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FITNESS FOR ALL: ADDRESSING DEMOGRAPHIC INEQUALITIES IN QUALITY PHYSICAL EDUCATION

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Abstract
Physical activity is essential for children's health, but many do not get enough. Schools are a key setting for physical activity, but there are challenges to implementing quality physical education programs. This paper reviews the factors that affect schools' ability to implement quality physical education programs, and discusses strategies for overcoming these challenges.

Keywords: Physical activity, Children's health, Schools Physical education, Quality Challenges Strategies

1. Introduction

Physical activity has been shown as an effective way to improve the weight status of children and adolescents (McDaniel et al., 2014). Participation in regular physical activity has also been shown to help control body weight, maintain healthy bones and reduce the risk for developing chronic diseases such as cardiovascular disease, hypertension, and diabetes mellitus (American Heart Association, 2013; Luke et al., 2004; U.S. Department of Health and Human Services, 2010). The current public health recommendation is for children to participate in 60 minutes of daily physical activity (U.S. Department of Health and Human Services, 2008). Schools have been identified as a key setting for children to engage in physical activity because children spend more time in school than any other place outside the home (Quitério, 2012). Although schools may not allow students the opportunity to accumulate all of the recommended minutes of physical activity, they do offer opportunities for children and adolescents to become active.

Within the school environment, physical education has been targeted as the most effective way to increase physical activity among students (Story et al., 2006; US Department of Health and Human Services, 2010). For students to benefit from the increased amounts of physical activity, schools need to offer quality physical education programs that provide opportunities for students to meet the recommended daily amount of physical activity. To help schools develop quality physical education programs, the Society of Health and Physical Educators (SHAPE), formerly known as the National Association for Sport and Physical Education (NASPE), has developed a set of guidelines to provide schools with specific criteria to help increase opportunities for students to meet the recommended daily amount of 225 minutes per week of physical education. The guidelines include ensuring that the individuals delivering the physical education are qualified, and that there is appropriate safe space for physical education to be administered (National Association for Sport and Physical Education, 2011).

Although the benefits of physical activity are clear (US Department of Health and Human Services, 2010) and guidelines have been established to help schools deliver quality physical education, many children and adolescents do not participate in regular physical activity.Based on the results from the 2011 National Youth Risk Behavior Survey, only 28.7% of high school students meet the recommended level of physical activity (Centers for Disease Control and Prevention, 2012). Moreover, the percentage of students participating in 60 minutes of daily physical activity decreases as they progresses across the 9th (30.8%), 10th (30.8%), 11th (27.3%) and 12th grades (25.1%). Very few studies have examined the reasons for the lack of physical activity in school. A critical step in the design of quality physical education programs that deliver increased opportunities for physical activity,is understanding the factors that may affect the schools ability to implement such a program (Barroso et al., 2005).

A study conducted by Barroso et al. (2005) described the barriers toa quality physical education curriculum as reported by elementary physical education specialists trained as part of the Child and Adolescent Trial for Cardiovascular Health (CATCH)program. The data wasobtained from four consecutive annual surveys (2000-2004) that were collected from 157 teachers. The combined results from these surveys revealed that significant barriers exist to providing quality physical education. The teachers identified factors including inadequate indoor and/or outdoor facilities and insufficient numbers of physical education specialists were among the major obstacles (Barroso et al., 2005). Other reported barriers included low priority of physical education compared to other academic subjects and limited financial resources. There is research to suggest that the factors identified from this study may influence a schools ability to deliver quality physical education.

To investigate the effect of location on physical activity, Springer et al. (2009) conducted a study to examine the prevalence of physical activity and sedentary behaviors in a probability sample of students in 4th, 8th, and 11th grades by urban, suburban and rural locations. Data was collected from the 2004-2005 School Physical Activity and Nutrition (SPAN) study. The results of the study revealed that urban 8th and 11th grade students reported the lowest prevalence of physical activity. Students in suburban or rural schools were significantly more likely than urban students to report higher school-based team sport participation in 8th graders ($p=0.001$), higher vigorous physical activity ($p=0.01$) and strength training exercises ($p=0.01$) in 11th grade boys. Attendance in physical education was also higher among urban 4th grade ($p<0.01$) and urban 11th grade ($p=0.05$) students. Participation in sports teams ($p=0.04$) and other organized physical activity ($p=0.04$) was higher in urban 4th grade girls. Participation in vigorous physical activity was higher in urban 8th grade boys ($p=0.04$) when compared to the other students. The results of this study suggest significant differences in participation in physical activity by location status (Springer et al., 2009).

