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Student Moves: A Mixed Methods Cross- Sectional Study of Elementary School- Based Physical Education in Omaha Public Schools

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STUDENT MOVES

A MIXED METHODS CROSS- SECTIONAL STUDY OF ELEMENTARY SCHOOL- BASED PHYSICAL EDUCATION IN OMAHA PUBLIC SCHOOLS

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Abstract

Childhood obesity is one of the leading pediatric health problems and a major concern among Omaha metro parents (Professional Research Consultants, 2015). While there are many inter-related factors that contribute to the development of obesity, physical inactivity is a prominent risk factor. Targeting physical activity in health promotion is desirable for its feasibility and effectiveness in balancing energy consumption and expenditure (Hill, 2012). The Student Moves research project sought to inform school district and community strategies for promoting youth physical activity by assessing current physical education practices among a random sample of third- grade students in Omaha Public Schools. Variables of interest included: frequency, intensity and duration of physical activity obtained through physical education class. Trained and certified graduate research assistants conducted the on-site observations using the System for Observing Fitness Instruction Time, a validated observational instrument appropriate for this population and context. A secondary objective of the research project was to investigate the school wellness environment, assessed by the School Health Index. The student researcher administered the School Health Index (condensed online survey instrument available through Action for Healthy Kids). The version administered to schools was adapted from the CDC's School Health Index and administered to building principals to assess the school wellness environment related to: *nutrition, physical activity and physical education, as well as family and community engagement.*

This mixed-methods cross-sectional study provided valuable information regarding elementary school-based physical education for OPS administration to assess variability in student physical activity levels, compliance with district physical education standards and wellness policy goals related to physical activity and education. Additionally, it may inform out of school

programming providers, family, and community strategies for addressing the U.S. Physical Activity Guidelines for Americans' recommendation that all children receive 60 minutes of daily physical activity (Office of Disease Prevention and Health Promotion, CDC, 2008). The potential impact of the proposed research is significant. Greater understanding of current physical education practices in Omaha Public Schools facilitates data-informed decision-making at the school board, district, building, and household level.

Placement Site

Live Well Omaha Kids represents a collaboration of over 40 diverse community organizations, including Omaha Public Schools, working to improve the health and wellness of Omaha, specifically targeting childhood obesity among 0-8-year olds. The mission of Live Well Omaha Kids is to "work collaboratively to reduce and prevent childhood obesity in Greater Omaha by creating healthy environments for all children and families through advocacy, education, policy development, and environment change." Now in its seventh year of operations, Live Well Omaha Kids collaborates with public, private and not-for-profit entities to maximize community impact of the collective work happening within the Omaha metro area by: acting as the backbone collective impact organization for childhood obesity prevention in Omaha, conducting needs assessments, partnering with local school districts around school wellness policy and safe routes to school, and advocating for policies that promote healthy weight status in youth.

The graduate internship was a fixed term beginning July 2017 and concluding July 2018. Activities performed included:

- Safe Routes to CUES Schools project manager
- Survey of Partners for Healthy Schools membership to inform new strategy/ format

- Evaluation plan for Partners for Healthy Schools program
- Toolkits for schools: school wellness councils, employee wellness, physical activity and community partnerships
- School Wellness Policy Work Group facilitator
- Informational meetings with key community and school district leaders to inform healthy weight advocacy strategy
- Advocacy on early childcare HEPA standards

Throughout the summer and fall 2017, the graduate intern met with All Saints, Holy Name and Sacred Heart School, of Christian Urban Education Services, to implement the Safe Routes to School program. Project management duties included: drafting meeting agendas, minutes and presentations, developing Safe Routes to School toolkits, scheduling and facilitating meetings with school and district leadership, administering assessments and convening community partners in planning walk audits. Two validated instruments- the Safe Routes to School Parent Survey and Student Travel Tally- were used to assess parent perception of active transit to/from school and current student travel patterns. In March 2018, all three schools hosted a walk audit to engage school, neighborhood and community stakeholders in identifying and prioritizing barriers to active transportation to and from school. In July 2018, it is expected the graduate intern will conduct a workshop with the Christian Urban Education Services to implement a district Safe Routes to School policy.

Introduction

The U.S. Physical Activity Guidelines for Americans states children six years and older should get at least 60 minutes of daily physical activity (Office of Disease Prevention and Health

Promotion, CDC, 2008). Physical activity has been to shown to improve cognitive function (CDC, 2010). Physical inactivity, by contrast is a major risk factor for a panacea of adverse health conditions, such as: obesity, cardiovascular disease, diabetes, stroke, hypertension, certain cancers and depression. Sedentary individuals have an average life expectancy 20-30% shorter than physically active individuals (WHO, 2017). Considering children between the ages of 5- 18 years of age spend a significant proportion of their time in school, schools are an ideal place to address disparities in access to physical activity opportunities outside the school environment, as well as promote physical activity for all as a primary prevention strategy for childhood obesity (Action for Healthy Kids, 2004).

Despite reported declines in physical education program budgets, a meta-analysis conducted by the CDC on the link between student health and academic achievement reported the following:

- "Students who are physically active tend to have better grades, school attendance, cognitive performance, and classroom behaviors."
- "More participation in physical education class has been associated with better grades, standardized test scores, and classroom behaviors among students."
- "Increased time spent for physical education does not negatively affect students' academic achievement (CDC, 2014)."

Problem Statement

In Douglas county, 22% of children between the ages of 5-17 are overweight or obese. Of those, 12.3% are obese, defined as a body mass index of 95th percentile or greater on a standard U.S. growth chart (Douglas County Health Department, 2015). Further, only 52.7% of surveyed parents with children between the ages of 2- 17 years old, residing in the Greater Omaha

metropolitan area, reported that their child was physically active for at least one hour daily for the preceding week (Professional Research Consultants, 2015). Childhood obesity adversely impacts student health and academic performance. One study in the International Journal of Obesity found severely obese students were four times more likely to miss school than their healthy weight classmates (Li, 2012).

Most schools nationally and locally do not meet the Society of Health and Physical Educators (SHAPE America) physical education standard recommendation of 150 and 225 minutes of PE weekly at the elementary and secondary level, respectively (SHAPE America, 2016). The CDC's School Health Policies and Practices Study: 2014 found only 4% of schools nationwide provided students with 150 minutes of minutes of elementary physical education weekly (CDC, 2015). According to the Nebraska Youth Risk Behavior Survey, about half (52.8%) of Nebraska high school students meet the 2008 U.S. Physical Activity Guidelines for Americans of 60 minutes of daily physical activity (Bureau of Sociological Research University of Nebraska at Lincoln, 2016). The majority of time spent in daily physical activity should be moderate- vigorous intensity (Office of Disease Prevention and Health Promotion, CDC, 2008).

SHAPE America conducted an analysis of state- level policies with respect to school- based physical education. Seven states do not require elementary schools to provide physical education. Nineteen out of fifty states and the District of Columbia require a specific number of physical education minutes per week, including Missouri, North Dakota and Ohio. Six states require a minimum of 150 minutes of PE weekly- Alabama, Florida, Louisiana, New Jersey, Oregon and D.C. Additionally, Mississippi requires 150 minutes of activity-based instruction weekly. Colorado requires a monthly minimum of 600 minutes of physical activity for all elementary

students through: ‘recess, physical education class, fitness breaks, classroom activities that include physical activity, exercise programs, or field trips that include physical activity.’ Colorado state law also prohibits withholding physical activity as punishment, such as eliminating recess for poor classroom behavior (SHAPE America, 2016).

The primary goal of this research project is to quantify how active a cross section of third grade students are in a given week in Omaha Public Schools by directly observing school-based physical education. This information is not reported to the Nebraska Department of Education, nor is it required to be provided to parents through district wellness reporting. Therefore, there is no centralized tracking or reporting of this data, which presents a gap in knowledge from a community health perspective. There is currently no state mandate for physical education minutes (Whitehouse, 2017). The Nebraska Department of Education recently updated state physical education standards, which were adopted by the Nebraska Board of Education in 2016. These competency- based standards are voluntary and do not specify a minimum time requirement (Nebraska Department of Education, 2016).

Importance of Project

The purpose of the proposed research project is to inform school and community efforts in encouraging physical activity among students by assessing how much moderate- vigorous physical education and corresponding physical activity an elementary student in OPS receives in a typical week. School-based physical activity and physical education are evidence-based strategies for the prevention of childhood obesity (CDC, 2017). In Douglas county, 22% of children between the ages of 5-17 are overweight or obese (Douglas County Health Department, 2015). Statewide, 29.2% of children between the ages of 10- 17 are overweight or obese. Among

2- 4-year olds participating in the Special Supplemental Nutrition Program for Women, Infants and Children (WIC), the obesity rate in Nebraska is 16.9% (Trust for America's Health, Robert Wood Johnson Foundation, 2017). Children with an unhealthy weight status are predisposed to maintain an unhealthy weight into adulthood; between 70- 80% of overweight children will become overweight or obese adults (Action for Healthy Kids, 2004).

Significant efforts are underway within Omaha Public Schools to adequately capture school-level wellness practices, including progress toward student physical activity goals for district wellness reporting. Mandatory evaluation and public reporting of school-level wellness efforts are required on a triennial basis, as mandated by the Healthy Hungry Kids Act of 2010, and affirmed in the USDA's final rule on local school wellness policy (published in the Federal Register on July 21, 2016) that took effect during the 2016-2017 school year (USDA, 2017).

A study of 773 school districts nationally demonstrated that 'districts in the Midwest and South addressed fewer items in their wellness policies and provisions were weaker than policies in the West and Northeast as of school year 2013-14 (Piekarz, 2016).' Strong wellness policy provisions were characterized as being required, rather than encouraged, and specified a defined implementation plan. By the 2013- 2014 school year, 90% of school district wellness policies included a physical education provision. When a district wellness policy included a physical education provision, less than a quarter of the time that provision was actually required. More commonly, physical education provisions were weak and suggested certain actions, rather than requiring them. One quarter (25%) of district wellness policies addressed a time requirement for elementary physical education. Nearly one in five (21%) policies required daily recess for

elementary students. Bridging the Gap endorses specifying required time for physical education in district wellness policies to meet national standards (Piekarz, 2016).

Comprehensive school physical activity programs are an evidence-based approach to increasing student physical activity levels in the school environment, yet only eight states require daily physical education in school and Nebraska is not among them (SHAPE America, 2016). A national survey of 1,951 elementary school principals revealed one in five schools reduced recess time to accommodate state testing requirements and the mean recess time reported by elementary school principals was between 16- 30 minutes daily (Robert Wood Johnson Foundation, 2010). Nationally, “one in four elementary schools no longer provides recess to all grades (Robert Wood Johnson Foundation, 2010)." In a separate study of 11,000 third- grade students, daily recess time of fifteen minutes or greater was associated with better, on-task behavior, as reported by the classroom teacher (Barros, 2009).

Literature Review

According to meta-analysis commissioned by the CDC, “students who are physically active tend to have better grades, school attendance, cognitive performance (e.g., memory), and classroom behaviors (e.g., on-task behavior) (CDC, 2010) (Michael, 2015).” “Higher physical activity and physical fitness levels are associated with improved cognitive performance (e.g., concentration, memory) among students (CDC, 2010) (Michael, 2015).” Physical inactivity is a risk factor for childhood overweight and obesity (CDC, 2017). High- quality, frequent physical education and daily school-based physical activity have been posited as effective strategies in eroding the achievement gap as minority youth, particularly females, are less likely to be physically active and physically fit than White youth. The same literature review concluded that minority youth

most likely to be physically inactive had inferior access to school-based physical activity opportunities and resources (Basch, 2011).

There are many methods of assessing physical activity, including: self-report questionnaires, self-report activity logs, direct observation, accelerometers, pedometers, heart rate monitors, and armbands. Sylvia et al (2014) compiled a literature review of the indications, benefits and constraints of each method. Self-report questionnaires and activity logs, while among the most popular of physical activity assessments due to their relative ease of administration and low cost, are not ideal for elementary school children due to their lack of reliable recall (Anderssen N, 1995). There are many commonly used self-report questionnaires available, such as: Modifiable Activity Questionnaire (MAQ), Previous Week Modifiable Activity Questionnaire (PWMAQ), Recent Physical Activity Questionnaire (RPAQ), International Physical Activity Questionnaires (IPAQ), Previous Day Physical Activity Recall (PDPAR), and 7-day Physical Activity Recall (PAR) (Sylvia, 2014). Yet their validity is inconsistent across studies (Westerterp, 2009). Self-reporting is also not well-suited for the school environment because it presents a potential disruption of instructional time, if administered within the classroom.

Pedometers do not assess frequency, intensity and duration of physical activity, making this method ill-suited for the present research study. Armbands have been narrowly validated for children due to their difficulty differentiating high-intensity physical activity (Andreacci, 2006). Accelerometers, direct observation and the following self- report questionnaires: PDPAR, IPAQ, PAR and BAR, have all been validated for use in assessing physical activity among young children (Sylvia, 2014). Due to the prohibitive cost of accelerometers and the subject burden/

validity concern related to self-report questionnaires, direct observation has been selected as the method of physical activity measurement.

