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Public disclosure to improve physical education in an urban school district: results from a 2-year quasi-experimental study

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Abstract

BACKGROUND—Many elementary schools have policies requiring a minimum amount of physical education (PE). However, few schools comply with local/state PE policy and little is known about how to improve adherence. We evaluated changes in PE among 5th-grade classes, following participatory action research efforts to improve PE quantity and policy compliance that focused on publically disclosing PE data.

METHODS—Data were collected at 20 San Francisco public elementary schools in the spring of 2011 and 2013. PE schedules were collected and PE classes were directly observed (2011, N = 30 teachers; 2013, N = 33 teachers). Data on the proportion of schools meeting state PE mandates in 2011 were shared within the school district and disclosed to the general public in 2012.

RESULTS—From 2011 to 2013, PE increased by 11 minutes/week based on teachers' schedules (95% CI: 3.0, 19.6) and by 14 minutes/week (95% CI: 1.9, 26.0) based on observations. The proportion of schools meeting the state PE mandate increased from 20% to 30% ($p = .27$).

CONCLUSIONS—Positive changes in PE were seen over a 2-year period following the public disclosure of data that highlighted poor PE policy compliance. Public disclosure could be a method for ensuring greater PE policy adherence.

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Human Subjects Approval Statement

SFUSD's Research Department and the UC San Francisco and UC Berkeley Institutional Review Boards approved all study procedures.

Keywords

physical education; policy compliance; public disclosure; physical activity

Physical education (PE) has been identified as a primary public health tool for increasing youth physical activity levels.¹⁻⁴ PE offers students of all abilities and backgrounds the opportunity to be physically active and to obtain the skills and knowledge needed to facilitate a lifetime of physical activity.^{5,6}

In 2012, 44 states (86%) had education policy mandating the minimum PE minutes students should receive.⁷ In California, the state with the largest number of public school students, education policy mandates elementary students receive 200 minutes of PE every 10 days.⁸ However, PE policy compliance is low, both nationally and in California, particularly at the elementary level.⁹⁻¹⁵

Little is known about how to increase schools' compliance with PE policies. PE-related research to date has largely focused on increasing the percent of PE class-time spent in moderate-to-vigorous physical activity (MVPA).¹⁶⁻¹⁸ However, even if interventions to increase MVPA during PE are efficacious, they may contribute little to students' overall health if PE occurs infrequently.^{19,20}

One method that has been used to promote policy compliance is public disclosure. Public disclosure involves identifying information that is not widely known (often behavior that is inconsistent with a desirable target) and releasing it to the public.^{21,22} Public disclosure has been used successfully in the healthcare setting to promote greater adherence to guidelines,²³⁻²⁶ and has been used (though not tested) in the school setting regarding teacher performance.²⁷⁻²⁹ Whereas no known research has focused on the effect of public disclosure on PE-policy compliance, shining a public light on non-compliance could motivate districts and schools to implement required PE minutes.

To improve PE and PE policy compliance in the San Francisco Unified School District (SFUSD), the school district, the Department of Public Health, and a research university formed a strategic alliance. The alliance used participatory action research methods,³⁰ including deliberate power sharing and shared decision making to set a course of action. The alliance chose collecting local data on PE policy compliance as its initial step. An observational study conducted in 2011 demonstrated that 80% of elementary schools in the sample were not meeting the state PE mandate based on classroom teachers' weekly PE schedules.³¹ The alliance then elected to disseminate the study results through reports and a press release, which resulted in newspaper, TV, and radio coverage.³²⁻³⁵ In reflecting on the participatory action research, alliance members cited the public disclosure of PE data as an important tool for increasing priority and funding for PE.³⁶

The present study sought to evaluate changes in 5th-grade PE from 2011 to 2013, following the participatory action research efforts that publicly disclosed local PE data in SFUSD. Specific outcomes included scheduled and observed minutes of PE per week, as well as the proportion of schools meeting the state PE mandate.

METHODS

Setting

The study took place in SFUSD, an urban district with nearly 56,000 students, 88% of whom are non-white and 60% of whom qualify for free or reduced price meals³⁷ (Table 1).

Design

In this single group, pre-post study, baseline data were collected in the spring of 2011 (Time 1), public disclosure took place between August 2011 and March 2012, and follow-up data were collected in the spring of 2013 (Time 2).

Sample

School selection—Twenty of 72 elementary schools were selected for study inclusion in 2011 using stratified random selection based on the presence of a PE specialist (a district-provided PE teacher holding a teaching credential with a specialty in PE and approximately 70 hours of district-led PE professional development annually).³¹ All principals at schools selected for inclusion agreed to participate at both Times 1 and 2.