Similar to Springer, Butcher et al. (2008) conducted a study to assess the rates and correlates of adolescents' compliance with guidelines for physical activity. The variables examined included: race/ethnicity, income level, geographic region, and parental education level. A phone survey was used to gather self-reported physical activity data from 1625 adolescents ages 14-17. The parents of each adolescent also participated in the phone survey to answer demographic questions. Results of the survey revealed that compliance among adolescents who lived in a household with a higher household

income (above $60,000) was significantly associated with compliance of the physical activity guidelines (p = 0.03), although there was not a significant relationship between compliance and low or middle income. This suggests that a relationship may exist between socioeconomic status and participation in physical activity levels (Butcher et al., 2008).

In support the research of Springer and Butcher, Jones et al. (2003) conducted a study to examine the effectof factors such as location, schools size and school type have on schools in the United States implementing health promoting policies, programs, and facilities. The data used for the study was collected from the School Health Policies and Programs Study 2000. The following variables were used to group the schools: school type (public, private, or Catholic), urbanicity (urban, suburban, or rural), and school enrollment size. The results of this study revealed that public schools (vs. private and Catholic schools), urban schools (vs. rural and suburban schools) and schools with larger enrollments (vs. smaller schools) had more health-promoting policies, programs and facilities in place. These results are significant because they suggest that students who attend these schools may have access to higher quality programs including physical education than students who attend schools with fewer resources.

Therefore, there is evidence to support factors such as school location, school size and socioeconomic status may influence physical activity levels among children. However, what is unclear is how these factors affect a schools ability to achieve SHAPE's recommendationsfor quality physical. This information may be valuable in understanding how to improve the quality of physical education and as a result, improvethe health benefits of children and adolescents associated with increased physical activitylevels.

The primary focus of this studytherefore,was to determine whether a sample of high schools in Southwestern Pennsylvania, USA met the SHAPE guidelines including instruction time for physical education, teacher qualifications and facilities available for physical education and to determine the factors that may influence their ability to meet these guidelines. Further study aims were to (1) determine if school size influences a schools ability to meet the SHAPE guidelines for instruction time for physical education, teacher qualifications and facilities, (2) determine if school location influences a schools ability to meet the SHAPE guidelines and (3) determine if socioeconomic status influences a schools ability to meet the SHAPE guidelines.

2. Methods

2.1 Sample

There are 91 public high schools in Southwestern Pennsylvania. The physical education department chairperson or designated high school physical education teacher for each of the 91 schools was invited to participate in the study via an electronic letter that provided an overview of the study aims and directions on how to complete the electronic survey. The email addresses for the physical education department chairperson or designated high school physical education teacher were obtained directly from each school's website.

2.2 Survey Validity and Reliability

The survey instrument was developed by the researcher based on an existing questionnaire used by SHAPE to evaluate quality physical education programs. Survey validity was reviewed by a panel of 12 experts in the field of physical education and curriculum design. The survey was distributed to this panel twice during the development process and feedback from each review was incorporated to determine the final version of the survey.

To examine the survey question clarity, general question format, and to provide data on reliability of the survey questions, a pilot study was conducted. The survey was sent to 18 randomly selected schools that were similar in demographics (i.e. school size, locale and SES status) to the schools in the target population. Atest of internal consistency was conducted using Cronbach's Alpha on the pilot study data.

2.3 Statistics

The data were analyzed using the statistical program SPSS 16.0. Descriptive statistics were used to describe the study schools, respondents of the survey, instruction time provided by each school and the facilities available for physical education. A chi-square test of independence was calculated to determine if there was a significant difference in between schools that responded to the survey and schools that did not respond to the survey. To determine the study schools' ability to meet the SHAPE recommendations, a within-subjects repeated measures of analysis of variance (ANOVA) was used. To determine the effect of demographic factors (school size, location and SES) on the study schools' ability to meet the SHAPE recommendations, repeated measures ANOVA was used. A chi-square test of independence was used to compare the availability of specific type of facilities available for physical education and demographic factors.

