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Development of the Presidential Youth Fitness Program Index: A Scale of Organizational-Level Capacity

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Abstract

Fitness education is essential for children's health, but it is difficult to measure. The present study developed and confirmed the validity of a 20-item scale, adapted from the School Health Index (CDC, 2014), to evaluate the degree of implementation of the Presidential Youth Fitness Program (PYFP). Physical education teachers from 892 schools completed the PYFP Index. Teachers self-assessed the degree of implementation (full, partial, under development, not in place) of criteria related to fitness education within their school (i.e., teachers helped students set fitness goals). An initial exploratory factor analysis revealed that the PYFP Index questions clustered into six factors. A subsequent confirmatory factor analysis conducted using Mplus concluded the six-factor solution was a good fit (CFI=0.92, TLI=0.90, RMSEA=0.077, SRMR=0.055). This scale is a reliable measure of a school's readiness to begin the PYFP or to track progress toward the implementation of fitness education.

Physical fitness, particularly cardiovascular fitness, is a fundamental determinant of health throughout the lifespan. In children, higher fitness levels are associated with better heart health, body composition, academic achievement and school attendance as well as improved cognitive and brain development (Baranowski et al., 1992; Strong et al., 2005) and is related to greater reductions in health risk over physical activity participation alone (Hurtig-Wennlöf, Ruiz, Harro, & Sjöström, 2007). The prevalence of poor fitness and obesity among children today is high, yet both of these outcomes remain largely preventable through adequate engagement in physical activity and healthy eating. A child should have many opportunities to be physically active during the day to foster appropriate motor development, social skill acquisition, and attention and learning. The school environment can be instrumental in providing opportunities for children's movement as well as teaching the values and competencies associated with physical health and nutrition. However, a recent trend has removed opportunities for physical activity during the school day. This trend is

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evidenced by the fact that less than 10% of schools nationwide require daily physical education in grades K-12, and many schools allow recess to be taken away from students as punishment (Lee et al., 2007). With schools becoming obesogenic environments, the tracking of opportunities and implementation of fitness education has inherent value as a means of addressing public health issues.

The Presidential Youth Fitness Program (PYFP) provides a model for fitness education that aims to improve student health. When implemented as intended, the program can invoke change across the multifaceted levels of the school environment (Barcelona et al., under review). The PYFP is used by educators to measure health-related fitness, motivate student achievement, and promote lifestyle physical activity through content-driven lesson planning. However, the success of the PYFP is largely dependent on its implementation. The degree of implementation of physical activity programming in schools depends on teacher level factors such as knowledge and motivation, but educators must also operate under the constraints of institutional budgets and policy. Thus, organizational level elements such as facilities and equipment, administrative support, curriculum, and time allocated to physical activity and physical education can also affect program implementation. To enable all schools to instill healthy practices, the environmental factors that facilitate or inhibit children’s health must be identified.

In 2000, the Centers for Disease Control and Prevention (CDC) developed the School Health Index (SHI), a tool to guide schools in fostering a better school environment across a wide range of health-related policies and practices affecting students (CDC, 2014). Since its introduction, over 25,000 users have adopted the SHI, and it has been identified as an effective health promotion tool, helping schools make immediate improvements to their health infrastructure (Austin, 2006; Staten, 2005). Resources like the SHI, which prompt change at the organizational level, work synergistically with curricular programming to help schools establish a health-enhancing culture.

While the SHI has been shown to be a useful planning tool for the overall school environment, the items related to fitness education and the resources needed for fitness programming are limited. For the purpose of a large-scale program evaluation of the PYFP (see Castelli et al., under review) a tool to assess barriers and facilitators to implementation of the PYFP at the individual and organizational levels was created. Drawing from the success of the SHI, the 20-item PYFP Index was developed to assess a broad range of school and community-based components related to program implementation (CDC, 2014). The purpose of this investigation is to determine the reliability of the PYFP Index as a tool to assess the presence of individual and organizational factors which may affect the implementation of fitness education programming such as the PYFP.

