Creating Healthy Schools: An Analysis of the Federal School Wellness Mandate

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ABSTRACT

Childhood obesity has become a growing problem in America; rates have tripled over the past 30 years, and more than 17 percent of America's children are classified as overweight or obese. To combat the rise in childhood obesity, the federal government mandated in 2004 that all public school districts adopt a local school wellness policy that incorporates goals to improve the wellness environments of these public schools. Previous research has indicated that the success of these policies is mixed; however, there has been no comprehensive research evaluating the quality of school wellness policies in Virginia, Maryland and the District of Columbia.

The purpose of this research is to evaluate local wellness policies within the Mid-Atlantic region. These evaluations include a preliminary wellness policy evaluation based on locale (rural and urban school districts), an evaluation of the strength and comprehensiveness of template-based policies versus locally developed policies, and a comprehensive evaluation of physical activity policies within Virginia, Maryland and DC. The last study included is an evaluation of the association between physical activity policy quality and physical activity rates within selected middle schools.

The results of this research show that wellness policy quality across the Mid-Atlantic region is weak and moderately comprehensive, and that the adoption process may impact the quality of a local policy. Furthermore, physical activity policy within the region is also weak and moderately comprehensive, and the results show that school districts that have adopted stronger and more comprehensive polices may be associated with higher local physical activity rates.

Dedication

This work is dedicated to the many students I taught at Paul Lawrence Dunbar Middle School (#155) in Baltimore City, where they taught me how humility, perseverance and a sense of humor can change a life.

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Preface

This dissertation is the original research of Erin M. Smith and the following co-authors:

- Chapters 3 and 4: Dr. Paul Estabrooks and Dr. Kristen Capogrossi contributed to this work by coding data and co-authoring the manuscript.
- Chapter 5: Grace Wilburn, an undergraduate student in Human Nutrition, Foods and Exercise, is also listed as an author on this paper. She coded data and contributed ideas for the manuscript.
- Chapter 6: Dr. Serena L. Parks is listed as a co-author on this manuscript. Dr. Parks collected data and contributed to the manuscript. Grace Wilburn also coded data used in this study.

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Chapter 1: Introduction

Childhood obesity has become a growing problem in America; rates have tripled over the past 30 years, and more than 17 percent of America's children are classified as overweight or obese (Ogden, 2010). This epidemic and its outcomes have been well documented in the literature, and like many other chronic illnesses, childhood obesity disproportionately affects those in ethnic and racial minority communities, certain geographic locales and lower socio-economic statuses (SES; Ogden, 2010). Policy-based interventions may be an effective way to effect broad-population change (Story, 2008), and public schools have become the recent targets for policymakers and social scientists enacting policy interventions to prevent and reduce childhood obesity from an environmental perspective (Story, 2009a; Story, 2009b; Story, 2006).

With the passage of the 2004 Childhood Nutrition and WIC Reauthorization Act, the United States federal government required that all public schools participating in the United States Department of Agriculture's federal food program, the National School Lunch Program, create a wellness policy (USDA, 2006). This federal foray into public school was the first of its kind. The wellness mandate required public school districts to create a wellness policy that addressed five areas seeking to improve student wellness. Districts were to address: 1) goals for nutrition education, physical activity and other school-based activities regarding wellness; 2) nutrition guidelines for all food available on each school campus during the school day; 3) guidelines for reimbursable school meals will not be less restrictive that federal regulations and guidelines; 4) a plan for measuring implementation and evaluation of the district's local wellness

policy; and, 5) community involvement in the development of the school wellness policy. The districts would have two years to develop, adopt and implement their policy, and by 2006, districts were required to be following the federal mandate (USDA, 2004).

Unfortunately, the 2004 legislature was largely deemed ineffective in requiring schools to regulate their nutrition and physical activity environments (Metos, 2011). As a result, the legislation was repealed and replaced with the passage of the 2010 Healthy, Hunger Free Kids Act. The Healthy, Hunger Free Kids Act largely clarified the 2004 goals.

From regulation of the competitive food markets to the requirements for physical activity in public schools, the wellness policy mandate required schools to take notice of the childhood obesity problem and their role in combating it. The general goal of this dissertation was to evaluate policy efforts, contained within the school wellness policy mandate to combat childhood obesity within public schools.