3. Results

3.1 Reliability of the Study Survey Instrument

The survey instrument specific for this study was developed, and a pilot study was conducted to assess the reliability of this survey instrument. Eighteen schools were selected at random to participate in this pilot study. Fifteen of the 18 schools (83.3%) completed the survey. Cronbach's alpha was used to measure the internal consistency of the survey and this analysis revealed a score of .707. The test/retest correlation was .979. Based on these results it was determined that the survey met acceptable criteria for reliability to proceed with the recruitment of additional schools for this study.

3.2 Recruitment of Schools

The target population for this study included 91 public high schools from Southwestern Pennsylvania. Initial outreach to these schools was to identify a Physical Education Department Chairperson or other designated physical education teacher to contact regarding participation in this study. Contact information was obtained for 83 out of the 91 schools (91.2%).

The invitation letter and electronic survey were sent to the Physical Education Department Chairperson or other designated physical education teacher at these 83 schools, with 39 schools partially or fully completing the survey, for a response of 46.98%. When considered based on the sample of 91 possible schools, the response was 42.9%.

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3.3 School Characteristics

Table 1 summarizes the demographic information including school size, locale and socioeconomic status (SES) of the schools that responded to the survey and the schools that did not respond to the survey. School size was determined based on the Pennsylvania Interscholastic Athletic Association (PIAA) ranking system which is established based on senior (12th grade) enrollment. Rankings include A, AA, AAA, and AAAA with "A" representing schools with low enrollment and "AAAA" representing schools with high enrollment. School locale was determined based on the National Center for Educational Statistics (NCES) classification system to describe a school's location in proximity to an urbanized area ranging from "large city" to "rural." The SES status of each school was determined based on the number of students eligible for a free or reduced lunch and were classified as low, middle or high as reported by the Pennsylvania Department of Education (PDE).

A chi-square test of independence was calculated to determine if there was a significant difference in school size, locale or SES status between respondents and non-respondents of the survey. No significant difference was found between respondents and non-respondents for school size (x^2 (3) =5.99, P>.05), locale (x^2 (5) =6.33, P>.05), or SES status (x^2 (5) =3.55, P>.05).

Table 1: Demographic Information for the Respondent Schools and Non-Respondent Schools

		Respondent (N=39)		Non-Respondent (N=52)	
			Frequency	Percent	Frequency	Percent
School by Class	Size PIAA	A	9	23	14	27
		AA	7	18	17	33
		AAA	10	26	14	27
		AAAA	13	33	7	13
School Locale		Large city	3	8	7	14
		Urban fringe of a large city	24	61	34	65
		Urban fringe of a mid-size city	0	0	1	2
		Small Town	0	0	1	2
		Rural, outside CBSA[a]	5	13	1	2
		Rural, inside CBSA[a]	7	18	8	15
SES Status		Low (1-14.79%)[b]	15	39	11	21
		Middle (14.8-32.29%) [b]	11	28	16	31
		High (32.3-100%) [b]	13	33	25	48

a = CBSA = Core Based Statistical Area b = Indicates based on tertiles the percent of students within a school receiving a free and reduced price lunch.

3.4 Achievement of the SHAPERecommendations

3.4.1Instruction Time. The instruction time for physical education within each of the study schools was collected for each grade level (10, 11, and 12). The number of days per week that physical education was offered in 10th, 11thand 12th grade was 2.8±1.4, 2.7±1.4, and 2.5±1.4 days per week per year, respectively. Results of a withinsubjects repeated measures analysis of variance showed no difference between the number of physical education classes offered per week for the entire school year for grades 10, 11 and 12 (P=.135). The number of minutes per week of physical education was offered in 10th, 11th and 12th grade was 104.9±54.3 min/wk, 100.1±55.1 min/wk, and 92.3±53.4 min/wk. A within-subjects repeated measures ANOVA revealed no significant difference for minutes of physical education instruction per week between grades 10, 11 and 12 (p=0.23).

3.4.2 **Academic Training of Physical Education Teachers.**Data was collected from each school regarding the number of teachers with an undergraduate and/or graduate degree in physical education. The percent of schools reported having 5 or more teachers with an undergraduate degree in physical education was 34.3, whereas 28.6% of schools reported that none of their teachers have a graduate degree in physical education. The mean percentage of teachers within a school having an undergraduate degree in physical education was 96.9±14.6% and the mean percentage of teachers within each school with a graduate degree in physical education was 65.0±34.8%.