Methods

For the purpose of this study, we used data collected from teachers representing two rounds of schools participating in a nationwide, two-year evaluation of the PYFP. Before the initiation of one of the PYFP programmatic components, virtual professional development (see Castelli et al., under review for more detail), teachers were asked to self-assess the degree to which individual and organizational factors related to fitness education programming were addressed in their schools. This first wave of data was used to examine the preliminary construct validity and internal consistency reliability of the 20-item scale. Teachers then completed the same assessment at the end of the first year of participation in the PYFP evaluation. This second wave of data was used to confirm the established properties of the scale. All data were de-identified prior to analysis to protect the identities of teacher participants.

Participants

In the initial year of PYFP funding (round one), 353 schools were selected for funding based on completion of an online application, which spoke to teacher-level commitment to utilize PYFP's provision of resources. Of the funded schools spanning 224 districts across 48 states, half (51%) were on the elementary level with an average enrollment of 569 students (±SD 401, range 62–2,900). The proportion of students receiving free or reduced lunch averaged 49% (±SD 27%).

In round two, an additional 404 schools were selected for PYFP grant funding under comparable selection criteria as the inaugural year. Also, round two included 101 schools from the inaugural year whose teachers completed the virtual professional development and PYFP Index at the beginning of the second year of data collection, rather than at the beginning of year one. Similar to round one schools, 57% of wave two schools were on the elementary level, with an average enrollment of 546 students (range 62–3,867). Round two schools represented 154 districts across 45 states, and the proportion of students receiving free or reduced lunch averaged 56%±26%.

Instrument Development

The PYFP Index was developed through the adaptation of 20 items derived from the SHI (CDC, 2014). The PYFP evaluation team purposefully streamlined the PYFP Index to 20 questions to minimize participant burden. Questions targeted key elements of the PYFP mission to improve students' health-related fitness and, therefore, targeted criteria such as the use of FitnessGram® assessments, presence of adequate physical education facilities and equipment, and incentivizing student progress toward physical fitness. Before utilization among teacher participants, the PYFP evaluation team gained input from advisory board members to confirm content validity. Once launched, teachers were directed to self-assess their perceived level of current implementation as it pertained to each specific health-related fitness question using a four-point Likert scale of full implementation, partial implementation, under development, and not in place.

Results

The initial exploratory factor analysis (EFA) was conducted using SPSS based on a subset of 373 teachers from the round one and round two schools who completed the PYFP Index before the first virtual professional course. The 20 PYFP Index questions were analyzed using principal component analysis with Varimax (orthogonal) rotation. Based on the scree plot, eigenvalues, and qualitative interpretation, the analysis indicated the best fit was six factors explaining a total of 69.83% of the variance for the entire set of variables. The Kaiser-Meyer-Olkin value was .89, exceeding the recommended value of .6 (Cerny & Kaiser, 1977) and Bartlett's Test of Sphericity (Bartlett, 1954) reached statistical significance. Factor 1 was labeled as access to PE opportunities which included three items (α=.63). Factor 1 explained 9.00% of the variance. Factor 2 was labeled as community and school engagement and included five items (α=.73). The variance explained by this factor was 4.40%. Factor 3, standards-based curriculum, consisted of four items (α=.80). This factor explained 5.11% of the variance. Factor 4 was labeled as student nutrition and included two items (α=.93). The variance explained by this factor was 6.48%. Factor 5, labeled incentives for student achievement, consisted of two items (α=.81). The variance explained by Factor 5 was 6.09%. Finally, Factor 6 was labeled as professional development and curriculum development and included four items (α=.86). It explained 38.75% of the variance. The exploratory factor analysis results from MPlus also concluded a six-factor solution was a good fit (CFI=.97; TLI=.94; RMSEA=.054; SRMR=.023).

