

Bridging Public Health and Education: Results of a School-Based Physical Activity Program to Increase Student Fitness

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Shannon L. Barrett-Williams, PhD¹, Padra Franks, MPH¹,
Christi Kay, MEd¹, Adria Meyer, BA¹, Kelly Cornett, MS²,
and Brian Mosier, PhD, MS³

Abstract

Objective: Power Up for 30 (PU30) is a schoolwide intervention that encourages schools to provide an additional 30 minutes of physical activity during the school day, beyond physical education. The objective of this study was to evaluate the impact of PU30 on Georgia public elementary schools and their students.

Methods: A total of 719 of 1320 public elementary schools in Georgia that were sent a baseline survey about school physical activity during October 2013 to September 2014 completed the survey, 160 of which were asked to complete a second survey. In the interim (March to June 2015), half (80) of these schools implemented the PU30 program. The interim surveys, which were completed during March to June 2015, assessed opportunities for student physical activity and staff member professional development focused on student physical activity.

Results: Compared with schools that had not implemented the program, more schools using the PU30 program reported offering before- and after-school physical activity programs. Forty-four of 78 (57%) PU30 schools compared with 20 of 53 (38%) non-PU30 schools offered before-school physical activity programs. Likewise, more PU30 schools than non-PU30 schools offered after-school physical activity programs (35% vs 16%), and a greater proportion of students at PU30 schools compared with non-PU30 schools met fitness benchmarks: recess 5 days per week (91% [288 of 323] vs 80% [273 of 341]), offering ≥ 11 minutes per day of classroom-based physical activity (39% [53 of 136] vs 25% [47 of 189] for kindergarten through second grade; 20% [37 of 187] vs 6% [9 of 152] for grades 3 through 5), and receiving physical activity–related professional development time (42% [136 of 323] vs 14% [48 of 341]).

Conclusions: The surveys provided a statewide picture of the physical activity opportunities offered to students and staff members in Georgia elementary schools and demonstrated the effective use of a comprehensive, multicomponent program to offer more school-based physical activity opportunities and to improve student fitness.

Keywords

physical activity, youth, school

From 1980 to 2012, childhood obesity (among those aged 2-19) in the United States nearly tripled from 6% to 17%.¹ In Georgia, 29.8% of high school students in 2014 were overweight or obese.² Once established, obesity is difficult to reverse, and obese children are more likely than nonobese children to become obese adults.³ Childhood obesity and weight gain may also be associated with higher mortality and morbidity in adulthood, including higher rates of heart disease, diabetes, arthritis, gout, and cancer, among obese children compared with nonobese children.⁴ Although many factors contribute to childhood obesity, one critical factor is lack of regular physical activity. Engagement in health-enhancing physical activity has been shown to improve

cardiorespiratory endurance, muscular and skeletal endurance, strength, and power. Indeed, an inverse relationship exists between physical activity (and physical fitness) and

¹ HealthMPowers, Inc, Norcross, GA, USA

² Georgia Department of Public Health, Atlanta, GA, USA

³ Department of Sport Management, Wellness, and Physical Education, College of Education, University of West Georgia, Carrollton, GA, USA

Corresponding Author:

Shannon L. Barrett-Williams, PhD, HealthMPowers, Inc, 250 Scientific Dr, Ste 500, Norcross, GA 30092, USA.

Email: shannon.williams@healthmpowers.org

all-cause mortality, as well as morbidity related to coronary heart disease, stroke, cardiovascular disease, and cancer.⁵ Despite the numerous and well-documented benefits of physical activity, the proportion of children who meet national guideline standards for physical activity and fitness is low. For example, in 2014, only about half of adolescents aged 11-14 in the United States and only about one-quarter of adolescents aged 11-14 in Georgia met the recommended daily physical activity of 60 minutes.⁶