McKenzie and Smith (2017) conducted a literature review of studies that used the System for Observing Fitness Instruction Time (SOFIT) as a validated direct observation instrument to assess frequency, intensity and duration of school-based physical and found the majority of studies were completed in elementary schools, affirming the present study's data collection methodology. SOFIT involves the use of an audio cueing system to record observations at a regular interval. Not only does SOFIT capture data about time spent engaging in physical activity, it also captures lesson context, whether students were engaged in moderate or vigorous physical activity, and the interaction of the physical educators in encouraging student physical activity. Thus, reliable outcome variables are: number of minutes in moderate- vigorous physical activity (MVPA), the proportion of instructional vs. active class time, and the estimated energy expended in a single class (McKenzie T., 2012). McKenzie and Smith acknowledged in their literature review several reporting limitations inhibited study comparability, including: very few studies reported lesson frequency, so that weekly PE minutes could be calculated. Lesson content was also rarely described, which has the potential to confound comparability as certain activities engage students in more moderate to vigorous physical activity than others. Understanding these shortcomings, the present study will attempt to identify lesson content and physical education frequency.

Among direct observation instruments, SOFIT, which is conducted in the context of physical education, is among the most commonly used tools. It has been validated against heart rate and oxygen uptake, with significant agreement (Hadabi, 2015). In a study similar to the present

proposal, McKenzie et al (2011) employed SOPLAY in 13 San Diego elementary schools to estimate school-based physical activity for nearly 37,000 students during three time periods: before school, at recess and during lunch. He concluded that if schools were offering an average of 30 minutes of recess daily on non-PE days based on the observed proportion of time students spent engaged in moderate- vigorous physical at recess, before school (playground) and at lunch, then students were engaging in 20- 22 minutes of school- based physical activity (McKenzie T. L., 2010).

The School Health Index (SHI) is an online assessment of school health programs, practices and policies associated with youth risk behavior reduction. The SHI was developed by the CDC and is consistent with their School Health Guidelines for reducing youth health risk behaviors (CDC, 2017). The SHI facilitates school health policy, systems and environmental changes by identifying a school's areas of strength and weakness, enabling schools to create an action plan for improving student health, and can be used to support school wellness reporting, which is federally mandated for all local education agencies (USDA, 2017).

Objectives

1. Goal: assess school-based student physical activity levels in three OPS elementary schools (Crestridge, Joslyn and Western Hills Elementary)

    a. Objective #1- Quantify the frequency, intensity and duration of physical activity incurred in elementary physical education classes using SOFIT direct observation tool

        i. Activity #1- Recruit schools to participate in study from among the eight schools eligible for study inclusion as designated by OPS (March 2018)

ii. Activity #2- Conduct two random PE observations at each of the elementary schools recruited (observations occurred in April 2018)

iii. Activity #3 Perform descriptive statistics of SOFIT data across and within school sample

c. Objective #2 Analyze school wellness environment using the School Health Index

i. Activity #5 Schools complete the School Health Index to assess school health culture in the areas of physical education and physical activity programs, nutrition and family and community involvement (April 2018)

Methods

Research questions:

- How much physical education does a randomly- selected 3rd grade student receive in a typical week?
- What is the frequency, intensity and duration of the physical education class?
- ~~How much school-based physical activity does a randomly- selected 3rd grade student receive outside of PE in a typical school day?~~ *
- Is school health culture (assessed by the School Health Index) associated with school-based physical activity and education?

*This research question was struck at the request of the OPS Research Review Committee.

Application of theories/theoretical models

Student Moves' theoretical framework is the Socioecological Model of Health. Obesity is a complex health issue. Interventions that target systems change yield the greatest potential impact because individual behaviors are heavily influenced by contextual factors such as the environments in which they occur (Thorndike, 2017). Engineering an environment to make a healthy option the default choice, such as healthy foods in a vending machine, are more likely to be effective than interventions that rely on personal behavior change, especially among children

who often lack decision-making authority regarding household purchases and are more susceptible to the influence of peer pressure (Hanks, 2013). Exposure to fresh fruits and vegetables offered through a school garden and farm to school program; the opportunity to run and play at recess every day; and access to safe after-school recreational spaces represent system- level influences on diet and exercise in a child's environment.

Study Design

Student Moves is a mixed methods cross-sectional study using direct observation to validate intensity and duration of school-based physical activity incurred in physical education class. Submission of a two- week PE schedule (reflective of the standard PE schedule throughout the school year) was used to assess frequency of PE class for third grade classes involved in the study. The School Health Index provides an assessment of the percentage of building- level nutrition and physical education/ activity programs and policies 'fully in place,' 'partially in place,' 'under development' and 'not in place.'

Study Sample

Eight OPS elementary schools were identified by the OPS Research Review Committee as eligible for study inclusion. The following schools were contacted for study inclusion: Crestridge, Joslyn, Hartman, Kellom, Prairie Wind, Saddlebrook, Standing Bear and Western Hills Elementary. Two recruitment emails were sent to each principal and a phone call was made to each building in a period of one and a half weeks. Three schools agreed to participate: Crestridge Elementary, Joslyn Elementary and Western Hills Elementary.

Sample size

Approximately 400 third grade students were anticipated to participate in the observational research study, which included two third grade classrooms with an approximate enrollment size of 25 students, at each of the eight eligible elementary schools. Actual sample size was 129 students among the three elementary schools that elected to participate after three recruitment attempts.

Data sources

Data on student physical activity was collected from direct observation of school-based physical education using System for Observing Fitness Instruction Time (SOFIT) and the momentary time sampling method. SOFIT observations were conducted by graduate students in the Master of Public Health program at the UNMC College of Public Health. Both graduate students were certified SOFIT observers, having satisfactorily completed SOFIT training requirements for conducting field observations. School Health Index surveys were administered to school principals to complete collaboratively with the District Food Service Director and the Interim Director of Instruction for Physical Education (one survey was completed per school).

Additionally, each school submitted their PE schedule for the two- week period beginning Monday, April 2 and concluding Friday, April 13, 2018. It was confirmed with each school that this time period was reflective of their PE schedule throughout the school year. No state testing or other events took place during the observation period, which could have caused the school to deviate from their normal cycle schedule for PE.

Data collection

The System for Observing Fitness Instruction Time (SOFIT), a validated observational instrument, uses an audio cueing system for timing alternating intervals of observing and recording. Each ten second observation interval, a trained observer watches a randomly- selected student and assesses the following variables: the type of activity they are currently engaged in, the lesson context and whether the teacher promotes physical activity through verbal prompts. For understanding the type of physical activity the student is engaged in, the use of conventional physical activity codes was used: lying down, sitting, standing, walking, vigorous. The following lesson context codes were used: management, knowledge, fitness, skill drills, game play and other. Finally, to understand the PE teacher's contribution in promoting physical activity through demonstration and prompts, the following codes were used: in class, out of class and no activity prompts.

Activity Codes	
1	Lying down
2	Sitting
3	Standing
4	Walking
5	Vigorous

Context Codes	
M	Management
K	Knowledge
F	Fitness
S	Skills Drills
G	Game Play
O	Other

Teacher Prompt Codes	
I	In class
O	Out of class
N	No activity prompts

The activity codes have been validated through the use of accelerometers and pedometers as a reliable estimate of energy expenditure among elementary students (McKenzie, 2002) (Nader, 2003). Table 1 below shows each physical activity code with its corresponding estimated energy expenditure. Activity code 1- *lying down* is estimated to be the equivalent of .029 kilocalories per kilogram per minute. Activity code 2- *sitting down* corresponds to .047 kilocalories per kilogram per minute. Activity code 3- *standing* corresponds to .051 kilocalories per kilogram per

minute. These represent the sedentary physical activity codes. Activity code 4- *walking* is estimated to be the equivalent of .096 kilocalories per kilogram per minute. Activity code 5- *vigorous* corresponds to .144 kilocalories per kilogram per minute (McKenzie, 1991). Activity codes 4 and 5 can be summed to obtain a metric known as *moderate to vigorous physical activity,* MVPA (McKenzie, 2015). Moderate to vigorous physical activity is an important measure of physical education intensity because at least 50% of physical education class time students should be engaged in moderate to vigorous physical activity (SHAPE America, 2015).

Estimated Energy Expenditure by Activity Code (kilocalories/ kilogram/ minute)			
Sedentary	Lying down	0.029	kcal/kg/min
	Sitting	0.047	kcal/kg/min
	Standing	0.051	kcal/kg/min
Moderate	Walking	0.096	kcal/kg/min
Vigorous	Vigorous	0.144	kcal/kg/min

Figure 1

The School Health Index, an online survey instrument for assessing school health culture in the areas of physical education, physical activity, nutrition and family/ community engagement was administered online through the Action for Healthy Kids school portal. The OPS District Food Service Director completed Module 4: Nutrition questions since the answers were consistent across each of the schools. The other seven modules were completed at the building level by the principal and physical education teacher, where appropriate.

School Health Index	
Code	Answer
0	Not in place
1	Under development
2	Partially in place
3	Fully in place

The School Health Index includes 98 questions across the following eight modules: School Health and Safety Policies and Environment, Health Education, Physical Education and Other Physical Activity Programs, Nutrition Services, School Health Services, School Counseling, Psychological and Social Services, Health Promotion for Staff, and Family and Community Involvement. There are a total of 45 cross-cutting questions, 26 that relate directly to physical activity and 27 questions that relate to nutrition. Respondents selected answers based on the coding convention in figure 1.

Schedule of Observations

SOFIT observations occurred over a two-week period beginning Monday, April 2 and concluding Friday, April 13, 2018. School 1 observations were completed on Monday, April 2 and Tuesday, April 3. Class time was reported to be 1:10- 2:00 pm. School 2 observations occurred on Tuesday, April 10 and Wednesday, April 11, 2018. Class time was reported to be 12:35- 1:25 pm. School 3 observations occurred on Monday, April 9 and Thursday, April 12, 2018. Class time was reported to be 10:50- 11:40 am.

Both trained and certified SOFIT observers conducted Week 1 observations together. They arrived at the school site approximately 15- 20 minutes prior to the scheduled class time. Week 1 inter-rater reliability met the 80% threshold among field observers, so week two observations were conducted independently. The first field reliability agreement rate was 93.8%, based on 151 intervals that equated to 453 codes. There were 28 disagreements between observers. The second

field reliability agreement rate was 96%, based on 146 intervals that equated to 438 codes. There were 18 disagreements between observers on the second field observation.

Statistical and analytical methods

Descriptive statistics were completed using IBM® SPSS® Statistics Base GradPack 24 for Mac. Cross- tabulation was used to assess frequency and proportion of activity codes, lesson context and teacher prompts at the school- level and by case (n= 6 observations, or distinct classes).

Analysis included aggregate scoring of School Health Index results across each of the eight domains: School Health and Safety Policies and Environment, Health Education, Physical Education and Other Physical Activity Programs, Nutrition Services, School Health Services, School Counseling, Psychological & Social Services, Health Promotion for Staff, Family and Community Involvement.

Results

The Society for Health and Physical Educators of America recommends that elementary students receive at least 150 minutes of physical education time weekly (SHAPE America, 2015). They recommend that at least 50% of physical education time be spent in moderate to vigorous physical education and up to 50% for didactic instruction of health and physical education concepts (SHAPE America, 2015). The average number of PE sessions in a given week among all 6 classes was 1.33 (mode was one). The total average physical education time for Omaha Public Schools third grade students included in the Student Moves study was 62.5 minutes weekly. The mean proportion of time spent in moderate to vigorous physical activity was 67% across the three participating schools. Third grade students that participated in the Student Moves

study were engaged in moderate to vigorous physical activity for an average of 41.875 minutes per week in physical education class.

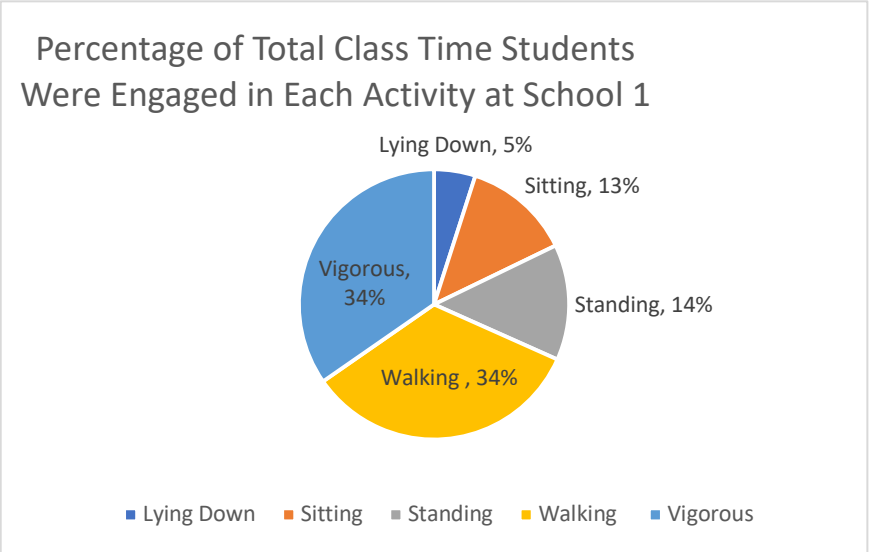
Frequency

At School 1, third grade students have PE once a week (twice in a two- week period) for a period of 50 minutes, plus an additional 25 minutes bi-weekly due to the school's involvement with Project Fit. Therefore, third grade students at School 1 receive a weekly average of 62.5 PE minutes. The frequency of physical education class was once weekly (twice in a two- week period) at School 2 for a total of 50 minutes per week. School 3 class 1 meets twice a week for 50 minutes, while class 2 meets once a week for 50 minutes each, resulting in School 3 class 1 students receiving 50 minutes of PE weekly and class 2 students receiving 100 minutes of PE weekly.