Teacher selection—Researchers observed PE classes for up to 3 teachers at each study school. Three types of adults led PE (hereafter called PE leaders): PE specialists; classroom teachers (holding a multi-subject teaching credential but little to no PE-specific training); and/or PE consultants (no teaching credential but training in leading school-based physical activity). Details on teacher selection have been described previously.³¹ In short, PE leaders at each school were sampled to ensure that at least one of each type was observed. If a PE leader was observed at Time 1 and was still teaching in the school at Time 2, s/he was observed at Time 2.

Procedures

PE schedules—If available, researchers obtained school-level PE master schedules, which contained PE times for all classes in the school. Eleven schools had master PE schedules at both Times 1 and 2. Two schools had a master schedule at Time 1 only, 4 schools at Time 2 only, and 3 at neither time. Additionally, researchers contacted *all* 5th-grade classroom teachers individually to obtain their classroom's PE schedule. At Time 1, there were 5 5th-grade classroom teachers who did not have a PE schedule; all 5th-grade classroom teachers had a PE schedule at Time 2. The California state PE mandate⁸ specifies PE minutes per 10-day period. All PE schedules in study schools were kept on a weekly basis, so data herein are reported by week.

PE class observations—For each PE leader selected for study participation, researchers attempted to observe PE classes on 3 randomly selected days on which PE was scheduled. If a PE class did not occur as scheduled, the class was considered a “no-show,” and researchers returned on another random day to observe PE. Classes that did not occur because of rain or standardized testing were not counted as no-shows. Observing 3 classes per PE leader occasionally required the scheduling of observations ahead of time (N = 8 at Time 1; N = 4

at Time 2). PE observations that were arranged ahead of time were not included in the denominator for no-shows.

Measures

SOFIT—The System for Observing Fitness Instruction Time (SOFIT)³⁸ was used to collect data on observed PE class length and proportion of class in MVPA. Briefly, observers coded activity levels of 4 randomly selected students (2 girls and 2 boys) using momentary time sampling (10-second observation, 10-second record intervals) for the entire PE class. Activity levels coding for moderate and vigorous physical activity have been validated using pedometry³⁹ and accelerometry.⁴⁰ All trained data collectors achieved at least 90% agreement in individual interval scoring with the lead observer during 2 separate observations prior to commencement of data collection. The observed class length (the number of minutes that PE actually occurred, with observations beginning when 50% of students had entered the PE area and stopping at the class's termination, per SOFIT protocol) was recorded.

Public Disclosure

As part of the participatory action research process, the research partners shared findings from Time 1 with the strategic alliance in June 2011. The alliance partners discussed results and identified key talking points, as well as the appropriate process and context for presenting and disseminating results. The alliance then shared results within the school district (Board of Education, top district administrators, and teachers and principals) through meetings, reports, and presentations from August 2011 through March 2012. Through an iterative writing and editing process, the alliance published a report on the study results in February 2012.⁴¹ A press release was used to disclose publically the study results in March 2012, which resulted in local media coverage.^{32–35}

Data Analysis

Linear mixed models were used to examine change in the primary outcomes of scheduled minutes of PE/week (based on classroom teachers' and master schedules – models 1 and 2) and estimated minutes spent in PE per week (based on observations – model 3). No-shows were factored into model 3 as follows: if a PE leader had a “show” proportion of 75% (3 of 4 classes occurred as scheduled) and 100 minutes of scheduled PE/week, her actual PE was estimated to be 75 minutes/week. Logistic mixed effects models were used to estimate the proportion of classroom teachers and schools meeting California's PE mandate (models 4 and 5). A school was determined to meet the state PE mandate if, on average, 5th-grade classroom teachers at that school provided 200 minutes of PE per 10 days on their schedule. Models included random effects for school (models 1, 2, 4 and 5) and classroom teacher (models 2 and 4), and crossed random effects for school and PE leader (model 3).

Secondary analyses included examining the observed proportion of lesson time in MVPA (based on SOFIT) using linear mixed models including crossed random effects for school and PE leader. All analyses were performed using Stata/IC version 13.1 (StataCorp LP, College Station, TX).

RESULTS

School-level demographics did not differ between study and other elementary schools in SFUSD. SFUSD elementary schools have lower enrollment and a greater proportion of African-American students and Asian-American students than California elementary schools in general (Table 1).

Researchers observed a total of 30 PE leaders (91 class observations) at Time 1 and 33 PE leaders (101 class observations) at Time 2. Of the 30 PE leaders observed at Time 1, 16 were observed at follow-up. At both times nearly half of PE leaders were women and had an average of 8 years of teaching experience.