Schools are well positioned to reach populations at risk for childhood obesity through school-based physical activity programming, in part because, in the United States, they come into contact with 95% of school-aged children and nearly 6 million teachers, and in part because school settings typically provide a safe opportunity for physical activity. Physical activity programming is especially important in low-income communities, where children are less likely to have access to safe recreational facilities (eg, playgrounds, parks)⁷ and are also less likely to engage in physical activity than children who are not in low-income communities.⁸ In addition, school-based, health-enhancing physical activity may have the potential to improve cognitive outcomes. A recent meta-analysis identified 20 cross-sectional studies that linked physical fitness with academic outcomes.⁹ Similarly, a prospective study of 725 students in West Virginia found that those who maintained high aerobic fitness levels in fifth through seventh grades also had the best average scores on standardized academic tests.¹⁰

With the increased awareness of the rising rates of childhood obesity and the promising links among physical activity, improved fitness, higher academic achievement, and reduced risk for adult medical morbidity, collaborative efforts have emerged among public education entities, public health agencies, nonprofit organizations, and institutions of higher education that emphasize increasing children's fitness and physical activity opportunities. One such collaboration is Georgia Shape, a multiagency, multidimensional initiative that has brought together governmental, philanthropic, academic, and business communities to address childhood obesity in Georgia.¹¹ This initiative was launched in 2010, when Governor Sonny Perdue signed House Bill 229, the Student Health and Physical Education (SHAPE) Act.¹² This unfunded mandate required all Georgia public school students in grades 1 to 12 to be enrolled in physical education and to participate in an annual health-related physical fitness assessment. The Georgia Shape partnership was established to provide funding, support, evaluation, and communication to implement the SHAPE Act, and the partnership has continued to provide support for other health initiatives across the state.¹¹

After analyzing statewide fitness assessment data, Georgia Shape (with the support of the Georgia Department of Public Health, Georgia Department of Education, and other key partners) created Power Up for 30 (PU30), a statewide initiative to increase physical activity in schools.¹³ PU30 uses components of the Comprehensive School Physical

Activity Program (CSPAP), a multicomponent model designed to help students be physically active, meet the nationally recommended 60 minutes of physical activity each day, and develop the knowledge, skills, and confidence to be physically active for a lifetime.¹⁴ The 5 goals of the CSPAP model, which is promoted by the Centers for Disease Control and Prevention (CDC) in collaboration with the Society of Health and Physical Educators, are (1) quality physical education; (2) physical activity opportunities before, during, and after school; (3) school staff member wellness; (4) family engagement; and (5) community engagement.

The objective of our study was to evaluate the impact of PU30 on public elementary schools in Georgia. We hypothesized that schools that implemented the PU30 program would show improvement in offering opportunities for physical activity and physical fitness to their students. We used surveys of key school personnel before and after implementation of PU30 to collect data on changes in measures of physical activity opportunities and school staff member engagement. We combined these data with health-related fitness assessment data from the Georgia Department of Education to determine the impact of PU30 on Georgia elementary schools and students.

Methods

In keeping with the CSPAP model, the steps used for the PU30 program in this study included:

1. Establishing a team: schools were asked to send a 3-person school health team, comprising an administrator, a classroom teacher, and a physical education teacher, for training.
2. Conducting a needs assessment: schools completed a first survey and discussed their results during training.
3. Determining goals, objectives, and outcomes: the results of the needs assessment led to goals, objectives, and outcomes.
4. Creating a plan: schools created a strategy to integrate 30 minutes of physical activity for students into the school day.
5. Implementing the program: schools integrated 30 minutes of physical activity throughout the school day.
6. Evaluating results: schools completed a second survey.

Every school that implemented PU30 received a free 8-hour training course, low- or no-cost resources, a customized needs assessment, and ongoing technical support. The training sessions educated the teams from the elementary schools about how to maximize the use of facilities and personnel before, during, and after school to incorporate more physical activity into each school day. The data and

methods used in this study have been shared through a collaboration among several universities in Georgia, including University of Georgia, Georgia State University, and Emory University. The Emory University Institutional Review Board determined that this study was exempt.

