available online at: <https://doi.org/10.1016/j.econedurev.2019.04.003>.

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