According to classroom teachers' PE schedules, PE increased by 11.3 minutes/week between Times 1 and 2 (95% CI: 3.0, 19.6; Table 2). At Time 1, 15% of classroom teachers met the PE mandate versus 37% at Time 2 ($p = .03$). Based on the average of classroom teachers' schedules across schools, the number of *schools* meeting the PE mandate increased from 20% to 30% between Times 1 and 2 ($p = .27$). Based on master schedules, however, there was an 11-minute decrease in the number of weekly PE minutes, though this difference was not statistically significant (Table 2). Of schools with master schedules, 10 of 13 (77%) met the PE mandate at Time 1 and 8 of 15 (53%) met the mandate at Time 2.

Based on PE-class observations (taking no-show averages of 21% at Time 1 and 14% at Time 2 into account), the estimated minutes spent in PE increased from 56.5 to 70.0 minutes per week (95% CI for change: 1.9, 26.0).

The proportion of observed lesson time students spent in MVPA increased from 54% at Time 1 to 61% at Time 2 (95% CI for change: 3%, 10%). At both times, students spent more than the recommended 50% of class time in MVPA.

DISCUSSION

The purpose of this study was to evaluate changes in 5th-grade PE from 2011 to 2013, following participatory action research efforts that publicly disclosed local PE data. Over the 2-year period, daily minutes of PE in San Francisco schools significantly increased, as did the proportion of schools meeting California's PE mandate based on classroom teachers' PE schedules.

Whereas factors such as the absence of a control group limit our ability to draw causal inferences, this line of research is critically important to identifying successful methods for improving PE and increasing youth physical activity. In both school and community settings, advocates and practitioners are actively working towards implementing policy to change environments and create physical activity opportunities. Although PE policies exist in most states, adherence to those policies is inadequate, reducing their intended impact.^{7,10,11}

This is the first study known to examine the impact of public disclosure of local PE data on PE quantity and policy compliance. To date, most PE research has focused on observing

current PE practices,^{42–44} improving class quality when PE occurs,^{18,20,45} or examining associations between PE policies and schools' self-reported quantity of PE.^{46–48} Few studies have focused on PE policy compliance.

There have been attempts to increase PE policy compliance, but efforts have focused on a more litigious route.^{49,50} After a diverse coalition of stakeholders threatened litigation,⁴⁹ the Los Angeles Unified School District (LAUSD) passed a policy requiring its schools to meet the California PE mandate. Research conducted 2 years later demonstrated a 10-minute increase in PE-class duration in high-income elementary schools, but no increase among lower-income schools.¹² The results suggested that the LAUSD policy had not been implemented fully in all schools throughout the district, despite schools being required to have the policy requirements in place. Unequal implementation of policies is likely to worsen existing disparities in youths' access to PE.^{19,51}

Legal action may be a lengthy and expensive process and has the potential to alienate the very school-based allies needed to implement improvements in PE. In the case of *Doe v. Albany*,⁵⁰ a parent sued the Albany Unified School district for failing to meet the California elementary PE mandate and won, but the district publicly labeled the lawsuit a tremendous waste of school resources.⁵² As of yet, no published data on the impact of that lawsuit exist.

In a few medical field studies, the disclosure of performance data has been associated with improved health outcomes.²³ In the education setting, the *Los Angeles Times* published value-added rankings of teachers and schools in 2010 in an effort to improve school and teacher performance.²⁷ The validity and reliability of the statistical methods used to create the rankings were brought into question, however,⁵³ and the impact of the data disclosure was not assessed. In addition to questions related to data accuracy, public disclosure efforts have been criticized as at odds with the principles of quality improvement efforts.^{54–56}

As with most public health interventions, multiple process factors are likely to impact the success of disclosure efforts. Clearly, the appropriate stakeholders need to be at the table, including those directly involved with PE implementation and those advocating for PE from outside the district (ie, public health practitioners and community members). The ongoing collection or identification of data is necessary to assess progress and may be an important component of work to improve PE. To have a positive impact, disclosing data should not be done to shame schools, but instead to bring attention to the value of PE and to gain support for PE programs. With myriad competing priorities within schools, the voices of multiple advocates are likely needed to maintain a sustained focus on PE.

Limitations

Several limitations warrant comment. Although alliance partners have attributed the positive changes in PE to the collection and dissemination of local data,³⁶ it is unclear if these changes resulted directly from the public disclosure efforts or from other unidentified factors. Results might be different in a district with a PE department less invested than SFUSD in improving PE. The restriction to a single district and a relatively small sample may limit the generalizability of these results. However, the district's size and urban location make it comparable to many districts across the state and country. Finally, because this was

participatory action research, the intervention was not defined *a priori*; rather, it evolved through discussions within the alliance. Therefore, it is difficult to pinpoint the specific impact of any singular intervention component.