Intensity

The proportion of class time engaged in the activity codes: lying down, sitting, standing, walking and vigorous. It also varied by the lesson context: management, knowledge, fitness, skill drills, game plan and other. Lesson context refers to the activity type that the majority of the class are engaged in. Finally, teacher

Figure 2



interaction codes are an indicator of physical activity promotion on the part of the physical education instructor. The following teacher prompt codes were used: in class, out of class and neither.

At School 1, the total average proportion of class time that students were lying down was 5%, sitting down- 13%, standing- 14%, walking- 34% and 34% of class time students were engaged in vigorous physical activity (see figure 2).

The total average time School 1 students were engaged in moderate- vigorous physical activity was 69%. Moderate- vigorous physical activity (using the McKenzie standard protocol of summing walking and vigorous activity intervals) ranged from 67-71% among the two classrooms observed.

At School 2, the total average proportion of class time that students were lying down was 2%, sitting down- 6%, standing- 24%, walking- 45% and 23% of class time students were engaged in vigorous physical activity (see figure 3). The total average time School 2 students were engaged in moderate- vigorous physical activity was 68%. Moderate- vigorous physical activity ranged from nearly 60- 75% among the two classrooms observed.

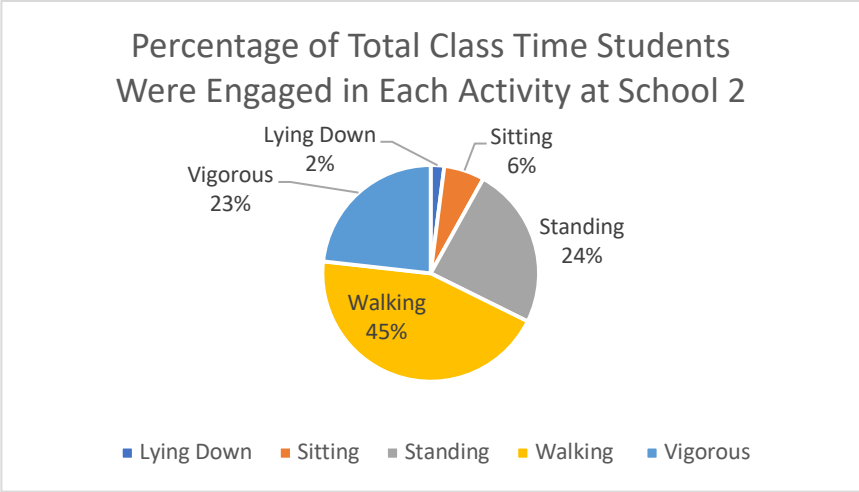


Figure 3

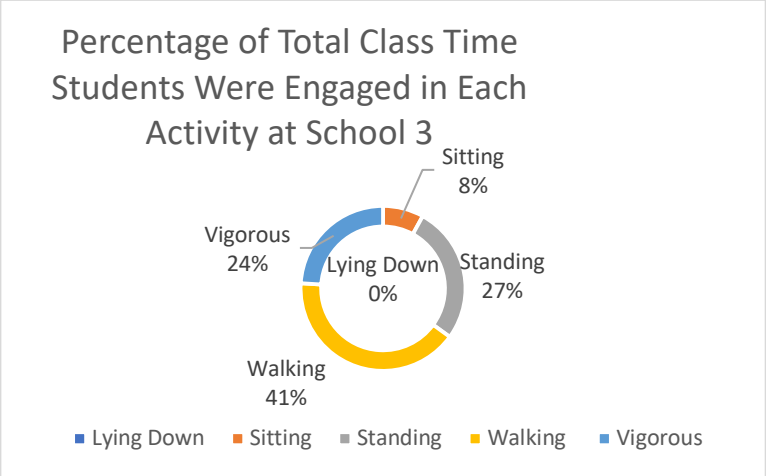


Figure 4

At school 3, the total average proportion of class time that students were lying down was 0%, sitting down- 8%, standing- 27%, walking- 41% and 24% of class time students were engaged in vigorous physical activity (see figure 4). The total average time School 3 students were engaged in moderate- vigorous physical activity was 65%. Moderate-vigorous physical activity ranged from 57- 74% among the two classrooms observed.

Cross- tabulation yielded frequencies of activity codes (by interval) for each observation. Since six distinct classrooms were observed, each individual observation served as a separate case. See figure 5 for the number of activity intervals by observation. On average, students were observed lying down for an average of 2% of PE class time (total average of all six observations). Students were observed sitting down 9% of class time, students were standing for 21% of observation intervals, walking was recorded 40% of observed intervals and students were engaged in vigorous physical activity 28% of total observation intervals.

Frequency of Activity and Total % of Class Time by Individual Observation, N=6						
Case	**Lying Down**	**Sitting**	**Standing**	**Walking**	**Vigorous**	**Total**
1	4	26	20	57	44	151
2	10	12	20	45	58	145
3	0	10	29	68	42	149
4	1	10	44	59	23	137
5	4	7	24	65	43	143
6	0	11	46	48	27	132

Total	19	76	183	342	237	857
% of Total	**2%**	**9%**	**21%**	**40%**	**28%**	1

Figure 5

Since school- level statistics represent an average of two separate classroom observations, the proportion of PE class time that students were engaged in moderate to vigorous physical activity (MVPA) was computed.

- Case 1 MVPA= 67%, or 34.17 minutes out of a total of 51 observed PE minutes
- Case 2 MVPA= 71%, or 34.79 minutes out of a total of 49 observed PE minutes
- Case 3 MVPA= 74%, or 37 minutes out of a total of 50 observed PE minutes
- Case 4 MVPA= 60%, or 27.6 minutes out of a total of 46 observed PE minutes

- Case 5 MVPA= 76%, or 36.48 minutes out of a total of 48 observed PE minutes
- Case 6 MVPA= 57%, or 25.65 minutes out of a total of 45 observed PE minutes

Frequency of Lesson Context Code by Observation, N=6
(Case * Context) Cross tabulation

		Context						
		F Fitness	G Game Play	K Knowledge	M Management	O Other	S Skill Practice	Total
Case	1	0	0	0	11	140	0	151
	2	0	0	0	10	135	0	145
	3	26	0	15	26	0	82	149
	4	27	55	2	53	0	0	137
	5	27	72	7	37	0	0	143
	6	32	26	1	43	0	30	132
Total		112	153	25	180	275	112	857

Figure 6

Figure 6 shows the frequency of each context code (by interval) for each observation. It is important to note that Case 1 and 2 represent observations at School 1. During this particular

recording period, the students were rewarded with 'free play.' Therefore, it is unsurprising that curricular lesson context was predominantly "other," with a small proportion of management time, reflecting minimal lesson content being delivered. See Figure C: *Lesson* Context *Frequency bar chart* in the appendix.

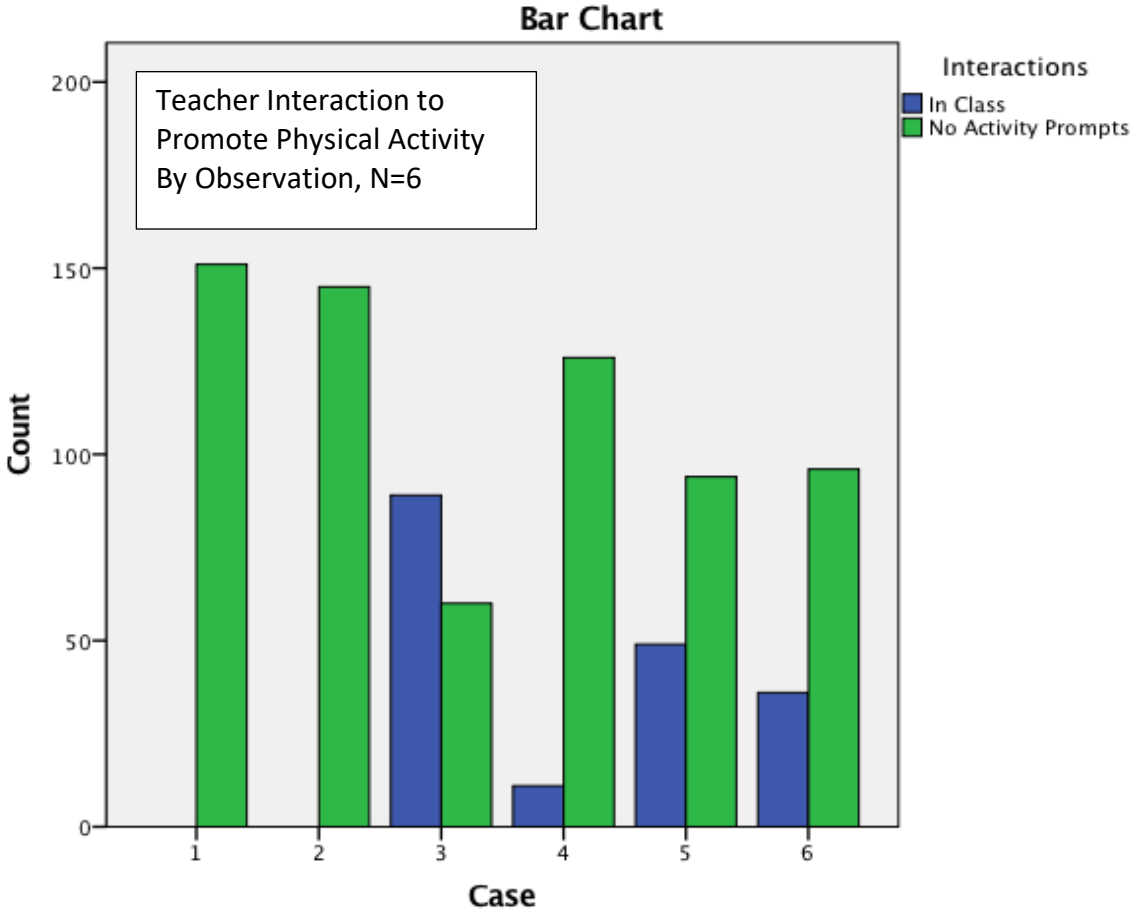


Figure 7

Figures 7 and 8 depict the frequency of teacher physical activity promotion. Zero out of class physical activity or fitness promotion codes were recorded at any of the six observations. At school 1, zero in- class physical activity or fitness promotion codes were recorded, though it is noteworthy that each class was given 'free play.'

Figure 8

Frequency of PE Teacher Interactions to Promote Physical Activity By Observation, N= 6 classes (Case * Interactions Cross tabulation)

		Interactions In Class	Neither	Total
Case	1	0	151	151
	2	0	145	145
	3	89	60	149
	4	11	126	137
	5	49	94	143
	6	36	96	132
Total		185	672	857

Duration

School 1 reported PE class duration of 50 minutes. As per the SOFIT protocol, observation/ reporting intervals began after 51% of the classroom had entered the gymnasium. The recorded class duration by the SOFIT observers was 51 minutes, from 1:12- 2:03 pm, using momentary time sampling, for class 1. Actual class time for class 2 was 49 minutes (1:13- 2:02 pm), thus the average PE duration for school 1 was 50 minutes, consistent with school reporting.

School 2 also reported PE class duration of 50 minutes. The first recorded class duration by the SOFIT observers was 46 minutes, from 12:39- 1:25 pm. Actual class time for class 2 was 48 minutes (12:36- 1:24 pm), thus the average observed PE duration for school 2 was 47 minutes, representing a 3- minute discrepancy between reported and observed PE class time.

School 3 reported PE class duration of 50 minutes. The observed class duration was 50 minutes for class 1 (10:52- 11:42) and 45 minutes for class 2 (10:53- 11:38), respectively. Therefore, the average observed PE duration for school 3 was 47.5 minutes, representing a 2.5- minute discrepancy between reported and observed PE class time.

School Health Index

The total School Health Index score for Elementary School 1 was 162, Elementary School 2 scored 173 and Elementary School 3 scored 143 out of a possible 237 points, respectively. Elementary School 1's total score reflects a 68.35% of total possible points, while Elementary School 2 reported 72.99% of total possible points and Elementary School 3's score reflects 60.33% of total points possible. These scores reflect the percentage of agreement with policy and programs in place at the school building to reduce youth health risk behaviors (3= Fully in place, 2= Partially in place, 1= Under development and 0= Not in place).