3.4.3 **Facilities Available for Physical Education.**Schools reported information regarding the number and type of facilities available for physical education. The percent of schools reported having indoor spaces available for physical education was 100% and 94.3% of these schools reported that they also have outdoor grass spaces available for physical education. The majority of schools also reported having access to a track (71.4%), fitness center (68.8%), and outdoor concrete spaces (62.9%). The climbing wall (34.3%) and swimming pool (42.9%) were identified as the least available facilities for physical education.

3.5 Demographic Factors Influencing Achievement of the NASPE Recommendations

3.5.1 School Size

To determine the effect of school size on physical education instruction time, the categories of minutes per week that physical education was offered were recoded to 29 min/wk for the <30 minute category, the midpoints of the range were used for the 30-59, 60-89, 90-119, 120-149, and 150-179 minute categories, and 180 min/wk was used for the >180 minute category. A two-factor (Grade X School Size) repeated measures ANOVA was performed and revealed no significant Grade Effect, School Size Effect, or Grade X School Size Interaction Effect for minutes of physical education offered. These data are shown in Table 2. In addition to the parametric tests, non-parametric tests were also used. Results of the Kruskal-Wallis H Test revealed no significant difference between school size and physical education instruction time offered in10th grade (H (3) = .577, p=.902), 11th grade (H (3) = .245, p=.970), or 12th grade (H (3) = 3.464, p=.325).

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Table 2. Repeated Measures Analysis of Variance (ANOVA) to Compare Minutes of Physical Education Per Week by Grade Level Between Classifications of School Size.

	School Size Categories				p-values		
Grade Level	A (N=9)	AA (N=6)	AAA (N=10	AAAA (N=12)	Grade	School Size	Grade X School Size
10th grade	111.3±65.3	101.9±47.0	104.5±49.7	95.8±56.2	0.213	0.938	0.115
11th grade	97.8±62.7	101.9±47.0	106.1±55.7	95.8±59.7			
12th grade	66.0±45.2	101.9±47.0	106.1±55.7	95.8±59.1			

A one-way ANOVA was computed to compare the differences in teacher qualifications as determined by the number of teachers with an undergraduate degree or graduate degree in physical education within each school and the percent of teachers with an undergraduate degree or graduate degree in physical education within each school and school size. As shown in Table 3, a significant difference was found for the number of teachers with an undergraduate degree within each school (F (3, 31) =2.923, p=.049). Post-hoc comparisons using the LSD test indicated that for the number of teachers with an undergraduate degree for PIAA class A schools (3.8±1.1) was significantly lower when compared to PIAA class AAAA schools (5.3±1.5). However, there was no significant difference between the percent of teachers with an undergraduate degree (F (3, 31) =.522, p=.671) between school size classifications. Moreover, there was no significant differences found for the number of teachers with a graduate degree (F (3, 31) =.877, p=.464) or the percent of teachers with a graduate degree (F (3, 31) = .149, p=.929) between school size classifications.

Table 3. One Way Analysis of Variance (ANOVA) to Compare Physical Education Teacher Qualifications within Each School by Classifications of School Size.

Teacher Qualifications	School Size Categories	AA (N=6)			F value	
	A (N=9)		AAA (N=8)	AAAA (N=12)		p-value
Number of						

Teachers with Undergraduate Degree	3.8 ±1.1 [a]	4.0 ±1.1	4.8 ±1.0	5.3 ±1.5[a]	2.923	0.049
Percent of Teachers with Undergraduate Degree	100.0±.0	95.8±10.2	100.0±.0	93.1±24.1	0.522	0.671
Number of Teachers with Graduate Degree	2.3 ±1.9	3.0 ±2.3	3.3 ±2.1	3.8±2.2	0.877	0.464
Percent of Teachers with Graduate Degree	58.2±28.7	66.7±36.8	67.1±38.5	68.1±39.1	0.149	0.929

Note: Values with the same superscript within each grade level are significantly different at $p<0.05$.