We used 2 surveys: one administered before implementing the PU30 initiative (baseline physical activity survey, or baseline survey) and another administered after implementing the initiative (formative physical activity survey, or formative survey). The surveys posed the same questions about physical activity opportunities offered to students in the classroom, before school, and after school; the amount of recess time; and the amount of professional development time (focused on integrating physical activity into the school day) offered to school personnel. The formative survey included 6 additional questions pertaining to the frequency and duration of before- and after-school physical activity opportunities. We compiled the surveys using SurveyMonkey and recorded results using Microsoft Excel.

HealthMPowers, a nonprofit organization in Norcross, Georgia, that was founded in 1999 to promote physical activity and healthy eating in schools using evidence-based guidelines established by CDC, led survey development. The process was guided by relevant research and guidelines, including the CSPAP,¹⁴ *School Health Index* from CDC,¹⁵ *Educating the Student Body: Taking Physical Activity and Physical Education to School* from the Institute of Medicine,¹⁶ and *Healthy Schools Program Inventory* from the Alliance for a Healthier Generation.¹⁷ The survey was determined to be exempt by the Georgia Department of Education and Georgia Department of Public Health; Georgia State University's Andrew Young School of Policy Studies, School of Public Health, and Georgia Health Policy Center; the University of Georgia College of Public Health; and the Rollins School of Public Health at Emory University. The survey was initially piloted in 5 school districts during the 2013-2014 school year, and modifications were made to ensure the clarity of questions.

In September 2013, the Georgia Department of Education sent an email with a web link to the baseline survey to all ($n = 1320$) public elementary school principals. This email was accompanied by a letter signed by the Georgia Commissioner of Public Health and the Georgia Superintendent of Schools requesting that a school administrator, physical education teacher, and classroom teachers serving as grade-level chairs in kindergarten through fifth grade complete the survey. The survey was closed in September 2014.

In April 2015, the Georgia Department of Education sent another email with a web link to the formative survey. The email was distributed to 160 randomly selected schools that had completed the baseline survey the previous year. Half ($n = 80$) of these schools had implemented PU30 training (PU30 schools) and the other half ($n = 80$) had not (non-PU30 schools). An administrator, physical education teacher, and each kindergarten through fifth-grade classroom teacher were asked to complete the survey. This survey was closed in June 2015.

Efforts to improve response rates for the baseline survey included 2 reminder emails to school principals from the Georgia Department of Education, 2 raffle prize opportunities from the Georgia Department of Public Health, and direct contact with school district-level personnel. Similarly, efforts to enhance response rates for the formative survey included 2 emails to school principals, a mailed letter from the Georgia Department of Education, and an email from HealthMPowers. For the formative survey, school principals were also notified about which personnel had not completed surveys.

We also included health-related fitness assessment data in our study. Georgia students in grades 4 through 12 are required to complete an annual FitnessGram assessment, the goal of which is for children to achieve the Healthy Fitness Zone (HFZ) on as many assessments as possible.¹⁸ FitnessGram assessments are criterion-referenced fitness activities that include an aerobic capacity measure. Students complete the test to the best of their ability. HFZ scores are predetermined by The Cooper Institute. Students achieving the HFZ demonstrate healthy levels of fitness for good health for their sex and age. We obtained Progressive Aerobic Capacity Endurance Run (PACER) aggregate HFZ achievement percentages for the 2014-2015 school year from the Georgia Department of Education, and we calculated aggregate results for PU30 and non-PU30 schools.

We compared the outcomes for PU30 schools with those of non-PU30 schools (ie, the control group). In addition, we compared these outcomes for both groups for the 2014-2015 school year with baseline data for the 2013-2014 school year. We assessed the following outcomes: percentage of schools offering before- and after-school student physical activity programs (using responses from 160 physical education teachers), percentage of teachers offering recess 0 or 5 days per week (using responses from 664 classroom teachers), percentage of teachers offering classroom physical activity 0 or ≥ 11 minutes per day (using responses from classroom teachers only, divided into 325 teachers for kindergarten through second grade and 330 teachers for third through fifth grade), percentage of students achieving the HFZ for aerobic capacity, and percentage of teachers reporting physical activity-related professional development time, use of physical activity equipment, and access to physical activity resources.