Module 1: School Health and Safety Policies and Environment has a total of 27 questions, including 12 cross- cutting questions, five physical activity- related questions and 10 nutrition-related questions. The average score for Module 1 for all three schools was 69.45%. The range was 35 percentage points. School 2 scored the highest on Module 1 at 86.67%, school 1 scored 51.67% and school 3 scored 70%. These scores reflect the percent agreement that the school has programs and policies are fully in place, such as: a 'representative school health committee or team,' 'written school health and safety policies,' 'recess,' 'access to physical activity facilities outside school hours,' and 'adequate physical activity facilities.'

The average score for Module 2: Health Education was 68.89%. The range of percent agreement scores was 30. School 1 scored 53.33%, school 2 scored 83.33%, and school 3 scored 70%. These scores reflect the percent agreement that the school has program and policies fully in place, such as: 'essential topics on physical activity,' 'active learning strategies,' and 'health education taught in all grades.'

Module 3: Physical Education and Other Physical Activity Programs has a total of 19 questions. The average score for module 3 was 66.67%. The range of percent agreement scores was 19.3. School 1 scored 75.44%, school 2 scored 68.42% and school 3 scored 56.14%. These scores reflect the percent agreement that the school has programs and policies fully in place, such as: '150 minutes of physical education per week,' 'prohibit exemptions or waivers for physical education,' 'sequential physical education curriculum consistent with standards,' and 'licensed physical education teachers.' (Action for Healthy Kids, 2004)

The table below shows all module 3 questions, along with individual school answers.

School Health Index: Module 3- Physical Education and other Physical Activity Programs		**Answer**			
Number	**Question**	**School 1**	**School 2**	**School 3**	**100% Agreement**
1	150 minutes of physical education per week	2	0	1	
2	Adequate teacher/ student ratio	3	3	3	X
3	Sequential physical education curriculum consistent with standards	2	3	2	
4	Information and materials for physical education teachers	2	3	3	
5	Prohibit exemptions or waivers for physical education	2	2	2	X
6	Students active at least 50% of class time	3	3	1	
7	Individualized physical activity and fitness plans	2	0	0	
8	Health- related fitness	2	2	1	
9	Promote community physical activities	2	0	1	
10	Licensed physical education teachers	3	3	3	X
11	Address special health care needs	1	2	1	
12	Physical education safety practices	3	3	1	
13	Playgrounds meet safety standards	3	3	2	
14	Professional development for teachers	2	3	3	
15	Participation in intramural programs or physical activity clubs	1	3	1	

16	Promotion or support of walking and bicycling to school	3	1	2	
17	Availability of before- and after- school physical activity opportunities	3	2	2	
18	Availability of physical activity breaks in classrooms	2	2	2	X
19	Physical activity facilities meet safety standards	2	1	1	
				21% total agreement	

For question 1*, "Do all students in each grade receive physical education for at least 150 minutes per week throughout the school year?"* the range of possible answers included: '3= 150 mins/ weekly, 2= 90-149 mins/ weekly, 1= 60-89 mins/ weekly, or 0= fewer than 60 mins or not all students receive PE throughout the school year.' Only school 2's answer was consistent with their average weekly physical education frequency (as validated by two- week PE schedule) and duration (as validated by SOFIT observation).

For question 2, *"Do physical education classes have a student/teacher ratio comparable to that of other classes?"* the range of possible answers included: '3= yes, 2= the ratio is somewhat larger than the ratio for most other classes, 1= ratio is considerably larger, but there are plans to reduce it, or 0= the ratio is considerably larger, and there are no plans to reduce it.' All three schools answered consistently that PE classes have a student teacher/ ratio comparable to that of other classes.

For question 3*, "Do all teachers of physical education use an age-appropriate, sequential physical education curriculum that is consistent with national or state standards for physical education (see national standards below)?*" the range of possible answers included: '3= yes, 2= some use a sequential PE curriculum, and it is consistent with state or national standards, 1= some use a sequential PE curriculum, but it is not consistent with state or national standards, or

0= none do or the curriculum is not sequential or there is no PE curriculum.' Schools 1 and 3 indicated that some physical education teachers use an age-appropriate, sequential physical education curriculum that is consistent with national or state PE standards, while school 2 reported that all physical education teachers do.

For question 4, *"Are all teachers of physical education provided with the following information and materials to assist in delivering quality physical education?*" the range of possible answers include: '3 = yes, all teachers of physical education are provided with at least eight kinds of materials, 2 = teachers of physical education are provided with four to seven kinds of these materials, 1 = teachers of physical education are provided with one to three kinds of these materials or 0 = teachers of physical education are not provided with these kinds of materials.' Materials listed include: 'goals, objectives and outcomes for PE, a written PE curriculum, a chart with scope and sequence for providing PE instruction, a plan for assessing student performance, physical activity monitoring devices, internet resources, The Presidential Youth Fitness Program, protocols to assess or evaluate student performance in PE, learning activities intended to increase the amount of time students are engaged in moderate to vigorous physical activity, and adaptive learning activities for active engagement of students with disabilities in PE.' Two out of three schools (schools 2 and 3) reported at least 8 of these resources were available to assist physical education teachers in delivering quality physical education, while school 1 reported between four- seven of these resources were available.

For question 5, *"Does the school prohibit exemptions or waivers for physical education?"* the range of possible answers included: '3 =yes, 2 = yes, but occasional exceptions or waivers are made, 1 = no, but there are plans to start prohibiting exemptions or waivers, or 0 = no, or there is

no physical education.' All three schools unanimously reported that their school prohibits exemptions or waivers for physical education, but occasionally exceptions or waivers are made.

For question 6, "*Do teachers keep students moderately to vigorously active for at least 50% of the time during most or all physical education class sessions?"* the range of possible answers included: '3 = yes, during most or all classes, 2 = during about half the classes, 1 = during fewer than half the classes, or 0 = during none of the classes, or there are no physical education classes.' Schools 1 and 2 responded in the affirmative that during most or all classes, students were engaged in moderate to vigorous physical activity for at least 50% of PE class time. This was consistent with the SOFIT observations of third grade classrooms in school 1 and 2. School 3 responded that fewer than half the classes are moderately to vigorously active for at least 50% of PE class time.

For question 7, *"Do students design and implement their own individualized physical activity and fitness plans as part of the physical education program? Do teachers of physical education provide ongoing feedback to students on progress in implementing their plans?"* the range of possible answers included: '3 = yes, 2 = students design and implement their own individualized plans, but teachers provide only occasional feedback, 1 = students design and implement their own individualized plans, but teachers provide no feedback, or 0 = students do not design and implement their own individualized plans, or there is no physical education program.' School 1 reported that students design and implement their own individualized plans, but teachers only occasional feedback, while schools 2 and 3 indicated students do not design and implement their own individualized plans.

For question 8, *"Does the physical education program integrate the components of the Presidential Youth Fitness Program (PYFP), including: fitness assessment using Fitnessgram®, professional development for physical education teachers on proper use and integration of fitness education, fitness assessment, and recognition; as well as recognition of students meeting Healthy Fitness Zones or their physical activity goals?"* the range of possible answers included: '3 = yes, all 3 components of the PYFP are integrated, 2 = 2 of the PYFP components are integrated, 1 = 1 of the PYFP components is integrated, or 0 = none of the PYFP components are integrated.' Schools 1 and 2 indicated that two of the Presidential Youth Fitness Program components were integrated into their physical education program, while school 3 indicated that only one PFYP component was integrated.

For question 9, *"Does the physical education program use three or more methods to promote student participation in a variety of community physical activity options?"* the range of possible answers included: '3 = yes, through three or more methods, 2 = the program promotes participation in a variety of community physical activity options, but through only one or two methods, 1 = the program promotes participation in only one type of community physical activity option, or 0 = the program does not promote participation in community physical activity options, or there is no physical education program.' Answers ranged between 0- 2. School 1 reported their physical education program promotes student participation in a variety of community physical activity options through only one or two methods. School 2 reported their PE program does not promote student participation in community physical activity options, while school 3 indicated their PE program promotes participation in only one type of community physical activity option.

For question 10, *"Are all physical education classes taught by licensed teachers who are certified or endorsed to teach physical education?"* the range of possible answers included: '3 = yes, all are, 2 = most classes are, 1 = some classes are, or 0 = no classes are, or there are no physical education classes.' There was 100% agreement among all three schools that all physical education classes are taught by licensed teachers who are certified or endorsed to teach physical education.

For question 11, *"Does the physical education program consistently use all or most of the following practices as appropriate to include students with special health care needs?"* the range of possible answers included: '3 = yes, the physical education program uses all or most of these instructional practices consistently, 2 = the physical education program uses some of these instructional practices consistently, 1 = the physical education program uses some of these instructional practices, but not consistently (that is, not by all teachers or not in all classes that include students with special health care needs), or 0 = the program uses none of these practices, or there is no physical education program.' Examples of adaptive practices included: 'encouraging active participation; modifying type, intensity, and length of activity if indicated in Individualized Education Plans, asthma action plans, or 504 plans,' 'offering adapted physical education classes,' 'using modified equipment and facilities,' 'ensuring that students with chronic health conditions are fully participating in physical activity as appropriate and when able,' and 'monitoring signs and symptoms of chronic health conditions.' Schools 1 and 3 reported that some of the nine practices listed to include students with special health care needs were used in physical education class, but not consistently. School 2 reported they use some of the adaptive practices consistently.

For question 12, *"Does the physical education program implement and enforce all of the following safety practices: practice active supervision, encourage pro-social behaviors, use protective clothing and safety gear that is appropriate to child's size and in good shape, use safe, age-appropriate equipment, minimize exposure to sun (including through use of sunscreen), smog, and extreme temperatures, use infection control practices for handling blood and other body fluids, and monitor the environment to reduce exposure to potential allergens or irritants (e.g., pollen, bees, strong odors)?"* the range of possible answers included: '3 = yes, all these safety practices are followed, 2 = all these safety practices are followed, but at times our school has temporary lapses in implementing or enforcing one of them, 1 = one of these safety practices is not followed, or at times our school has temporary lapses in implementing or enforcing more than one of them, or 0 = more than one of these safety practices is not followed, or there is no physical education program.' Schools 1 and 2 reported that their physical education program implemented and enforced all of the safety practices. School 3 indicated that one of the safety practices is not followed, or at times their school has temporary lapses in implementing or enforcing more than one of them.

For question 13, *"Does your school or district ensure that playgrounds meet or exceed recommended safety standards for design, installation, and maintenance, in all of the following ways: using recommended safety surfaces under playground equipment, using developmentally-appropriate equipment designed with spaces and angles that preclude entrapment, designating boundaries around equipment (e.g., swings) so that students on foot are unlikely to be struck, separating playgrounds from motor vehicle and bicycle traffic, maintaining equipment for safe use and removing unsafe equipment, ensuring that staff members are trained in developmental appropriateness of different types of playground equipment, and developing, implementing, and*

enforcing rules for safe use of the playground?" the range of possible answers included: '3 = yes, all these safety standards are met, 2 = all these safety standards are met, but at times our school has temporary lapses in implementing or enforcing one of them, 1 = one of these safety standards is not met, or at times our school has temporary lapses in implementing or enforcing more than one of them, or 0 = more than one of these safety standards is not met, or there are no playgrounds. All three schools reported that all safety standards were met, yet school 3 indicated that at times they had temporary lapses in implementing or enforcing one of them (answer 2).

For question 14, *"Are teachers of physical education required to participate at least once a year in professional development in physical education?"* the range of possible answers included: '3 = yes, all do, 2 = most do, 1 = some do, or 0 = none do, or no one teaches physical education.' School reported that most physical education teachers are required to participate at least once a year in professional development, while schools 2 and 3 reported that all of their physical education teachers do.

For question 15, *"Do both boys and girls participate in school-sponsored intramural programs or physical activity clubs?"* the range of possible answers included: '3 = yes, many boys and girls participate in school-sponsored intramural programs or physical activity clubs, 2 = for the most part, many students of only one sex participate in school-sponsored intramural programs or physical activity clubs, 1 = very few students of either sex participate in school-sponsored intramural programs or physical activity clubs, or 0 = there are no school-sponsored intramural programs or physical activity clubs.' Schools 1 and 3 reported that very few students of either sex participate in school-sponsored intramural programs or physical activity clubs, while school 2 reported that many boys and girls participate (answer 3).

For question 16, *"Does your school promote or support walking and bicycling to school in the following ways: designation of safe or preferred routes to school, promotional activities such as participation in International Walk to School Week, National Walk and Bike to School Week, secure storage facilities for bicycles and helmets, instruction on walking/bicycling safety provided to students, promotion of safe routes program to students, staff and parents via newsletters, websites and local newspaper, crossing guards, crosswalks on streets leading to schools, walking school buses, documentation of number of children walking and or biking to and from school, creation and distribution of maps of school environment (sidewalks, crosswalks, roads, pathways, bike racks, etc.)?"* the range of possible answers included: '3 = yes, our school promotes or supports walking and bicycling to school in six or more of these ways, 2 = our school promotes or supports walking and bicycling to school in three to five of these ways, 1 = our school promotes or supports walking and bicycling to school in one to two of these ways, or 0 = our school does not promote or support walking and bicycling to school.' Answers ranged from 1- 3. School 1 reported they promote or support walking and bicycling to school in six or more of the ways listed, school 2 only utilizes one or two of the possible promotion strategies, and school 3 is using between three- five of the possible promotion strategies.