To compare the number of facilities including the total number of facilities, number of indoor spaces, number of outdoor grass spaces and the number of outdoor concrete spaces available within each school to support physical education and school size, a one-way ANOVA was computed. As shown in Table 4, a significant difference was found for the number of available indoor spaces between schools based on PIAA classification ($F(3, 31) = 3.519$, $P=.026$). Post-hoc comparisons using the Tukey test indicated that for the number of available indoor spaces to support physical education within each school for PIAA class A schools (1.8±0.8) was significantly lower than for PIAA class AAAA schools (3.7±1.5). No significant difference was found for the total number of facilities ($F(3, 31) = 1.286$, $p=.297$), the number of available of outdoor grass spaces ($F(3, 31) = .409$, $p=.748$), or the number of outdoor concrete spaces ($F(3, 31) = .1.359$, $p=.274$).

In addition to the total number of facilities available to support physical education, data was also collected to determine the specific types of facilities available within the study schools. The chi-square test of independence was used to compare the availability of facilities including a swimming pool, track, rock climbing wall and a fitness center within each school and school size. A significant relationship was found for the availability of a climbing wall by school size with a higher number of small schools having a climbing wall available for physical education ($x^2(3) = 8.185$, $p=.042$). No significant relationship was found between school size and the availability of a swimming pool ($x^2(3) = 4.318$,

p=.229), the availability of a track ($x^2(3) = .700$, p=.873), or the availability of a fitness center ($x^2(3) = 1.488$, p=.685).

Table 4. One Way Analysis of Variance (ANOVA) to Compare the Facilities Available to Support Physical Education between Classifications of School Size.

Facilities	School Size Categories A (N=9)	AA (N=6)	AAA (N=8)	AAAA (N=12)	F Value	p-value
Total Facilities	7.6±2.1	9.8±4.8	9.4±3.4	10.7±4.0	1.286	0.297
Indoor Spaces	1.8±0.8[a]	3.5±2.1	3.8±1.7	3.7±1.5[a]	3.519	0.026
Outdoor Grass Spaces	2.6±1.2	2.8±2.4	3.2±2.3	3.4±1.8	0.409	0.748
Outdoor Concrete Spaces	0.9±0.8	0.8±0.8	0.6±0.7	1.4±1.2	1.359	0.274

Note: Values with the same superscript within each grade level are significantly different at p<0.05.

3.5.2School Location

To determine the effect of school location on physical education instruction time, a two-factor (Grade X
School Size) repeated measures ANOVA was performed and revealed no significant Grade Effect, School Locale Effect, or Grade X School Locale Interaction Effect for minutes of physical education offered. These data are shown in Table 5. Results of the non-parametric test, Kruskal-Wallis H Test, revealed a non-significant difference between physical education instruction time and school locale.

Table 5. Repeated Measures Analysis of Variance (ANOVA) to Compare Minutes of Physical Education Per Week by Grade Level Between School Locales.

Grade Level	School Locale Categories Large City (N=3)	Urban Fringe of a Large City (N=22)	Rural Outside CBSA (N=5)	Rural Inside CBSA (N=7)	p-values Grade	School Locale	Grade X School Locale
10th grade	119.3±78.2	103.8±47.8	80.5±62.7	108.9±63.1	0.145	0.381	0.100
11th grade	119.3±78.2	104.5±52.2	56.3±32.7	108.9±63.1			
12th grade	119.3±78.2	104.5±52.2	59.4±30.1	65.8±47.4			

A one-way ANOVA was computed to compare the differences in school locale and teacher qualifications within each school. As shown in Table 6, a significant difference was found for the number of teachers with an undergraduate degree within each school (F (3, 31) =4.795, p=.007). Post-hoc comparisons using the Tukey test indicated that the number of teachers with an undergraduate degree for schools classified as "urban fringe of a large city" (5.1±1.0) was significantly higher than schools classified as "rural, outside CBSA" (3.2±0.4). No significant differences were found for the number of teachers with a graduate degree (F (3, 31) =.1.040, p=.389), the percent of teachers with an undergraduate degree (F (3, 31) = 1.377, p=.286), or the percent of teachers with a graduate degree
(F (3, 31) = .658, p=.584)

Table 6. One Way Analysis of Variance (ANOVA) to Compare Teacher Qualifications within Each School by Between School Locales.