To obtain a deeper understanding of how participants viewed the steps involved in the PU30 program, we distributed a third survey to all 80 PU30 schools in April 2015. This survey included questions about facilitators of and barriers to PU30 implementation, extent of progress on and targeted areas in action plans, items needed for future support, likelihood of attending additional training, and methods of recognition desired.

Statistical Methods

We reported categorical variables as means with standard deviations (SDs). We conducted analysis for reliability using the Pearson χ^2 test and SPSS version 21.0.¹⁹ We calculated

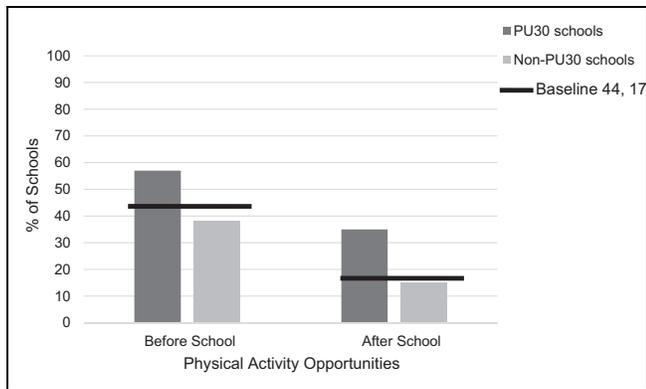


Figure 1. Elementary schools offering before- and after-school physical activity opportunities after Power Up for 30 (PU30) program implementation, by PU30 ($n = 78$) and non-PU30 ($n = 73$) schools, Georgia, 2014-2015. Baselines established from physical education teacher responses ($n = 160$) to a 2013-2014 survey. Only 53 of the 73 non-PU30 schools answered the question. PU30 is a schoolwide intervention that encourages elementary schools to provide an additional 30 minutes of physical activity during the school day, beyond physical education.¹³

means and SDs of the 2014-2015 aerobic capacity results using Microsoft Excel. We defined significance as $P \leq .05$.

Results

A total of 112 of 160 (70%) administrators, 106 of 160 (66%) physical education teachers, and 70 to 80 of 160 (depending on grade level) or 53% of kindergarten through fifth-grade classroom teachers responded to the baseline survey. The response rates for the formative survey for PU30 ($n = 78$) and non-PU30 ($n = 74$) schools were 91% (71 of 78) and 66% (49 of 74) of administrators, 91% (71 of 78) and 66% (49 of 74) of physical education teachers, and 76% (356 of 468) and 78% (346 of 444) of kindergarten through fifth-grade classroom teachers, respectively. Of note, we received no data from 2 of the kindergarten through second-grade schools (for PU30 schools) and 2 of the kindergarten through second-grade schools and 4 elementary schools (for non-PU30 schools).

For the 2013-2014 school year (baseline), 70 of 160 (44%) schools offered before-school physical activity programs. For the 2014-2015 school year, 44 of 78 (56%) PU30 schools and 20 of 53 (38%) non-PU30 schools offered before-school physical activity programs. The number of PU30 schools offering before-school physical activity programs was significantly higher than either the number of non-PU30 schools ($P = .03$) or the previous year's baseline ($P = .03$) (Figure 1).