For question 17, *"Does your school offer opportunities for students to participate in physical activity before and after the school day for example, through organized physical activities (such as interscholastic sports, physical activity clubs, intramural sports, before school physical activity), or access to facilities or equipment for physical activity?"* the range of possible answers included: ' 3 = yes, both before and after the school day, 2 = we offer before school or after school, but not both, 1 = we do not offer opportunities for students to participate in physical

activity before or after the school day, but there are plans to initiate it, or 0 = no, we do not offer opportunities for students to participate in physical activity before or after the school day, and there are no plans to initiate it.' School 1 reported they offer physical activity opportunities for students before and after the school day, while schools 2 and 3 indicated they offer physical activity opportunities either before or after school, but not at both times.

For question 18, *"Are all students provided opportunities to participate in physical activity breaks in classrooms, outside of physical education, recess, and class transition periods?"* the range of possible answers included: '3 = yes, on all days during a typical school week, 2 = on most days during a typical school week, 1 = on some days during a typical school week, or 0 = no, we do not provide students with opportunities to participate in physical activity breaks in classrooms.' There was 100% agreement among the three schools that students were provided opportunities to participate in physical activity breaks on most days during a typical week.

For question 19, "*Does the school ensure that spaces and facilities for physical activity meet or exceed recommended safety standards for design, installation, and maintenance, in the following ways: regular inspection and repair of indoor and outdoor playing surfaces, including those on playgrounds and sports fields; regular inspection and repair of physical activity equipment such as balls, jump ropes, nets, cardiovascular machines, weights, and weight lifting machines; padded goal posts and gym walls, breakaway bases for baseball and softball, securely anchored portable soccer goals that are stored in a locked facility when not in use, bleachers that minimize the risk for falls, slip-resistant surfaces near swimming pool use, and pools designed, constructed, and retrofitted to eliminate entrapment use?"* the range of possible answers included: '3 = yes, all these safety standards are met, 2 = all these safety standards are met, but at

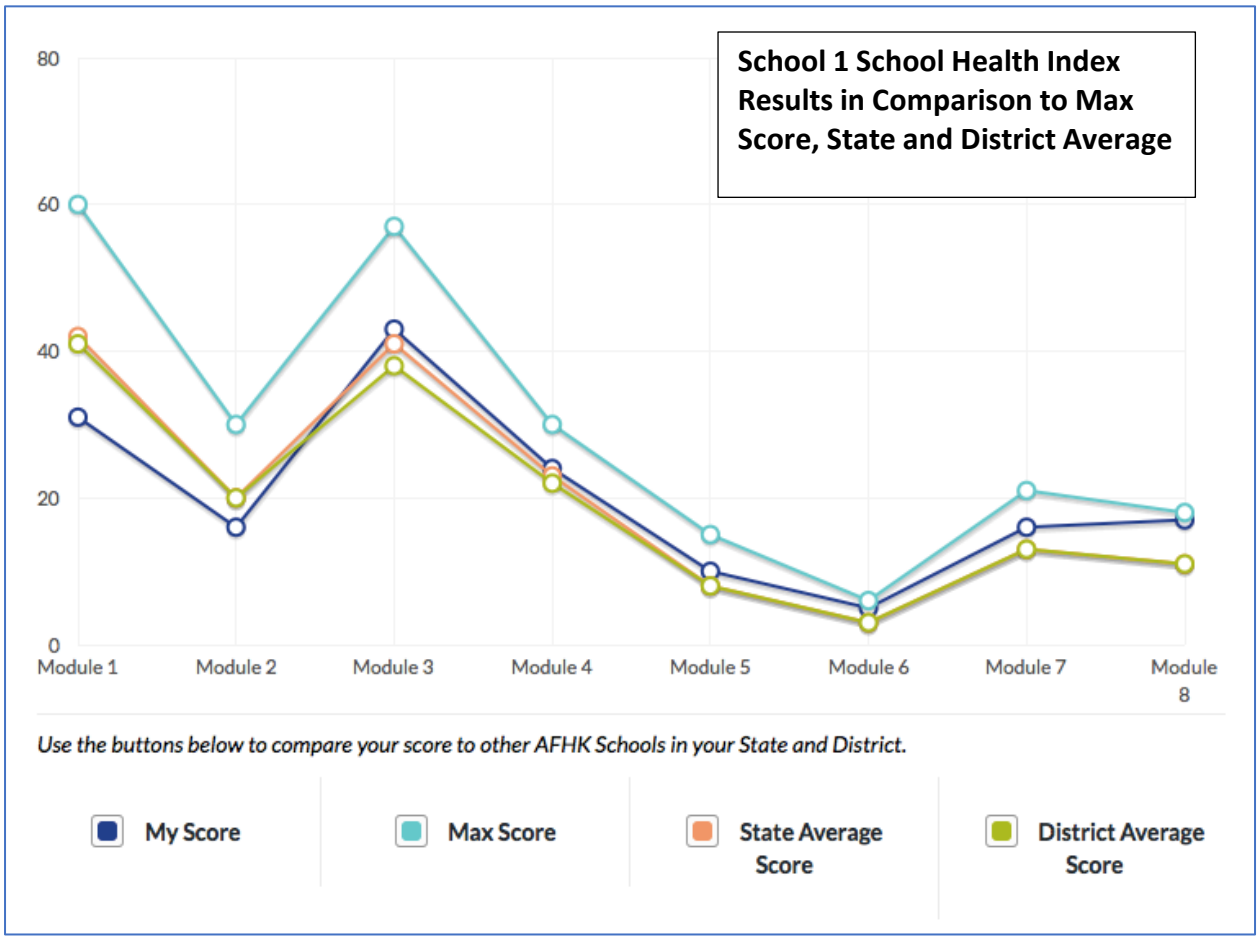
times the school has temporary lapses in one of them, 1 = one of these safety standards is not met, or at times the school has temporary lapses in more than one of them, or 0 = more than one of these safety standards is not met, or there are no spaces or facilities for physical activity.' It is worth noting that respondents were instructed to disregard any standard not relevant to their campus, such as there being no pool at their school. School 1 reported they met all the safety standards, but at times they had temporary lapses in one of them. Schools 2 and 3 reported that one of the safety standards was not met or at times they had temporary lapses in more than one safety standard.

Module 5: School Health Services had the lowest percentage agreements of all eight modules, reflecting a lack of building- level program and policy in the following areas, 'health services provided by a full-time school nurse,' 'health and safety promotion for students and families,' 'collaboration with other school staff members,' and 'consulting school health physician.' Across all three schools, the highest response in those areas was "2= partially in place," though the most frequent answer was "1= under development."

The module with the greatest observed range was Module 8: Family and Community Involvement. The range was 55.55, reflecting one school scoring 94.44% of the total points possible, while the other schools scored 55.56% and 38.89%. "Student and family involvement in the school meal programs and other foods and beverages sold, served and offered on school campus," was consistently the lowest- scored performance indicator for Module 8.

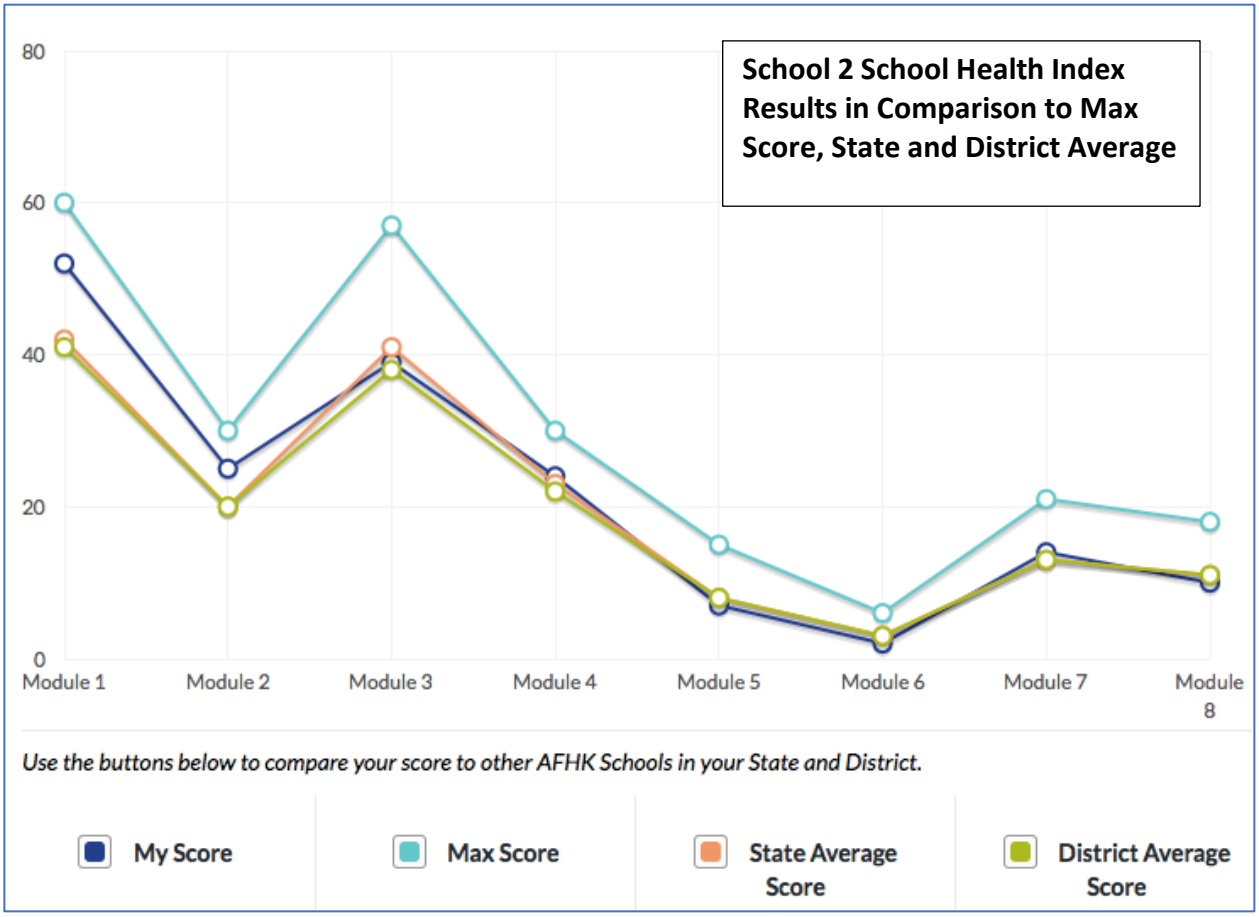
None of the surveyed schools provide 150 minutes of PE weekly (question 1, module 3). Two out of the three schools reported students have access to school physical activity facilities outside of school hours (question 14, module 1). The other school reported this was partially in place, or