The first study to be included in this dissertation is a preliminary evaluation of wellness policies within a sample of low-income rural and urban school districts across three states: Maryland, the District of Columbia and Virginia. To evaluate the policy quality, the Wellness School Assessment Tool (WellSAT) was used. The WellSAT comprehensively evaluates school wellness policies across the following categories: (1) Nutrition Education and Wellness Promotion; (2) USDA Meal Standards; (3) Nutrition Standards; (4) Physical Activity and Physical Education; and, (5) Policy Evaluation (Schwartz, 2009). This validated and reliable tool was developed by the Rudd Center for Food Policy and Obesity and Yale University, and it has been used frequently in studies evaluating school wellness policy environments (Belansky, 2010; Cradock, 2010; Gaines, 2011; Chriqui, 2011; Chriqui, 2010; Haire-Joshu, 2011; Hoxie-Setterstrom, 2011; Brener, 2011; Taber, 2011, Smith, 2012; Schwartz, 2012).

The second study in this dissertation extends the first by evaluating the strength and comprehensiveness of school wellness within one state—Virginia—and the effect third-party wellness policy templates may have on policy quality. To evaluate this, we randomly selected policies within the state that were influenced by a third-party and compared them to those that were locally developed. We hypothesized there would be a distinct difference between the two groups, with the locally developed policies being stronger and more comprehensive than those based on a third-party template.

The first two studies indicated that many school wellness policies were weakest and least comprehensiveness in the areas of physical activity and physical education. Further, much of the current research evaluating the role of public schools in preventing and reducing childhood obesity focused on the effects of school nutrition on the weight status, academic performance and other health outcomes (Story, 2009; Moag-Stahlberg, 2008; Metos, 2007; Belansky, 2009). There is a sizable gap in literature evaluating physical activity policies within public schools, and more recently, there are very few studies that seek to use populations located within the mid-Atlantic region. We hypothesized that our policy samples were indicative of a weak physical activity policy environment in schools located throughout the mid-Atlantic, and the third study included in the dissertation is an evaluation of these physical activity policies located within Maryland, Virginia and the District of Columbia. By gathering information about the strengths and weaknesses of physical activity policies, our research can begin to shed light how the school environment can play an active role in increasing the physical activity of children.

The fourth dissertation study evaluated the associations between physical activity policy quality and observed physical activity at school. We hypothesized that districts with stronger and more comprehensive physical activity policies will have higher rates of physical activity

within a selected school. We also hypothesized that the characteristics regarding the school (e.g. the amount of space dedicated to physical activity) can predict physical activity rates. From our results, we have begun to paint a picture of physical activity policies from paper to practice, and these results may spur policy makers to make changes to the physical activity policy environment to improve child health outcomes.

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Chapter 2: Review of Literature

This section will provide an overview of the federal school wellness mandate along with current research evaluating the effect of the mandate on the public school wellness environment.

The Federal Mandate Explained

With the passage of the 2004 Childhood Nutrition and WIC Reauthorization Act, the federal government required that all schools participating in the USDA's reimbursable lunch program create a school wellness policy, or SWP (USDA, 2006). This federal mandate was the first of its kind (Story, 2008), and the SWPs included five components to promote student wellness. These goals were later clarified in the more recent 2010 Healthy, Hunger Free Kids Act. These updated goals are outlined below.

1) Goals for nutrition promotion and education, physical activity and other school-based activities that promote wellness:

In a recent review and in previous research (Schwartz, 2009; Metos and Murtaugh, 2011), this component has been evaluated in three distinct parts: evaluation of a nutrition education curriculum, evaluation of physical activities offered by the district and evaluation of a physical education curriculum. Using the Wellness School Assessment Tool (WellSAT), published by the Yale Rudd Center for Food Policy and Obesity, strong and comprehensive policies provide

comprehensive nutrition and physical education curriculum for each grade level that teaches skills that are behaviorally focused (Schwartz, 2009). These classes were intended to be taught by certified professionals, who should also be role models for healthy behaviors. For physical activity, a strong and comprehensive policy may allow for physical activity breaks during elementary school, offer intramurals or extracurricular activities before and/or after school, offer community access to recreational facilities and not withhold physical activity as a form of punishment. (For the full list of characteristics of a strong and comprehensive policy addressing nutrition promotion, physical activity and other-school based activities, please see Appendix A).

Physical Activity and Physical Education

Only 29 percent of 9th to 12th graders meet the federal recommendations for physical activity (YBRFS, 2011), and 23% of high-school students did not participate in at least 60 minutes of activity that increased their heart rate on any day. The Youth Behavior Surveillance System also noted that physical activity declines as children age, and male high school students are more likely to participate in physical activity than female students (YBRFS, 2011).