Conclusions

Continued attention to approaches that will both support schools in PE implementation and create accountability for mandated PE minutes is necessary. Significant positive changes in PE were seen over a 2-year period after the public disclosure of local data highlighting poor PE policy compliance. To the extent that this reflects the impact of public disclosure efforts, sharing PE-related data could be a method for increasing policy adherence. Rigorously evaluating the results of public disclosure efforts will be critical to developing a strong theory about how and if these efforts can be successful in improving PE.

IMPLICATIONS FOR SCHOOL HEALTH

Schools and teachers face tremendous pressure to comply with numerous educational standards and mandates. Simply passing PE policies, especially if they are under-funded and weakly evaluated, may not produce intended results; further action is required. Districts and schools need assistance in identifying practices that will ensure teachers are held accountable to mandated PE minutes, but also supported in implementing PE. Collecting and sharing PE-related data may be effective methods for ensuring increasing accountability and compliance. To improve PE and positively impact student health, disclosing data should not be done to embarrass schools, but instead, to highlight the value of PE and to garner support for teachers to ensure they receive the necessary support (be it PE teachers, equipment, evidence-based PE curriculum, and/or teacher trainings) to implement quality PE programming.

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Table 1

Baseline Demographic Characteristics, 2010–11 school year

Demographic Characteristics	Study Schools (N = 20)	Non-study SFUSD elementary schools (N = 52)	All CA elementary schools (N = 4450)	Study vs. non-study schools in SFUSD, p-value	Study vs. all CA schools, p-value
School enrollment, mean (SD)	391 (150)	370 (145)	565 (200)	0.60	< .01
Students eligible for free or reduced price meals, % (SD)	60 (22)	65 (24)	60 (30)	0.84	.74
Student race/ethnicity, % (SD)					
African American	12 (14)	13 (18)	7 (10)	0.85	.01
Asian	30 (29)	31 (26)	9 (14)	0.64	< .01
Latino	29 (25)	26 (26)	52 (30)	0.81	< .01
White	13 (11)	14 (14)	26 (24)	0.47	.04
Academic Performance Index base score, ^a mean (SD)	812 (92)	795 (103)	810 (75)	0.52	.93
Students in Healthy Fitness Zone for aerobic capacity, ^b % (SD)	63 (17)	61 (18)	62 (17)	0.67	.86

^a A California-wide measure of a school's academic performance and growth on a variety of academic measures. Possible scores range from 200 to 1000.

^b The state-wide fitness test, the FITNESSGRAM, uses Healthy Fitness Zones to evaluate fitness performance of 5th-graders. These zones are criterion-referenced standards and represent minimum levels of fitness for age and sex that offer protection against the diseases that result from sedentary living. Aerobic capacity reflects the maximum rate of oxygen uptake and use during exercise.

Table 2

Changes in SFUSD Elementary School Physical Education Minutes

	Time 1 (2011)		Time 2 (2013)		Change (From Time 1 to Time 2)	
	Mean ± SD	Range	Mean ± SD	Range	Mean	95% CI p-value
Scheduled minutes of PE/week						
<i>(based on school master schedules)^a</i>	98.3 ± 8.6	80 – 113	87.7 ± 34.3	30 – 175	- 10.6	-29.1, 7.9 .261
Scheduled minutes of PE/week						
<i>(based on classroom teacher's schedules)^b</i>	71.3 ± 34.4	15 – 175	82.6 ± 24.2	30 – 125	11.3	3.0, 19.6 .008
Estimated minutes spent in PE/week						
<i>(based on observations)^c</i>	56.5 ± 33.4	15 – 175	70.0 ± 29.9	0 – 125	14.0	1.9, 26.0 .023

^a Eleven schools had master schedules at Time 1 and Time 2; 2 schools had master schedules at Time 1 only; 4 schools had master schedules at Time 2 only; 3 schools had no master schedule. P-value for change in means assessed using a linear mixed effects model with random effects for school.

^b At Time 1, 5th-grade classroom teachers did not have a set PE schedule; all 5th-grade classroom teachers had a set PE schedule at Time 2. P-value for change in means assessed using a linear mixed effects model with random effects for school and PE leader.

^c Takes into account proportion of no-shows (times observer went to watch a randomly selected class and the class did not occur). The p-value for change in means assessed using a linear mixed effects model with random effects for school and PE leader.