Twenty-seven of 160 (17%) schools offered after-school physical activity programs during the 2013-2014 school year (baseline), and 27 of 78 (35%) PU30 schools and 8 of 53 (15%) non-PU30 schools offered after-school physical activity programs the following year. The number of PU30 schools offering after-school physical activity programs was

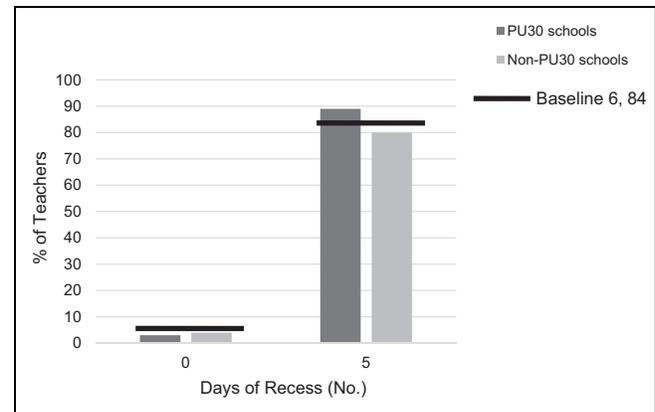


Figure 2. Kindergarten through fifth-grade teachers offering recess 0 or 5 days per week after Power Up for 30 (PU30) program implementation, by PU30 ($n = 323$) and non-PU30 ($n = 341$) schools, Georgia, 2014-2015. Baselines established from classroom teacher responses ($n = 664$) to a 2013-2014 survey. PU30 is a schoolwide intervention that encourages elementary schools to provide an additional 30 minutes of physical activity during the school day, beyond physical education.¹³

significantly higher than either the number of non-PU30 schools offering after-school physical activity programs or the previous year's baseline ($P = .03$) (Figure 1).

During the 2014-2015 school year, PU30 schools had significantly fewer teachers who offered no recess (3 of 323 [1%] teachers) compared with non-PU30 schools (17 of 341 [5%] teachers) ($P = .05$) and the 2013-2014 baseline (40 of 664 [6%] teachers) ($P = .04$) (Figure 2). On the other hand, PU30 schools had significantly more teachers who offered recess 5 days per week (287 of 323 [89%] teachers) compared with non-PU30 schools (272 of 341 [80%] teachers) ($P = .04$) and baseline (551 of 664 [84%] teachers) ($P = .04$).

When analyzing the data for number of minutes of physical activity integrated into the classroom per day, we created 2 subgroups of classroom teachers: those in kindergarten through second grade and those in third through fifth grade. In the 2013-2014 school year (baseline), 49 of 325 (15%) kindergarten through second-grade teachers never offered classroom physical activity, whereas 108 of 339 (32%) third-through fifth-grade teachers never offered classroom physical activity (Figure 3a,b).

For kindergarten through second-grade classrooms during the 2014-2015 school year, PU30 schools had significantly more teachers offering ≥ 11 minutes of physical activity per day (53 of 136 [39%] teachers) compared with non-PU30 schools (47 of 189 [25%] teachers) ($P = .04$) and the 2013-2014 baseline (85 of 325 [26%] teachers) ($P = .04$) (Figure 3a). Similarly, for third- through fifth-grade classrooms, PU30 schools had significantly more teachers offering ≥ 11 minutes of physical activity per day (37 of 187 [20%] teachers) compared with non-PU30 schools (9 of 152 [6%] teachers) ($P = .04$) and baseline (37 of 339 [11%] teachers) ($P = .04$), as well as significantly fewer