Currently, no federal law exists mandating that physical education be provided for students in public schools. Further, few federal policies exist that support physical education and physical activity in schools, and most of them encourage participation and equal access to activity by providing funding for equipment and staff training (Story, 2009). Although no federal agency exists to mandate physical activity for children, physical activity recommendations in 2008 issued by the Department of Health and Human Services were the first physical activity recommendations explicitly aimed at children and youth suggested by the federal government (DHHS, 2011).

The federal recommendations for children and adolescents are to receive 60 minutes or more of daily physical activity, which includes muscle-strengthening exercises, aerobic exercises and bone-strengthening exercises. The National Association for Sport and Physical Education has recommended guidelines for defining quality physical education for elementary, middle and high-school students (NASPE, 2006). These guidelines recommend a school adopt a comprehensive physical activity program to emphasize daily and minimum time requirements while enacting curriculum and assessment standards with a certified educator and appropriate class sizes (NASPE, 2006).

With the implementation of the 2001 No Child Left Behind Act, the federal government established the Carol M. White Physical Education Program to award competitive grants to school districts to initiate, expand and improve K-12 physical education programs; however, some school administrators and policymakers have argued that the passage of NCLB has begun to eliminate physical education from schools due its omission from the list of core academic subjects rigorously tested (NASPE, 2006). Story writes that legislation has been introduced to amend NCLB to include plans for physical activity and education content and to tie in achievement standards (Story, 2009).

Still, small physical activity interventions in public schools have seen positive results. Researchers have noted that the presence of renovated school yards is associated with high physical activity rates among adults and children (Colabianchi, 2009). Also, when smaller interventions were placed in schools (e.g. painted schoolyard, more playground balls, and accessibility of game equipment) researchers also noted an association with higher physical activity levels among children (Stratton, 2000). Researchers have suggested that "if we build it, they will come" when increasing physical activity among students (Sallis, 2001).

However, one longitudinal study conducted in Australia reported that physical activity during school is not associated long-term with overall physical activity, fitness or overweight in childhood or as adult. The study conducted by Cleland and Dyer of the Menzies Research Institute followed 6,412 children over 20 years in various public schools with various levels of compulsory physical activity programs. As adults, many of the rates of obesity were the same among those who attended schools with high, medium or low amounts of compulsory physical activity (Cleland and Dyer, 2008). Whether or not the physical activity is sustainable over the lifetime of a child is debatable; however, it has been well documented the positive health outcomes of increasing the activity of sedentary children (DHHS, 2008).

2) Nutrition guidelines to promote student health and reduce childhood obesity for all food available in each school district

This component aims to strengthen the nutrition environment by increasing participation in USDA meal programs and reducing the amount of low nutrient dense foods available for student consumption. This requirement is broken into two distinct measurable groups: USDA meal regulation and competitive foods regulation. Strong and comprehensive policies, according to WellSAT, have adopted stringent standards for all foods and beverages sold during the school day available through vending machines, school stores, a la carte offerings, class parties, and fundraisers while limiting sugar, fat, and sodium. Calorie content is also measured, and serving size is limited for beverages (Schwartz, 2011).

USDA Meal Programs

Using public schools to offset childhood hunger is not new; states and localities have been targeting schools for places of intervention since the early 19th century (Gunderson, 2011a). However, the federal government did not begin to assist public schools until the Great Depression by giving grants to certain localities to cover costs in the production of school lunch (Gunderson, 2011a). As the Great Depression worsened, Congress passed an act that established the Commodity Donation Program in 1936, which allowed struggling farmers to distribute surplus food to hungry children in needy schools. Out of the Commodity Donation Program, other school lunch programs within the Works Progress Administration and the National Youth Administration popped up and increased the number of daily lunches served to nearly 7 million (Gunnderson, 2011b). However, policymakers feared that the program was not expanding as rapidly as it should, and the 79th Congress enacted the National School Lunch Act of 1946, which permanently provided the basic, comprehensive legislation for lunch aid (Gunderson, 2011b).

Today, the National School Lunch Program serves more than 31 million lunches each day at a yearly cost of $10.8 billion (USDA, 2010). It is the second largest food and assistance program in the United States (behind the Supplement Nutrition Assistance Program), and research has been mixed on what effect the NSLP has on weight status of children (Ralston, 2008).