A subsequent confirmatory factor analysis (CFA) was conducted to verify the six factor structure using MPlus, based on a subset of 412 teachers from the round one and round two schools who completed the PYFP Index at the end of the first year of implementation of the PYFP. The determination of model fit was based on a comparison of fit indices using cutoff values recommended by the literature (CFI and TLI greater than .90, RMSEA lower than .050, and SRMR less than .080; Hu & Bentler, 1999). The model was run using the maximum likelihood estimator with robust standard errors (MLR) to account for both missing data as well as potential skewness of individual items. The results from the initial CFA indicated the model was not a good fit (CFI=.86; TLI=.82; RMSEA=.100; SRMR=.073). Therefore, we examined the modification indices, and the results suggested the need to correlate items with similar word stems. PYFP Index question 3 (Families are aware of and have access to school facilities after school hours) was correlated with question 4 (Students are aware of and have access to community facilities/programs). PYFP Index question 9 (Teachers deliver standards-based physical education curricula and lessons) was correlated with question 10 (Teachers regularly assess the physical education standards). PYFP Index question 18 (Teachers are provided with professional development to interpret student data (e.g., FitnessGram®, academic scores, etc.) was correlated with question 19 [Teachers use student performance data (e.g. FitnessGram® data) to inform curriculum decisions]. Finally, we correlated PYFP Index question 19 with question 20 [Teachers use student performance data (e.g. FitnessGram® data) to develop specific lessons targeting student needs]. The final model indicated a good fit to the data (CFI=0.92, TLI=0.90, RMSEA=0.077, SRMR=0.055).

Discussion

The current prevalence of childhood obesity underlies a clear need for quality health-related fitness programming in schools. Examination of such programming requires an adequate tool to assess a school's readiness to provide physical activity opportunities and nutrition programs to support fitness education programming. While tools exist to assess the organizational factors related to a school's overall capacity for health and well-being, there has been no tool specifically for assessing the multiple organizational factors associated with a school's capacity to provide quality fitness education. The results of the exploratory and confirmatory factor analyses in this study demonstrated that the PYFP Index is a reliable tool for measuring individual and organizational level factors related to fitness education program implementation within the school environment. It is necessary to capture each of these elements, as effective fitness programs require cooperation across teachers, staff, administration, students, families, and the surrounding community.

The analyses confirmed the PYFP Index consists of six distinct factors.

Access to PE opportunities

Community and school engagement

Standards-based curriculum

Student nutrition

Incentives for student achievement

Professional development and curriculum development

Coupled with access to free online educational resources, such as those provided by the CDC and the PYFP, the PYFP Index will help inform and empower schools to create environments more conducive to physical activity and healthy eating. It is important to note that many practices that help facilitate a culture of health within schools may not require an increased budget, but rather a shift in attitudes and values (e.g. having classroom teachers provide opportunities for physical activity throughout the day). Thus, after completing the PYFP Index, schools that have more limited resources than others may be compelled to make changes in their fitness programming that they may not have otherwise considered.

Findings from this study must be interpreted within the context of the study limitations. First, the evaluation project that was the source for the data collection was not centered on teacher-level characteristics and as such, information was not available regarding the sociodemographic characteristics of teachers (e.g., age, gender, race/ethnicity). Second, the sample for this study was unique in that it was comprised of teachers enrolled in a voluntary program designed to advance student's health-related fitness. Thus, the sample may not be representative of all physical educators. Additional research including teachers from various populations should therefore be conducted to replicate study findings, and future research should explore whether the PYFP Index has equivalence across teacher demographics. Likewise, differences in school characteristics may be an important consideration for future study. Teachers completed the PYFP Index online, necessitating replication of the results with in-person samples. While the study was able to conduct the exploratory factor analysis and confirmatory factor analysis with two separate samples, the nature of the evaluation project (i.e., school as the level of analysis vs. teacher) prevented the ability to conduct test-retest reliability. Finally, the fit statistics for the CFA model indicated adequate but not excellent fit. However, past research suggests that the cutoff values recommended in psychological research (e.g., Hu & Bentler, 1999) may be overly strict for scales used in physical activity research (Perry et al., 2015).

Notwithstanding these limitations, the current study makes an important contribution to the literature by developing an index that can be broadly used to assess the presence, or absence, of teacher, school, and community supports shown to be related to physical fitness in children. The PYFP Index was shown to be a valid and reliable tool and included six factors related to the accessibility of physical education opportunities, school and community engagement, the use of standards-based curriculum, student nutrition tracking, the use of incentives for student achievement, and teacher utilization of professional development and fitness-based curriculum strategies. This index will be of value to both researchers and practitioners interested in assessing and tracking the relationship between organizational factors and physical fitness in the school environment.