Teacher Qualifications	School Locale Categories Large City (N=3)	Urban Fringe of a Large City (N=22)	Rural Outside CBSA (N=5)	Rural Inside CBSA (N=7)	F value	p-value
Number of Teachers with Undergraduate Degree	4.0±0.0	5.1±1.0 [a]	3.2±0.5 [a]	3.8±1.9	4.795	0.007

Number of Teachers with Graduate Degree	3.5±0.7	3.2±2.1	1.8±0.8	4.0±3.0	1.040	0.389
Percent of Teachers with Undergraduate Degree	100.0± 0.0	98.9±5.3	100.0± 0.0	86.1±34.0	1.377	0.268
Percent of Teachers with Graduate Degree	87.5±17.7	62.2± 36.7	55.0±20.1	76.4±41.0	0.658	0.584

Note: Values with the same superscript within each grade level are significantly different at $p<0.05$.

A one-way ANOVA was computed to compare the number of facilities including the total number of facilities, number of indoor spaces, number of outdoor grass spaces and the number of outdoor concrete spaces available within each school to support physical education and school locale. As shown in Table 7, no significant differences were found between school locale and the total number of facilities available within each school to support physical education ($F (3, 31) = 1.146$, $p=.346$), the number of indoor spaces available ($F (3, 31) =1.199$, $p=.326$), the number of outdoor grass spaces available ($F (3, 31) = 1.361$, $p=.273$), or the number of outdoor concrete spaces available ($F (3, 31) = .459$, $p=.731$).

The chi-square test of independence was used to compare the availability of facilities including a swimming pool, track, rock climbing wall and a fitness center within each school and school locale. A significant relationship was found between school size and the availability of a climbing wall ($x^2(3) = 8.827$, $p=.032$). No significant relationship was found between school size and the availability of a swimming pool ($x^2(3) = 1.294$, $p=.731$), the availability of a track ($x^2(3) = 1.160$, $p=.763$), or the availability of a fitness center ($x^2(3) = 1.099$, $p=.777$).

Table 7. One Way Analysis of Variance (ANOVA) to Compare the Facilities Available to Support Physical Education between School Locales.

Facilities	School Locale Categories Large City	Urban Fringe of a Large City	Rural Outside CBSA	Rural Inside CBSA	F Value	p-value
Total Facilities	7.0±4.2	10.0±3.6	7.2±1.5	10.2±5.0	1.146	0.346
Indoor Spaces	3.0±1.4	3.5±1.7	2.0±1.0	3.0±2.1	1.199	0.326
Outdoor Grass Spaces	1.0±1.4	3.2±1.9	2.4±1.1	3.7±2.1	1.361	0.273
Outdoor Concrete Spaces	0.5±0.7	1.1±1.0	0.8±0.8	0.8±0.8	0.459	0.713

Note: Values with the same superscript within each grade level are significantly different at $p<0.05$.

3.5.3 Socioeconomic Status (SES)

To determine the effect of SES on physical education instruction time, a two-factor (Grade X School SES Status) repeated measures ANOVA was performed and revealed a non-significant Grade Effect, School SES Status Effect, and Grade X School SES Status Interaction Effect for minutes of physical education offered. These data are shown in Table 8. Results of the non-parametric test, Kruskal-Wallis H Test, revealed a non-significant difference between physical education instruction time and school SES status.

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Table 8. Repeated Measures Analysis of Variance (ANOVA) to Compare Minutes of Physical Education Per Week by Grade Level Between School SES Status.

School SES Status			p-values			
Lowest Tertile (1% to <14.8%) (N=13)	Middle to Tertile (14.8% <32.3%) (N=11)	Highest Tertile (32.3% to 100%) (N=13)	Grade	School SES Status	Grade X Locale	School
81.3±44.7	96.3±47.3	130.0±58.5	0.248	0.089	0.698	
76.7±45.2	103.2±53.6	120.7±60.1				
76.7±45.2	89.5±51.3	110.3±60.7				

A one-way ANOVA was computed to compare the differences in teacher qualifications within each school and SES status. As shown in Table 9, SES status of the school did not appear to affect the number of teachers with an undergraduate degree (F (2, 32) = .776, p=.469) or the number of teachers with a graduate degree (F (2, 32) = 2.065, p=.143),the percent of teachers with an undergraduate degree (F (2, 32) = 1.560, p=.226), or the percent of teachers with a graduate degree (F (2, 32) = .567, p=.573).

Table 9. One-Way Analysis of Variance (ANOVA) to Compare Teacher Qualifications within Each School by School SES Status.