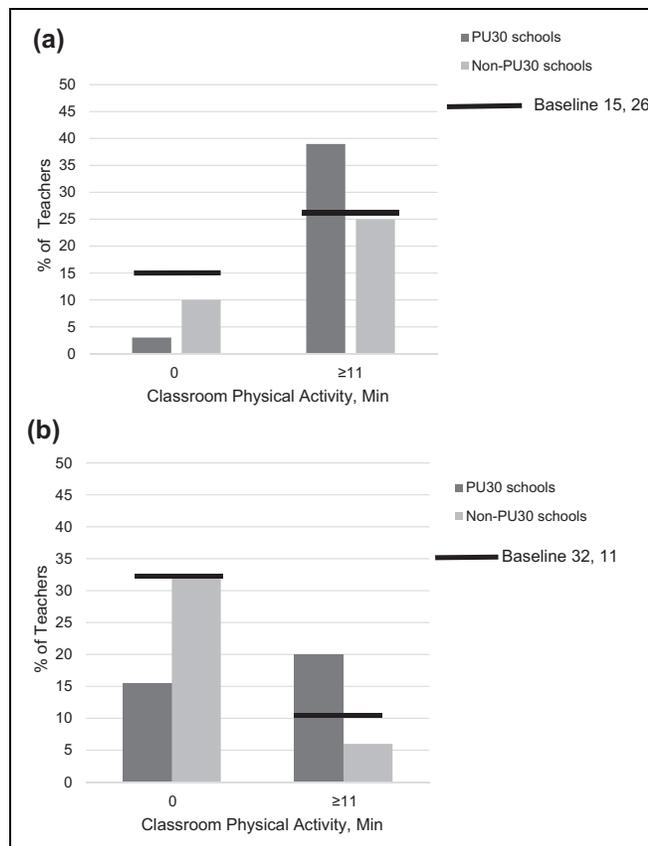


Figure 3. (a) Kindergarten through second-grade teachers offering classroom physical activity after Power Up for 30 (PU30) program implementation, in number of minutes per day, by PU30 ($n = 136$) and non-PU30 ($n = 189$) schools, Georgia, 2014-2015. Baselines established from classroom teacher responses ($n = 325$) to a 2013-2014 survey. (b) Third- through fifth-grade teachers offering classroom physical activity after PU30 program implementation, in number of minutes per day, by PU30 ($n = 187$) and non-PU30 ($n = 152$) schools, Georgia, 2014-2015. Baselines established from responses by classroom teachers ($n = 339$) to a 2013-2014 survey. PU30 is a schoolwide intervention that encourages elementary schools to provide an additional 30 minutes of physical activity during the school day, beyond physical education.¹³

teachers never offering classroom physical activity (29 of 187 [16%] teachers) compared with non-PU30 schools (49 of 152 [32%] teachers) ($P = .04$) and baseline (108 of 339 [32%] teachers) ($P = .04$) (Figure 3b).

Using 2014-2015 school year data from the Georgia Department of Education, we calculated that 15 695 of 20 926 (75%) students at PU30 schools achieved the HFZ for aerobic capacity, whereas 13 512 of 19 871 (68%) students at non-PU30 schools achieved the HFZ ($P = .04$).

On a separate note, of the 323 teachers at PU30 schools in 2014-2015, 135 (42%) reported professional development related to physical activity, 132 (41%) reported use of physical activity equipment, and 155 (48%) reported access to physical activity resources. These results were better than those reported by the 341 teachers at non-

PU30 schools (47 [14%], 115 [34%], and 61 [18%], respectively) and those reported by the 664 teachers in the baseline group (146 [22%], 205 [31%], and 205 [31%], respectively) (all $P = .04$).

Finally, a representative from 21 of 80 (26%) PU30 schools responded to our third survey about the PU30 program. Of the 21 respondents, 10 reported administrative support and staff member support, 18 reported student enthusiasm, 15 reported training, and 9 reported resources as the top 5 facilitators of successfully implementing PU30 at their schools. Eighteen respondents reported progress on their action plans, and 6 had completed them within 7 to 14 months. The most common areas targeted by these action plans were classroom physical activity (17 respondents), recess (16 respondents), and before-school physical activity (7 respondents); improvements were also noted by participating schools in all of these categories. Fifteen respondents cited inadequate time as the principal barrier to PU30 implementation. Respondents requested training, newsletters, and the continued provision of resources for future support, and 20 respondents indicated they would be likely or very likely to attend follow-up training, if funding were secured. Last, 63 respondents indicated an interest in receiving recognition for their efforts in increasing physical activity; 61 respondents chose state recognition as the preferred means.