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Table 1

Indicator loadings, percent of variance explained, and eigenvalues based on the exploratory factor analysis (N=373)

Item	Variables	F1	F2	F3	F4	F5	F6
	Factor 1 – Access to PE opportunities (3 items)						
1.	Adequate facilities and equipment for physical education instruction	X					
2.	Adequate facilities and equipment for classroom teachers to offer physical activity	X					
8.	Classroom teachers offer opportunities for physical activity participation	X					
	Factor 2 – Community and school engagement (5 items)						
3.	Families are aware of and have access to school facilities after school hours		X				
4.	Students and families are aware of and have access to community facilities/programs		X				
5.	Volunteers assist with student physical activity events (e.g., field day, fitness testing, etc.)		X				
6.	Administrative team members are actively engaged in student health decision-making		X				
7.	Staff members participate in health promotion (e.g., model physical activity, introduce opportunities to students)		X				
	Factor 3 – Standards-based curriculum (4 items)						
9.	Teachers deliver standards-based physical education curricula and lessons			X			
10.	Teachers regularly assess the physical education standards			X			
11.	Teachers measure and track student physical activity (e.g., logs, pedometers, accelerometers, etc.)			X			
12.	Teachers help students set physical fitness goals			X			
	Factor 4 – Student nutrition (2 items)						
13.	Teachers help students measure and track student nutrition				X		
14.	Teachers help students set nutrition goals				X		
	Factor 5 – Incentives for student achievement (2 items)						
15.	Teachers use awards to incentivize student progress towards physical fitness					X	
16.	Teachers celebrate student fitness accomplishments by publically providing awards					X	
	Factor 6 – Professional development and curriculum development (4 items)						
17.	Teachers regularly engage in professional development about physical fitness and activity						X
18.	Teachers are provided with professional development to interpret student data (e.g., FitnessGram®, academic scores, etc.)						X
19.	Teachers use student performance data (e.g. FitnessGram data®) to inform curriculum decisions						X
20.	Teachers use student performance data (e.g. FitnessGram data®) to specifically develop lessons targeting student needs						X

Table 2

Rotated component matrix for principal components analysis with varimax rotation for 20 items of PYFP Index

Item	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Communalities
2.	**.773**	−.026	.081	.246	−.042	.131	.522
8.	**.652**	.066	.024	.096	.388	.222	.683
1.	**.610**	.139	.335	.045	−.123	−.034	.638
3.	.098	**.818**	−.056	.202	.014	.152	.746
4.	.147	**.793**	.156	−.026	.139	.161	.720
5.	.347	**.370**	.072	.347	.558	−.093	.587
6.	.542	**.228**	.091	.542	.382	.177	.546
7.	.602	**.224**	.076	.602	.268	.333	.605
9.	.180	.087	**.826**	.017	.149	.220	.794
10.	.158	−.054	**.776**	.126	.137	.362	.796
12.	.096	.167	**.452**	.325	.219	.540	.567
11.	.099	.176	**.420**	.369	.157	.434	.687
13.	.173	.121	.093	**.875**	.188	.221	.902
14.	.231	.065	.086	**.863**	.187	.240	.902
16.	.033	−.007	.154	.178	**.736**	.318	.725
15.	.074	.051	.189	.255	**.690**	.374	.699
19.	.116	.049	.173	.123	.091	**.863**	.555
20.	.107	.080	.187	.144	.132	**.853**	.656
18.	.153	.146	.202	.085	.280	**.696**	.813
17.	.216	.163	.129	.249	.127	**.622**	.819

Note. Major loadings for each item are bolded. Reliability analyses for the six factors: Factor 1 (Cronbach's α = .63), Factor 2 (Cronbach's α = .73), Factor 3 (Cronbach's α = .80), Factor 4 (Cronbach's α = .93), Factor 5 (Cronbach's α = .81), and Factor 6 (Cronbach's α = .86)