Teacher Qualifications	School SES Status Lowest Tertile (1% to <14.8%) (N=13)	Middle to Tertile (14.8% <32.3%) (N=11)	Highest Tertile (32.3% to 100%) (N=13)	F value	p-value
Number of Teachers with Undergraduate Degree	4.8 ±1.6	4.6 ±1.4	4.2 ±1.0	0.776	0.469
Number of					

Teachers with Graduate Degree	3.9 ±2.2	3.4 ±2.6	2.3 ±1.1	2.065	0.143
Percent of Teachers with Undergraduate Degree	91.0±24.5	100.0±.00	100.0± 0.0	1.560	0.226
Percent of Teachers with Graduate Degree	72.4± 38.6	65.8±37.3	57.1± 29.3	0.567	0.573

Note: Values with the same superscript within each grade level are significantly different at $p<0.05$.

A one-way ANOVA was computed to compare the number of facilities including the total number of facilities, number of indoor spaces, number of outdoor grass spaces and the number of outdoor concrete spaces available within each school to support physical education and school SES status. As shown in Table 10, no significant differences were found between school SES status and the total number of facilities available within each school to support physical education ($F(2, 32) = .303$, $p=.741$), the number of indoor spaces available ($F(2, 32) =2.248$, $p=.122$), the number of outdoor grass spaces available ($F(2, 32) = .251$, $p=.780$), or the number of outdoor concrete spaces available ($F(2, 32) = 1.161$, $p=.326$).

The chi-square test of independence was used to compare the availability of facilities including a swimming pool, track, rock climbing wall and a fitness center within each school and school locale. No significant relationship was found between school SES status and the availability of a swimming pool ($x^2(2) = .725$, $p=.696$), the availability of a track ($x^2(2) = .217$, $p=.897$), the availability of a climbing wall ($x^2(2) = 2.553$, $p=.279$), or the availability of a fitness center ($x^2(2) = .375$, $p=.829$).

Table 10. One-Way Analysis of Variance (ANOVA) to Compare the Facilities Available to Support Physical Education between School SES Status.

Facilities	School SES Status Lowest Tertile (1% to <14.8%)	Middle Tertile (14.8% to <32.3%) (N=11)	Highest Tertile (32.3% to 100%) (N=13)	F value	p-value

	(N=13)				
Total Facilities	10.1±3.2	9.3±4.0	8.9±4.0	0.303	0.741
Indoor Spaces	4.0±1.5	2.9±1.9	2.7±1.5	2.248	0.122
Outdoor Grass Spaces	3.2±1.9	3.3±1.7	2.8±2.1	0.251	0.780
Outdoor Concrete Spaces	0.8±1.1	0.8±0.8	1.3±0.9	1.161	0.326

Note: Values with the same superscript within each grade level are significantly different at $p<0.05$.

4. Discussion

Improving the quality of physical education is necessary to achieve potential health-benefits in children and adolescents (Carrel et al., 2005; Dietz, 1997;Pate et al., 2006; and Sallis et al., 1997). To help guide the development of quality physical education programs, the Society of Health and Physical Educators (SHAPE) has proposed guidelines for physical education instruction time, physical education teacher qualifications, and availability of physical education facilities. This study focused on describing these components in high schools (10^{th}, 11^{th}, 12^{th} grades) located in southwestern Pennsylvania, and examined whether there are demographic characteristics of the school (locale, size, SES status) that affect these factors. This information may be valuable in understanding how to improve the quality of physical education across schools with diverse characteristics, and may lead to the development of interventions and policies to improve the quality of physical education in high schools.

Results of this study indicates there is no significant relationship between schools size and physical education instruction time, teacher qualifications or facilities. These results are in contrast to the current literature, as reported by Jones et al. (2005), which suggests that larger schools may have more health promoting policies and facilities than smaller schools thus offering students increased opportunities physical activity. Although this research suggests that school size may affect opportunities for physical activity, the current study measured instruction time for physical education

and not participation in physical activity which may account for the lack of association. The results of this study suggest that the locale of the school has limited impact on the physical education variables examined.