Discussion

Implementation of the PU30 program in public elementary schools in Georgia was associated with more schools offering before- and after-school physical activity programs, more teachers offering recess 5 days per week, more teachers offering classroom time for physical activity, and more students meeting health-related fitness benchmarks. Implementation of the program was also associated with more professional development time and resources being offered to school personnel for the purpose of integrating physical activity into the lives of students.

Although models have been developed for effective whole-school physical activity programs, the CSPAP and other similar multicomponent programs have not yet been rigorously evaluated and validated.²⁰ Studies of these programs have been constrained by limited participation, sample sizes, and intervention effectiveness.²¹ The implementation of some physical activity programs has resulted in isolated achievements, such as more extracurricular physical activity offerings²² or school staff member involvement.²³ However, few reports have been made about multicomponent programs achieving multiple and varied objectives, such as more school-related physical activity opportunities, more school personnel engagement, and improved student physical fitness.^{24,25}

In this study, we showed that implementation of a multicomponent program such as PU30 was associated with improvements in 2 of the 5 components of the CSPAP model (physical activity before and after school and physical

activity during school), enhanced cardiovascular fitness among students, and increased engagement of school personnel. On a larger scale, our results suggest that the PU30 program could influence the development of other multicomponent approaches using similar strategies and resources. This type of program may also have the potential to create the systems thinking and simulation models that may better inform policy and practice related to childhood obesity.²⁶

The PU30 schools in our study reported that the primary facilitators of their successful PU30 programs were administrative support, staff member support, student enthusiasm, training, and resources. A high percentage of the schools (85%) reported substantial progress in developing their action plans, and 6 schools had completed those plans within a relatively short time. These findings show that the integration of school health teams, administrator and staff member support, free staff member training, free or low-cost resources, and technical assistance into programs such as PU30 is critically important for success.

In our final survey, we found that administrators and staff members involved with the PU30 program were interested in continuing the work started through this initiative and in learning even more about increasing physical activity for elementary school students. This interest suggests that when school faculty members have the right training, administrative support, and resources, they will be more likely to engage with and be retained in a program such as PU30.

Additional research is needed to evaluate the long-term results and sustainability of initiatives such as PU30. Similarly, although we demonstrated a relationship between PU30 and more school-based physical activity opportunities, as well as improved student health-related fitness, additional investigation into the relationships between PU30 and educational outcomes (eg, academic achievement, student attendance, student discipline) and between PU30 and other school populations (eg, childcare, after-school care, middle school, high school) would also be beneficial.

Our work assessed 2 of the 5 components of the CSPAP model. Even so, future studies incorporating outcome measures related to the other 3 components (physical education, staff member wellness, and family-community engagement) would likely be of additional value. Furthermore, our study laid the groundwork for future investigations into which types of physical activity opportunities and physical activity-related resources might work best in the school setting and how the quality of these physical activity opportunity resources might be measured.

Limitations

Our study had several limitations. First, we collected data not only for the study but also to assess whether we were achieving the goals of our program grant. The use of a single instrument (in this case, our surveys) to address both issues may have created a potential conflict in how the instrument was designed. However, we made every attempt to make the study our first priority when making decisions about the

instrument and data collection. Second, additional unrelated efforts to improve physical activity may have been implemented at some schools during the time of our study and, if so, some of our results would have been affected. Third, variations in the types of schools (eg, magnet, charter, urban, rural), teaching formats, and faculty and administrator retention and turnover rates in the public schools in our study may have influenced our response rates and data collection.

Conclusions

We demonstrated the collaborative development and implementation of an assessment tool that provides a statewide picture of the physical activity opportunities offered to students and staff members in Georgia elementary schools. We also showed how a comprehensive, multicomponent program (which includes establishing a team, providing professional development, and offering turnkey resources; using school-generated data; and developing a customized action plan) can support elementary schools in their efforts to offer more school-based physical activity opportunities and improve student fitness.

Declaration of Conflicting Interests

The author(s) declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article: During the time of the project, Padra Franks, Christi Kay, and Adria Meyer worked for HealthMPowers. They were involved with the development of materials, teacher training, and data collection.

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