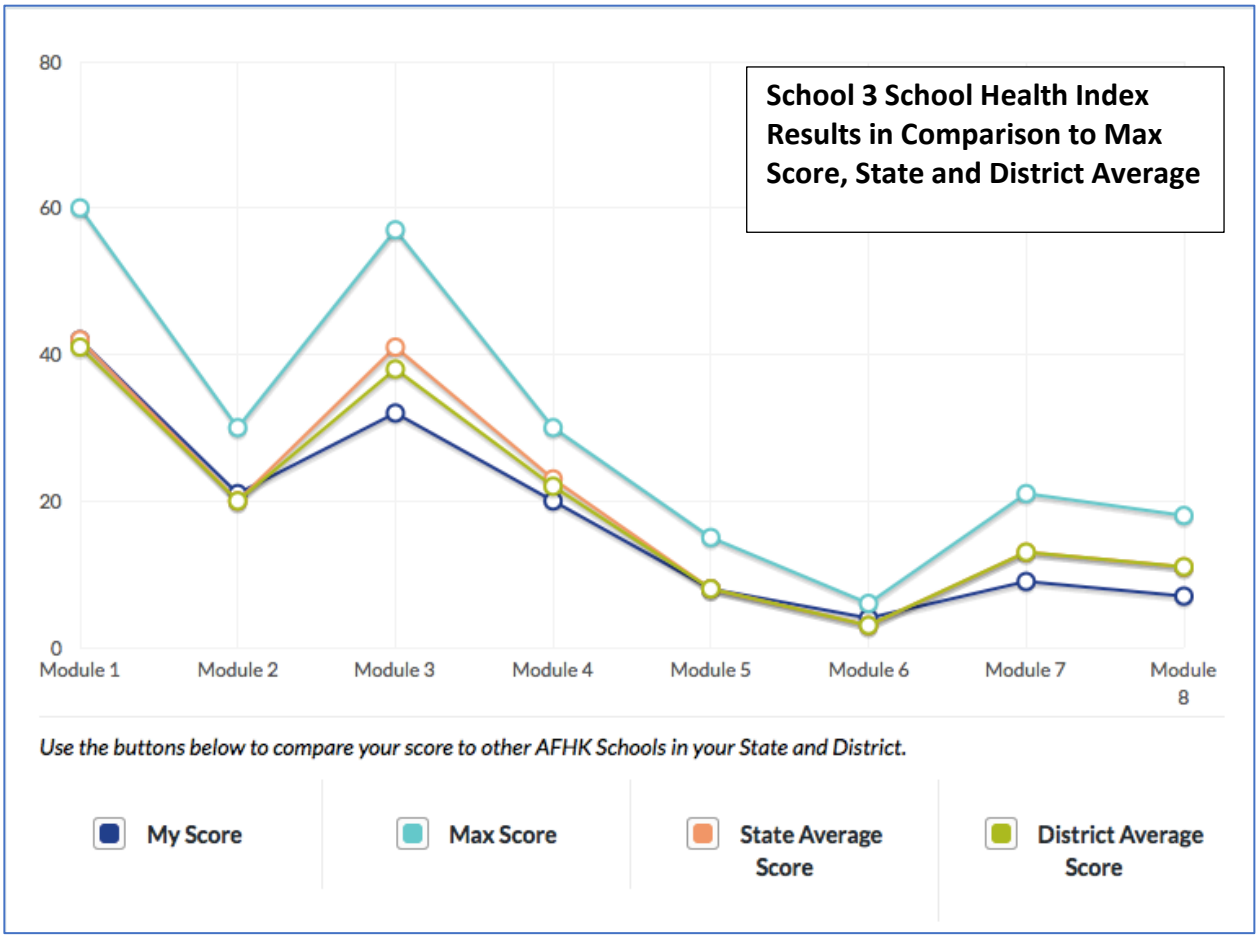
some opportunities exist. The implementation of active learning strategies in the classroom was inconsistent among schools. School 1 reported this as 'under development,' school 2 reported this as 'fully in place,' and school 3 reported this as 'partially in place.' All three schools indicated 'licensed physical education teachers' were fully in place (question 10, module 3). Professional development for PE teachers was reported as 'fully or partially in place' for all three schools (question 12, module 3). Sequential PE curriculum consistent with standards was fully in place at school 2, and partially in place at schools 1 and 3 (question 3, module 3). Individualized physical activity and fitness plans were 'not in place' for two schools, while they were 'partially in place' at school 1 (question 7, module 3).



The total School Health Index score was 162, 173 and 143 for schools 1, 2 and 3 respectively, out of 237 points possible. The weighted average percentage score was 68.35%, 73%, and

60.34% for schools 1, 2 and 3 respectively. For Module 1: School Health and Safety Policies and Environment, school 1 scored 31 points; school 2 scored 52 points; and school 3 scored 42 out of 60 points possible. The district average for Module 1 was 41 points, while the state average was 42 points. For Module 2: Health Education, school 1 scored 16 points; school 2 scored 25 points; and school 3 scored 21 out of 30 points possible. Both the district and state average for Module 2 was 20 points. For Module 3: Physical Education and Other Physical Activity Programs, school 1 scored 43 points; school 2 scored 39 points; and school 3 scored 32 out of 57 points possible. The state average was 41 points, while the district average was 38. For Module 4: Nutrition Services, school 1 scored 24 points; school 2 scored 24; and school 3 scored 20 out of 30 points possible. The state average was 23 points, while the district average was 22 points (Action for Healthy Kids, 2018).





For Module 5: School Health Services, school 1 scored 10 points; school 2 scored 7 points; and school 3 scored 8 out of 15 points possible. Both the state and district average score for Module 5 was 8 points. For Module 6: School Counseling, Psychological, and Social Services, school 1 scored 5 points; school 2 scored 2 points; and school 3 scored 4 out of 6 points possible. The state and district average for Module 6 was 3 points. For Module 7: Health Promotion for Staff, school 1 scored 16 points; school 2 scored 14 points; and school 3 scored 9 out of 21 points possible. The state and district average score for Module 7 was 13 points. For Module 8: Family and Community Involvement, school 1 scored 17 points; school 2 scored 10 points; and school 3

scored 7 out of 18 points possible. The state and district average were similarly 11 points (Action for Healthy Kids, 2018).

Limitations

Potential self- selection may have occurred due to participating schools volunteering to participate instead of being randomly assigned. The study design, a cross-sectional study, looks at a sample population at a specific point in time. This, by design, does not allow for assessment of causation between the study variables. Participant reactivity is another potential concern associated with direct observation (Hadabi, 2015).

An assessment of school- based physical activity outside physical education class, obtained through school- sponsored before or after physical activity programs, recess and in- class physical activity breaks was proposed in the initial research proposal submitted to Omaha Public Schools. This would have allowed for a more complete assessment of school- based physical activity. Having a more complete understanding of all school- based physical activity opportunities could better inform family, community and school district strategies for supporting school age children's satisfaction of US Physical Activity Guidelines for Americans, which recommend a total of at least 60 minutes of daily physical activity (Office of Disease Prevention and Health Promotion, CDC, 2008).

An area outside the scope of the Student Moves study was an assessment of healthy eating and physical activity standards in before or after- school programming that operate outside the school day, but are still located in the school building. It is unclear to what extent, if any, these programs promote healthy eating and physical activity. Additionally, it is unclear whether

evidence- based physical education curriculum is delivered in before or after school programs and whether program staff who may provide such education are licensed or certified. Before and after school programs represent an additional avenue for providing school- based physical activity opportunities for students.

Discussion/Recommendations

Suggested future research should include a comprehensive evaluation of all school- based physical activity. School-based physical activity outside of physical education class represents an opportunity to infuse more intentional movement into the learning environment without the necessity of hiring additional staff or investing in costly equipment/ technology. An evaluation of the OPS district wellness policy implementation adherence would yield invaluable data about policy adoption variability and could inform future revisions. USDA- mandated school wellness policies represent a potentially significant policy lever for increasing school-based physical activity, and subsequently reducing risk factors for childhood obesity.

As the School Health Index is a building- level assessment of health and safety policies and practices, it may prove to be a useful tool for gauging school readiness for interventions intending to increase school- based physical education and physical activity, and/or improving nutrition knowledge, attitudes and behaviors. The School Health Index provides contextual data for understanding the school health environment, so it would be reasonable to expect that a school with a comparatively high School Health Index score might be more amenable to interventions targeting youth health risk behaviors than a school with a relatively low School Health Index score. Using the School Health Index assessment to gauge school readiness might

be an effective strategy for community organizations with limited resources to prioritize schools for intervention.

It is the Society of Health and Physical Educators of America's (SHAPE America) official position that "states should require local education agencies and schools to complete comprehensive self-assessments of their physical education program and physical activity offerings using the CDC School Health Index at regular intervals consistent with state and district assessment. The results of the assessment should be integrated into the local education agency's or school's long-term strategic planning, School Improvement Plan, and/ or school wellness policy, to address the quality and quantity of physical education offered (SHAPE America, 2016)."

The Student Moves findings on physical education frequency, intensity and duration suggest that state or district standards that address the quantity of elementary physical education may be necessary to ensure OPS students receive a uniform amount of physical education weekly, consistent with SHAPE America standards. The Nebraska Department of Education's 2016 Physical Education Standards are voluntary for school district adherence and primarily address competencies of the physical education curriculum. They do not specify a minimum time requirement for physical education (Nebraska Department of Education, 2016).

Out of 39 states which formally require elementary physical education, less than half (19) specify a minimum time requirement (Whitehouse, 2017). Among the 19 states that require a specific number of physical education minutes per week, most including Missouri, North Dakota and Ohio, do not meet the SHAPE America standard of 150 minutes weekly. Only five states: Alabama, Florida, Louisiana, New Jersey, Oregon and D.C, have enacted policies to ensure

students receive the recommended amount of 150 minutes of physical education weekly (SHAPE America, 2016).

Still other states have enacted statutes that require schools to provide a requisite amount of physical activity time for students, which does not have to be incurred through physical education class, but may be offered through recess or classroom activity breaks. Iowa requires all students in kindergarten- fifth grade receive at least 30 minutes of physical activity time at school. Missouri elementary students must receive at least 20 minutes of daily recess, while Arkansas students in kindergarten- sixth grade must receive 90 minutes of physical activity weekly. Colorado takes a slightly different approach by requiring that all full- time elementary students receive 600 minutes of physical activity per month, not dictating how that time is distributed.

School- based physical activity statutes vary widely across the country. Louisiana students in kindergarten- eighth grade are required to receive an opportunity to engage in 30 minutes of vigorous physical activity at school daily. South Carolina requires kindergarten- fifth grade students receive 150 minutes of school- based physical activity weekly, 60 of which must come from physical education class (Whitehouse, 2017). Ten states prohibit withholding physical activity (such as recess) as punishment and 13 states prohibit the practice of using physical activity as punishment (such as running laps for insubordination) (SHAPE America, 2016).

It is advised that future iterations of this project include a follow- up procedure for obtaining participant testimonials. Feedback from study participants could inform the study process and ensure that participant burden is minimized. Incorporating participant testimonials into future

study recruitment materials may improve the participation rate and decrease potential study participant's reluctance to be included in the study.

Replication of the present study with a larger sample size is desired to improve generalizability. In the present study, the researcher was granted permission to contact eight of 63 OPS elementary schools for study recruitment. Of those, three out of eight schools agreed to participate, representing just over 1 in 3 schools contacted (37.5%). Therefore, of the total 63 elementary schools in the OPS district, just 4.7% were represented in the Student Moves research project.

Conclusions

The three participating elementary schools located in the Omaha Public Schools District do not meet the SHAPE America standard for essential components of effective physical education, which endorses a minimum of 150 minutes of physical education class weekly (SHAPE America, 2015). This is consistent with the CDC's School Health Policies and Practices Study: 2014, which found only 4% of schools nationwide provided students with 150 minutes of minutes of elementary physical education weekly (CDC, 2015). Though the duration of physical education was below the professional association's standard, the intensity of physical education observed in the Student Moves study exceeded SHAPE America's recommendation that students be engaged in moderate to vigorous physical activity for at least 50% of physical education class time (SHAPE America, 2015). Yet the intensity of physical education class still only accounted for an average of 41.875 minutes per week of moderate to vigorous physical activity. Frequency of physical education varied across and within schools, indicating that state or district policy may

be necessary to ensure students receive a minimum, consistent amount of physical education (SHAPE America, 2016).

The total School Health Index scores ranged from 60- 73% of total points possible. As the School Health Index is an assessment of school-level health and safety policies and practices based on the CDC School Health Guidelines for reducing youth health risk behavior, the sample data indicate there is substantial variance in school level policies and practices for promoting student health, as well as significant room for improvement across schools. Findings from this observational study may support implementation of comprehensive school physical activity programs and/or other interventions to increase school- based physical activity.

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Appendices

- Figure A- Bar Chart “Activity Count by Case”
- Figure B- Histogram “Activity Code Frequency”
- Figure C- Bar Chart “Lesson Context by Case”
- Figure D- Pie Chart “Frequency of Teacher Physical Activity Prompts”
- Figure E- Pie Chart “Lesson Context Frequency”
- Figure F- Crosstab output “Activity Code by School”
- MPH Competencies
- Parent Letter and Consent Form
- Research Timeline
- School Health Index- Elementary School Questions
- SL/ CE Reflection
- SOFIT Protocol
- UNMC Letter of Support to OPS Research Review Committee

Figure A

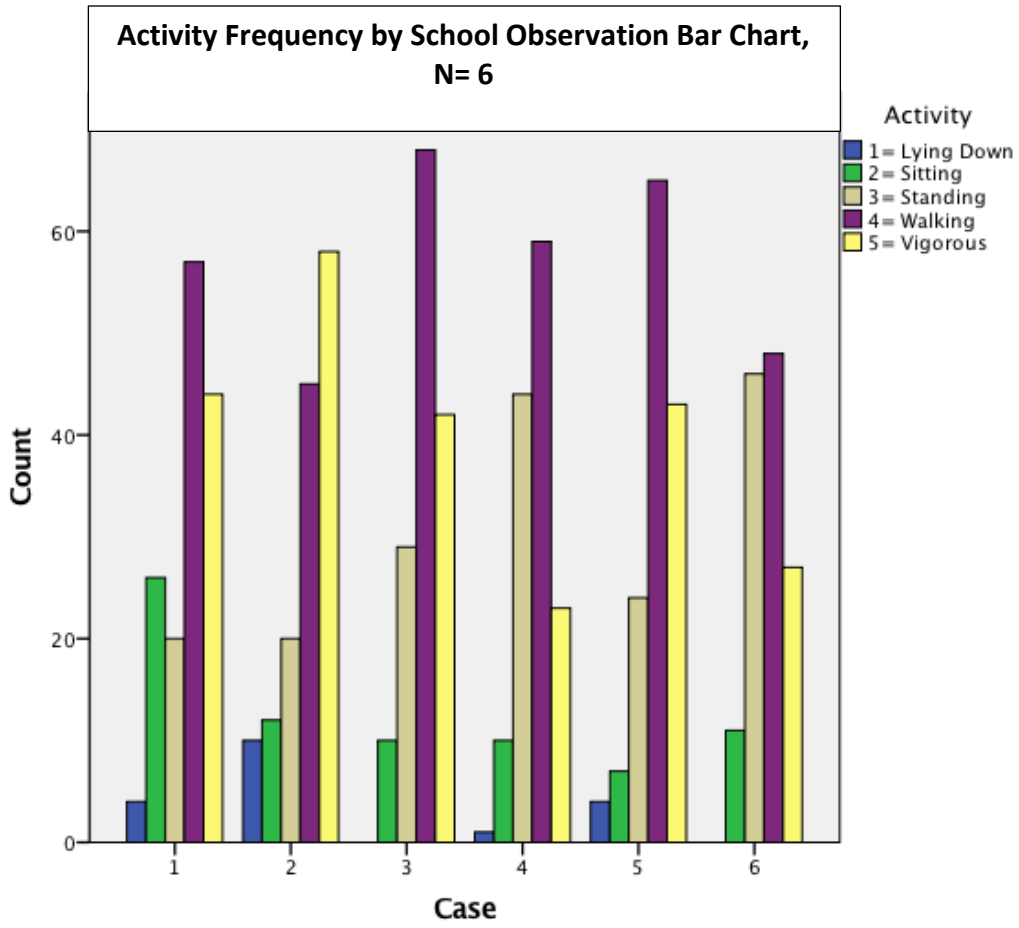

Figure A "Activity Frequency by School Observation Bar Chart" shows the relative frequency students were recorded lying down, sitting down, standing, walking and engaged in vigorous physical activity at each of the six school observations.