For example, while this study showed a significant difference in the number of physical education teachers with an undergraduate degree based on school locale, this finding may simply reflect differences in school size, because there was no significant difference for the percent of physical education teachers with an undergraduate or graduate degree when compared school locale categories. Moreover, aside from access to a rock climbing wall, access to facilities to support physical education instruction appears to be unaffected by the locale of the school. However, these findings that suggest no effect of school locale of physical education instruction variables may be inconsistent with the current literature. Springer et al. (2009) conducted a study to examine physical activity levels of students in 4^{th}, 8^{th}, and 11^{th} grades by urban, suburban and rural locations, and found that urban students reported lower levels of physical activity compared to students in suburban and rural locations. These results suggests that locale may affect participation in physical activity in children and adolescents; however, the current study assessed instruction time rather than time spent engaged in physical activity which may account for the differences in findings between these studies.

Thus, it may be necessary to further examine the effect of school locale on components of physical education instruction, which may provide insight into how these potential differences affect the quality of physical education programs in these geographical areas.

The results of this study suggest that there was no significant relationship between school SES status, instruction time, teacher qualifications or facilities. These results are in contrast with the current literature. Butcher et al. (2008) examined if demographic factors such as race/ethnicity, education level, and SES status affected physical activity participation in adolescents and found that adolescents living a household of higher SES status participated in higher levels of physical activity when compared to middle and low SES households. Although this research suggests that SES status may affect physical activity participation, the current study measured instruction time in physical education, which may account for the lack of association in the results.

4.1 Limitations

This study is not without limitations which could impact the application of the observed results. First,the survey used in this study assessed the days per week and the number of minutes that physical education is offered to high school students in Southwestern Pennsylvania. However, this may not reflect the time that students are actually engaged in physical activity during physical education class. Also, this survey did not include participation in physical activity outside of the physical education class. The second limitation of this study was the small sample size and limited geographic region. Physical education curriculum components reported for schools in Southwestern Pennsylvania are not generalizable to schools in other regions. Lastly, the study was conducted in 2009 and the data may not reflect what is currently being implemented in these schools. Although this study was not without limitations, it is the first study to describe the ability of schools in Southwestern Pennsylvania to achieve

SHAPE's components for quality physical education and to investigate the effect of demographic factors such as school size, school locale and SES status on the ability to achieve these components.

4.2 Conclusion

Improving the quality of physical education is necessary to achieve potential health-benefits in children and adolescents (American Heart Association, 2013; Carrel et al., 2005; Luke et al., 2004; and Allis et al., 1997). To help guide the development of quality physical education programs, the Society of Health and Physical Educators (SHAPE) has proposed guidelines for physical education instruction time, physical education teacher qualifications, and availability of physical education facilities. This study focused on describing these components in high schools (10^{th}, 11^{th}, 12^{th} grades) located in southwestern Pennsylvania, and examined whether there are demographic characteristics of the school (locale, size, SES status) that affect these factors. This information may be valuable in understanding how to improve the quality of physical education across schools with diverse characteristics, and may lead to the development of interventions and policies to improve the quality of physical education in high schools.

The results of the current study suggest that teacher qualifications, facilities and demographic factors such as school size, locale and SES status do not influence physical education instruction time and consequently, do not impact the quality of physical education. Quality physical education, however, may be necessary for improving health outcomes in children. Thus, it becomes important to identify other factors or barriers to implementing quality physical education. Results of a study conducted by Barroso et al (2005) revealed that physical education teachers identified factors such as large class sizes, low priority compared to other academic subjects and inadequate financial resources as the top three barriers to implementing quality physical education programs. Future research is needed to indentify strategies for improving the quality of physical education despite these barriers.

Although the present study was not without limitations, it is the first study to investigate the ability of schools in Southwestern Pennsylvania to achieve SHAPE's components for quality physical education and to determine whether there are demographic factors that affect the ability of the schools to implement these guidelines. While this study examined the effect of these factors on physical education instruction time, it is important to differentiate instruction time from measured physical activity within the period of physical education instruction and participation in physical activity during the school day outside of physical education. In fact, the current literature investigating the influence of demographic factors on physical education has focused on physical activity rather than instruction time (Butcher et al., 2008, Haug et al., 2008; McKenzie et al., 1996; and Springer et al., 2009). However, the SHAPE guidelines for quality physical education focus on instruction time. Therefore, it may be necessary to revise the guidelines for a quality physical education to include participation in physical activity rather than duration of instruction time.

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