For a child to qualify for a free or reduced lunch, the child must be from a family at or below 130 percent of the poverty level while those at or below 185 percent qualify for reduced-priced offerings (USDA, 2010). School districts who choose to participate in the program receive meal reimbursements from the United States Department of Agriculture. To receive

these reimbursements of up to $2.94 per meal, these school lunches must meet the Dietary Guidelines for Americans (USDA, 2010). Along with the National School Lunch Program, other federal school programs in place to combat childhood hunger are: (1) School Breakfast Program; (2) Fresh Fruit and Vegetable Program; and, (3) the Special Milk Program.

The School Breakfast Program was a pilot project that began in 1966 and received permanent status in 1975. Like the National School Lunch Program, this program operates at more than 88,000 schools across the nation, and it has the same participation requirements (USDA, 2010). The Fresh Fruit and Vegetable Program operates in eligible low-income elementary schools, and this year, nearly $167 million dollars will be given to state agencies for them to disburse to eligible elementary schools with the goal that each student will receive $50 to $75 in fresh produce a year (USDA, 2010). The Special Milk Program operates in localities that do not offer any other federal aid programs. In 2010, the program operated in more than 4,000 locations and institutions. Localities and institutions can also receive reimbursements for the milk they buy (USDA, 2010).

Research is mixed on what effect governmental nutritional programs have on the weight status and diet status of the children they serve. In a recent study, Campbell and colleagues found that NSLP participants did not consume a higher-quality diet than those children who did not participate in the federal program (Campbell, 2011); however, in a recent study measuring the long-term effects of the national school lunch program, researchers have found that the program provides lasting impacts on health and significant effects on education achievement (Hinrichs, 2010).

Lower-income children tend to not meet the recommended intake of fruits and vegetables, and studies show that many of the participants receive a majority of their fruit and

vegetable intake from school meals (Gleason and Suitor, 2001; Gordon, 2007; Robinson-O'Brien, 2009). Only 20% of the students surveyed ate more than 5 fruits and vegetables per day. Increase fruit and vegetable consumption has been associated with lower weight status, and the study concluded that the NSLP and the SBP were integral programs in providing an opportunity of increased fruit and vegetable consumption in children. Other studies have concluded that SBP participants were more likely to consume 100% fruit juice or fruit at breakfast than nonparticipants (Gordon, 2007). Moreover, one study noted the protected benefits the school breakfast program provided, saying that by encouraging students to consume breakfast regularly, they are less likely to be overweight (Gleason, 2009).

However, researchers have also found that school meals' participants typically exceeded the recommended intake level for sodium according to the School Nutrition and Dietary Assessment III (Gordon, 2009). Several studies have also concluded that school meal participants were more likely than nonparticipants to be overweight (Fox, 2009;Schanzenbach, 2009).

Competitive Foods

Although research tends to be mixed on the role NSLP plays in childhood obesity, researchers have begun to critically look at the role non-USDA reimbursable foods (competitive foods) may play in the obesity epidemic. In 2006, the national School Health Policies and Programs Study (O'Toole, 2007) found that 71 percent of middle schools and 89 percent of high schools had a vending machine or a school store, canteen or snack bar where students could purchase foods not reimbursable by the USDA. More often these foods were often high-calorie and low-nutrition foods (O'Toole, 2007). The most common items sold were sports drinks, sodas, fruit drinks and higher-fat salty snacks (Story, 2009). Furthermore, researchers associated

with the School Nutrition Dietary Assessment III found that these unhealthy foods were more present in high schools than in elementary schools (Finkelstein, 2008). They also noticed that rural schools had more competitive food offerings than urban schools; however, no significant differences were found across SES status (Finkelstein, 2008).

Unlike research describing the role the NSLP and SBP may have on childhood obesity, researchers have agreed that the presence of these competitive foods in the school environment may have a negative impact on a child's wellness. There have been reports of competitive food consumption being associated with a higher intake of total calories, soft drinks, total fat and saturated fat and a lower intake in fruits and vegetables, milk and other key nutrients (Briefel, 2009; Cullen, 2000; Cullen, 2005; Cullen, 2004; Kubik, 2003). In their study of middle school students food consumption, Cullen and Zakeri (2004) reported that those students that had access to snack bars ate fewer fruits and nonstarchy vegetables, drank less milk, and consumed more sweetened beverages and high-fat vegetables than they did in elementary school. Moreover, Kubik, Lytle and Story (2005) found a positive association between a student's body mass index (BMI) and a school's competitive food practices. For each additional food practice—foods being used as rewards, fund-raising, etc.—the student's BMI increased 0.10 BMI units (Kubik, Lytle and Story, 2005). Kakarala, Keast and Hoerr (2010) also found in their survey of the SDNA III that 22% of school children consumed these foods during a representative school day.