Figure B

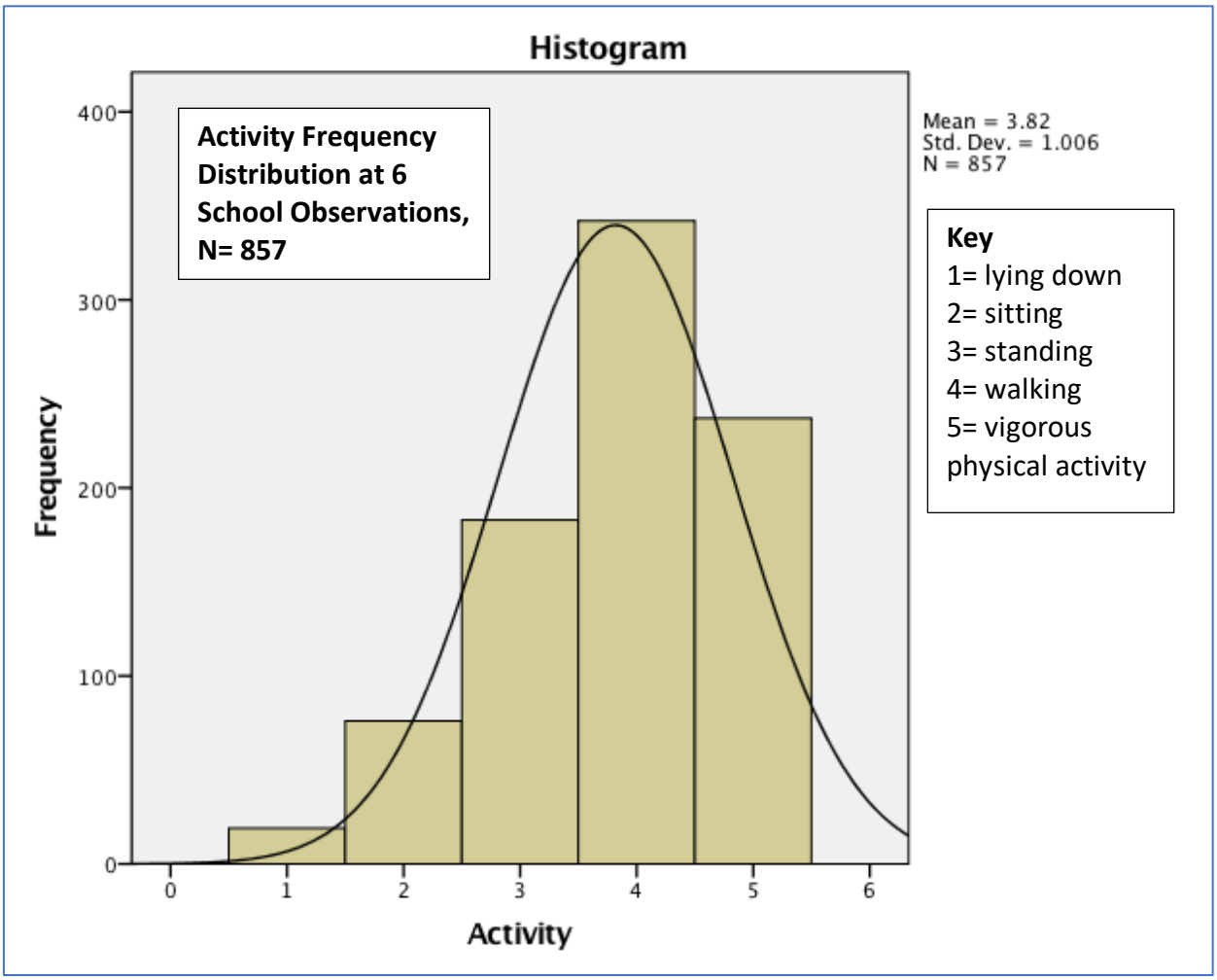

Figure B "Activity Frequency Distribution at 6 School Observations, N= 857" shows the frequency distribution for all five activity codes (lying down, sitting, standing, walking and vigorous physical activity) recorded through six observations at three separate elementary schools. Walking was the most frequently reported activity code.

Figure C

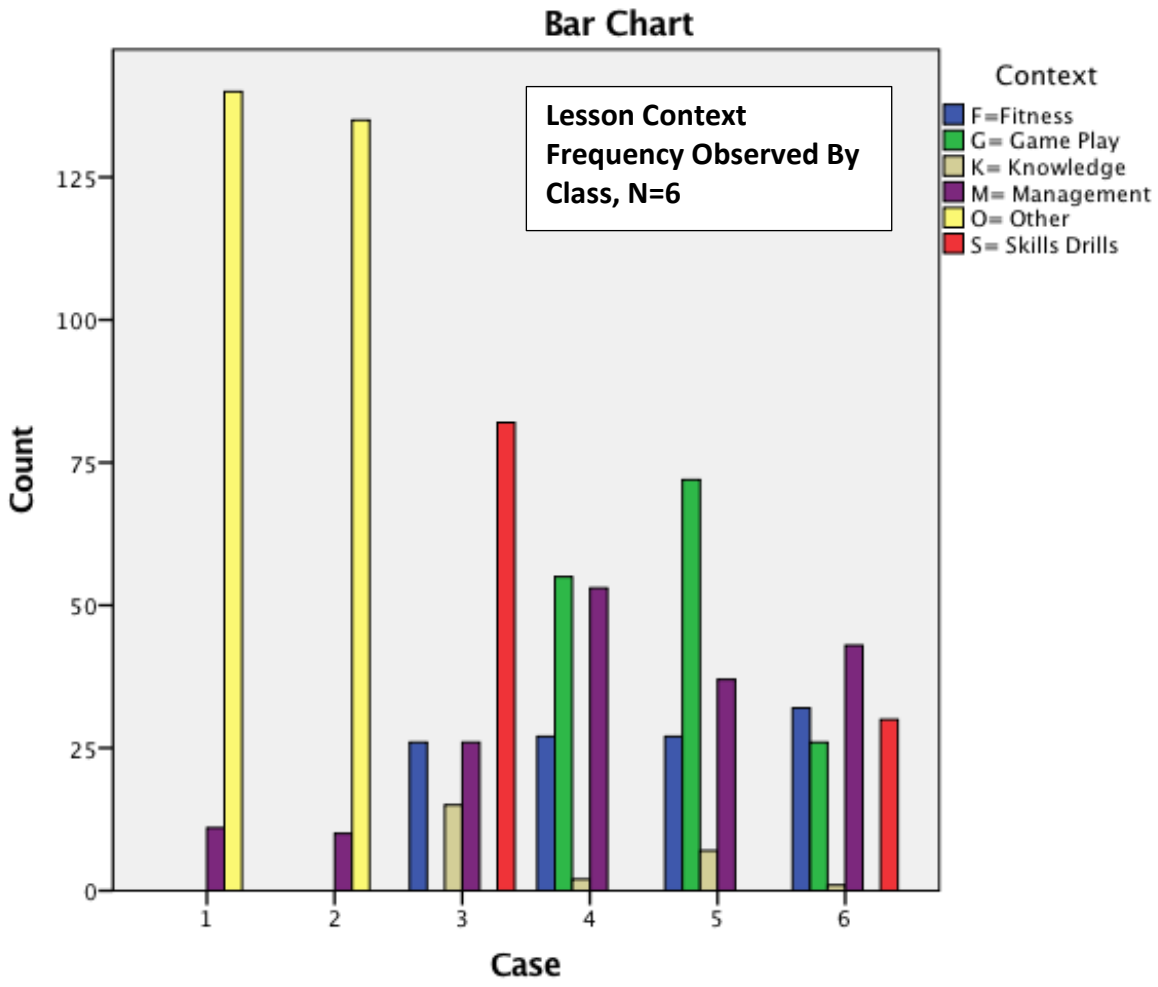

Figure C "Lesson Context Frequency Observed by Class" shows the relative frequency of each lesson context code recorded (fitness, game play, knowledge, management, other and skills drills) at each of the six SOFIT observations.

Figure D

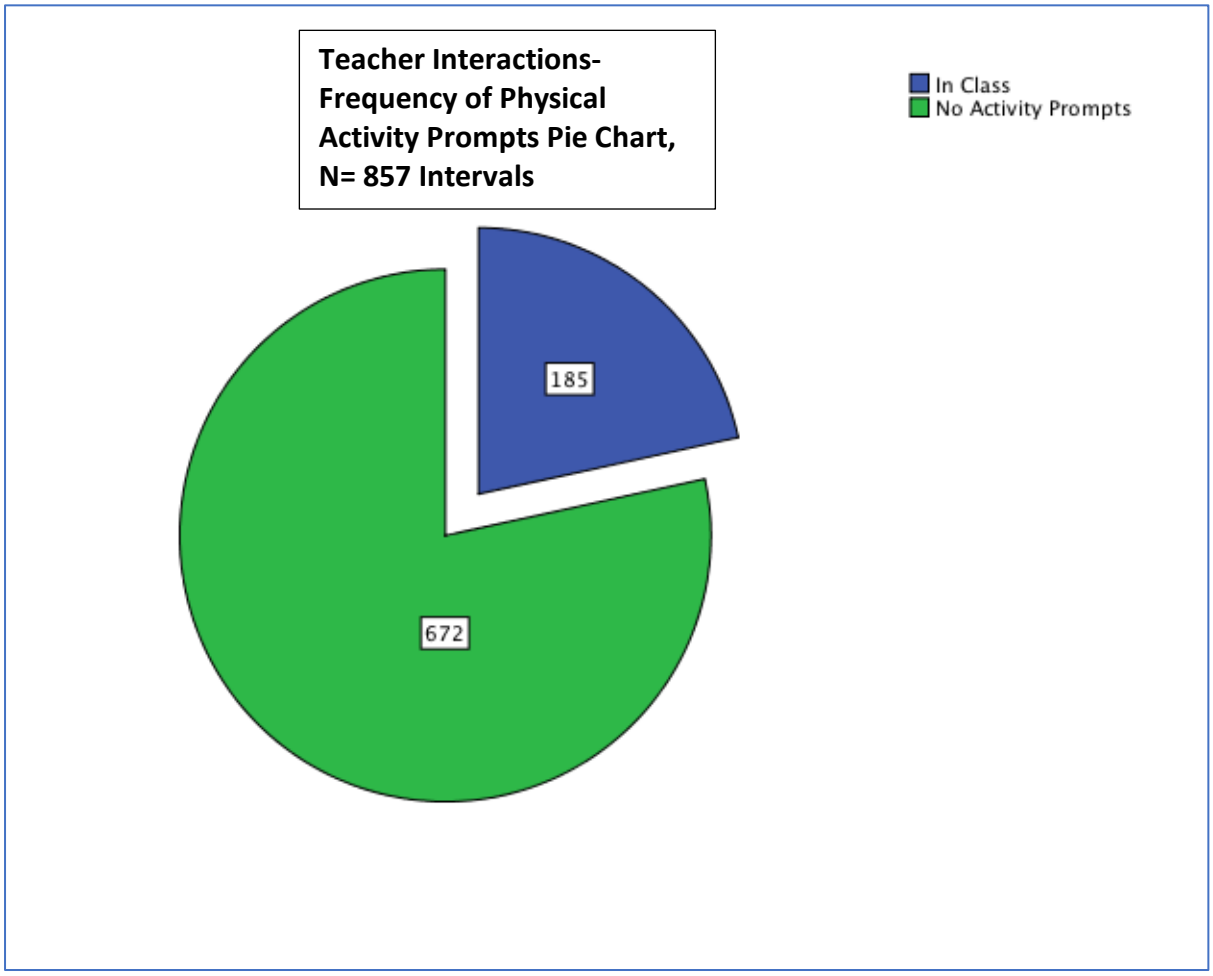

Figure D "Teacher Interactions- Frequency of Physical Activity Prompts Pie Chart" shows the frequency of in class, out of class and no activity prompts observed through all six observations. No out of class physical activity prompts were recorded.

Figure E

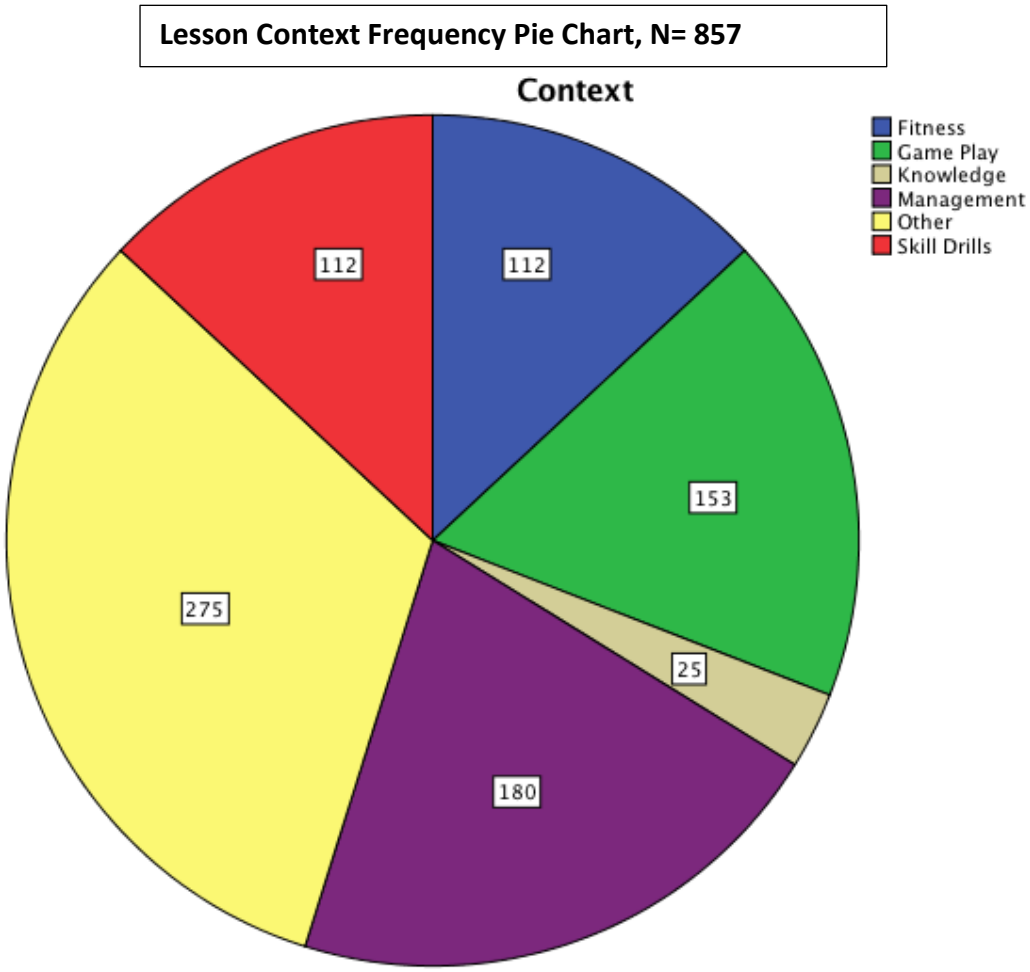

Figure E "Lesson Context Frequency Pie Chart" shows the total frequency of lesson context codes: fitness, game play, knowledge, management, other and skill drills for all six observations, representing the proportion of average class time that the majority of students (50% + 1) were in a given activity where physical education instruction was provided.

Activity Frequency by School (Based on Two Observations Per School)

		School 1	School 2	School 3	Total
Activity	1 Lying Down	14	5	0	19
	2 Sitting	38	17	21	76
	3 Standing	40	68	75	183
	4 Walking	102	124	116	342
	5 Vigorous	102	66	69	237
Total		296	280	281	857

Figure F

Figure F "Activity Frequency by School (Based on Two Observations Per School" shows the frequency that students were lying down, sitting, standing, walking or engaged in vigorous physical activity during physical education class, based on two observations at school 1, 2 and 3.

References

Action for Healthy Kids. (2018). *AFHK School Portal: School Health Index Report*. Retrieved April 18, 2018, from ActionforHealthyKids.org: https://afhkschoolportal.force.com/afhk_shi_total_results?aid=001E000000VQcIEIA1

Action for Healthy Kids. (2004). *The Learning Connection: The Value of Improving Nutrition and Physical Activity in Our Schools.* Chicago: Action for Healthy Kids.

Anderssen N, J. D. (1995). Do adolescents and parents report each other's physical activity accurately? . *Scandinavian Journal of Medicine and Science in Sports*, 302–7.

Andreacci, J. D. (2006). Validation of SenseWear Armband to Assess Energy Expenditure in Children Ranging in Body Size. *Medicine & Science in Sports & Exercise*, 255.

Barros, R. S. (2009, February). School Recess and Group Classroom Behavior. *Pediatrics, 123*(2).

Basch, C. H. (2011). Physical Activity and the Achievement Gap Among Urban Minority Youth. *Journal of School Health*. Retrieved from http://onlinelibrary.wiley.com/doi/10.1111/j.1746-1561.2011.00637.x/full

Bureau of Sociological Research University of Nebraska at Lincoln. (2016). *State of Nebraska 2015 Youth Risk Behavior Survey Results.* Lincoln, NE: Nebraska Department of Education, Nebraska Department of Health and Human Services.

CDC . (2010). *The Association Between School-Based Physical Activity, Including Physical Education, and Academic Performance.* Atlanta, GA: Centers for Disease Control and Prevention, US Department of Health and Human Services.

CDC. (2014). *Health and Academic Achievement.* Atlanta, GA: Centers for Disease Control and Prevention. Retrieved from https://www.cdc.gov/healthyyouth/health_and_academics/pdf/health-academic-achievement.pdf

CDC. (2017, June 28). *Healthy Schools: Physical Activity Facts*. Retrieved from Centers for Disease Control and Prevention: https://www.cdc.gov/healthyschools/physicalactivity/facts.htm

CDC. (2013). *Make a Difference in Your School: CDC Resources Can Help You Implement Strategies to Prevent Obesity Among Children and Adolescents.* Atlanta: Chronic Disease.

CDC. (2017, January 4). *School- Based Obesity Prevention Strategies for State Policy Makers.* Retrieved from Centers for Disease Control and Prevention: https://www.cdc.gov/healthyyouth/policy/pdf/obesity_prevention_strategies.pdf

CDC. (2017, October 10). *School Health Index*. Retrieved from Center for Disease Control and Prevention: https://www.cdc.gov/healthyschools/shi/index.htm

CDC. (2015). *School Health Policies and Practices Study 2014.* Retrieved from Centers for Disease Control and Prevention: Adolescent and School Health: https://www.cdc.gov/healthyyouth/data/shpps/results.htm

Douglas County Health Department. (2015, November). *Children (5-17) With BMI At/ Above 85th Percentile of US Growth Charts*. Retrieved from Douglascountyhealth.org: http://www.douglascohealth.org/index.php?module=indicators&controller=index&action=view&indicatorId=1155&localeTypeId=2&localeId=1733

Hadabi, B. (2015). Assessment of Physical Activity Levels in Children: Current Methods. *Aspetar Sports Medicine Journal*, 240-245.

Hanks, A. J. (2013). Smarter Lunchrooms Can Address New School Lunchroom Guidelines and Childhood Obesity. *Journal of Pediatrics*, 867-869.

Hill, J. O. (2012). Energy Balance and Obesity. *Circulation, 126*(1), 126-132.

Li, Y. R.-D. (2012). Association Between Increased BMI and Severe School Absenteeism Among US Children and Adolescents: Findings From a National Survey, 2005–2008. *International Journal of Obesity*, 517-523.

McKenzie, T. S. (1991). BEACHES: an observational system for assessing children's eating and physical activity behaviors and associated events. *Journal of Applied Behavioral Analysis, 24*(1), 141-151.

McKenzie, T. L. (2010). Leisure-Time Physical Activity in Elementary Schools: Analysis of Contextual Conditions. *The Journal of School Health*, 470–477.

McKenzie, T. S. (2017). Studies of Physical Education in the United States Using SOFIT: A Review. *Research Quarterly for Exercise and Sport*, 492-502.

McKenzie, T. (2012, September 14). *SOFIT (System for Observing Fitness Instruction Time) Generic Description and Procedures Manual.* San Diego: San Diego State University.

McKenzie, T. (2002, June 11). *SOFIT Overview and Training Manual.* Retrieved from des.ucdavis.edu: http://www.des.ucdavis.edu/faculty/handy/ESP178/sofitprotocol.pdf

McKenzie, T. L. (2015, May 20). *Using Systematic Observation to Research School Physical Education and Physical Activity Programs.* Retrieved from Active Living Research: https://www.activelivingresearch.org/using-systematic-observation-research-school-physical-education-and-physical-activity-programs

Michael, S. M. (2015). Critical connections: health and academics. *Journal of School Health*, 740-758.

Nader, P. (2003, February). Frequency and intensity of activity of third-grade children in physical education. *Archives of Pediatrics & Adolescent Medicine, 157*(2), 185-190.

Nebraska Department of Education. (2016, October 7). *Nebraska Physical Education Standards.* Retrieved from Nebraska Department of Education: https://2x9dwr1yq1he1dw6623gg411-wpengine.netdna-ssl.com/wp-content/uploads/2017/07/NE_Physical_Education_Standards_Final.pdf

Office of Disease Prevention and Health Promotion, CDC. (2008). *Physical Activity Guidelines for Americans.* Retrieved from Health.gov: https://health.gov/paguidelines/guidelines/chapter3.aspx

Piekarz, E. S. (2016, June). *School District Wellness Policies: Evaluating Progress and Potential for Improving Children's Health Eight Years after the Federal Mandate. School Years 2006- 2007 and 2013- 2014.* Retrieved from BridgingtheGapResearch.org: http://www.bridgingthegapresearch.org/_asset/98nbk1/WP_2016_monograph.pdf

Professional Research Consultants. (2015, October). *2015 PRC Child & Adolescent Community Health Needs Assessment: Douglas & Sarpy Counties, Nebraska, Pottawattamie County, Iowa.* Retrieved from boystownhospital.org: https://www.boystownhospital.org/AboutUs/Documents/ChildAdolescentCommunityHealthNeedsAssessmentReport.pdf

Robert Wood Johnson Foundation. (2010, February). *The State of Play: Gallup Survey of Principals on School Recess.* Retrieved from RWJF.org: https://www.rwjf.org/content/dam/farm/reports/surveys_and_polls/2010/rwjf53884

Schwimmer, J. B. (2003). Health-Related Quality of Life of Severely Obese Children and Adolescents . *Journal of the American Medical Association*, 1813-1819.

SHAPE America. (2015). *The Essential Components of Physical Education.* Retrieved from shapeamerica.org: https://www.shapeamerica.org/uploads/pdfs/TheEssentialComponentsOfPhysicalEducation.pdf

SHAPE America. (2016). *2016 Shape of the Nation: Status of Physical Education in the USA.* Reston, VA: SHAPE America, American Heart Association, Voices for Healthy Kids. Retrieved from https://www.shapeamerica.org/uploads/pdfs/son/Shape-of-the-Nation-2016_web.pdf

Sylvia, L. G. (2014). A Practical Guide to Measuring Physical Activity. *Journal of the Academy of Nutrition and Dietetics* , 199–208.

Thorndike, A. N. (2017). Obesity Prevention in the Supermarket—Choice Architecture and the Supplemental Nutrition Assistance Program. *American Journal of Public Health*, 158-1583.

Trust for America's Health, Robert Wood Johnson Foundation. (2017). *The State of Obesity in Nebraska*. Retrieved from stateofobesity.org: https://stateofobesity.org/states/ne

USDA. (2017, November 6). *Local School Wellness Policy*. Retrieved from United States Department of Agriculture Food and Nutrition Service: https://www.fns.usda.gov/tn/local-school-wellness-policy

Westerterp, K. (2009). Assessment of physical activity: a critical appraisal. *European Journal of Applied Physiology*, 823-828.

Whitehouse, E. S. (2017, March 9). *State Policies on Physical Activity in Schools*. Retrieved from The Council of State Governments: http://knowledgecenter.csg.org/kc/content/state-policies-physical-activity-schools

WHO. (2017, February). *Physical Activity*. Retrieved from World Health Organization: http://www.who.int/mediacentre/factsheets/fs385/en/