With the Healthy Hunger Free Kid's Act, the USDA will have the authority to regulate the nutritional value of competitive foods in public schools. This is an update to the 1972 legislation that only applied to foods sold along the reimbursable meals in the cafeteria (Federal Register, 2011). The previous requirements allowed candy bars, chips and high-caloric sugar sweetened beverages to be sold in cafeteria; however, the HHFKA may eliminate these

unhealthy foods in vending machines, snack bars and a la carte lines in cafeterias (FRAC, 2011). School fundraisers are exempt from the new legislation, and the standards are not expected to be fully implemented until 2013-2014 (USDA, 2011). Policing competitive foods has been a priority of many researchers and policymakers when debating how to promote childhood wellness in a public school environment; however, many school officials have encountered roadblocks to removing or regulating these foods in the school environment.

Vending Contracts And School Discretionary Funding

Many policymakers and school officials are wary of enacting bans on vending machines and other competitive foods in public schools due to the perceived amount of discretionary funds received from vending contracts and other third-party vendors. Revenues from a la carte sales usually help school food authorities and supplement revenues form sales and reimbursements of USDA lunches (Ralston, 2008); however, money generated through vending machines more often generate discretionary funds used for field trips, assemblies, athletic and music equipment and other needs (School Meals Program, 2005).

One systematic review of changing competitive food standards and its effect on total revenue found that there was no monetary impact on total revenue (Wharton, 2008). Although this review only contained seven studies, the data reflect that the concerns of policymakers are not necessarily warranted. Moreover, the Linking Education, Activity and Food (LEAF) pilot project in California maintained or increased their revenue after changing the school nutrition environment in response to the changes in California state law (Wharton, CM). Although the amount of revenue from vending machines decreased and some schools reported difficulties in finding competitive foods that met the state requirements, many schools saw an increase in

participation in USDA meals—especially in the free and reduced-price category (Woodward-Lopez, 2005).

Schools that participated in the LEAF program only had problems maintaining net income if they met one or more of the following characteristics: large districts, shorter meal periods; open campus allowing students to leave during lunch; inefficient point of sale technology, which resulted in longer lines and a likelihood of stigmatizing those with subsidized meals; inadequate technology for meal planning, analysis of nutrients and accounting; greater emphasis in standardized testing; greater competition with non-foodservice entities for sales (Woodward-Lopez, 2005).

Marketing And First Amendment Issues

To offset chronic underfunding, many public schools have allowed third-party vendors access to advertise and market to their students on campus (Graff, 2008). A school that wants to restrict access to these vendors may run into legal questions raised by First Amendment issues. Since 1976, commercial speech has been protected by the first amendment by the court case Virginia State Board of Pharmacy v. Virginia Citizens Consumer Council (Graff, 2008). The Virginia Citizens Consumer Council argued that they had the right to advertise prescription drug prices within pharmacies, and the Supreme Court agreed, saying that commercial speech, like non-commercial, speech is protected. Pharmacies, like schools, have the choice to display whatever advertisement they choose

3) Goals for public involvement in the development, implementation, and review/evaluation of the wellness policy

This component looks to strengthen the policy's transparency by ensuring public involvement, which includes teachers, students, parents, school administrators and school food staff, in the development, implementation and evaluation of the policy. WellSAT suggests that strong and comprehensive policies have designated school wellness teams and committees during the policy process who oversee the implementation and evaluation of the policy (Schwartz, 2011).

Policy Development

According to Nancy Milio (1987), policy adoption is facilitated when there is agreement between policy and program planners regarding the: (1) the problem to be addressed by the policy; (2) the importance of the policy; (3) potential solutions to the problem; and (4) the person responsible for monitoring the policy and making decisions. And, researchers have begun to look at the policy development process in the creation of school wellness policies.

In the development period, Agron and colleagues (2010) found in their survey of school board officials, state school board associations, state public health officials and wellness directors that there were large gaps in the perceived confidence of school boards developing and reviewing policies based on best methods. Forty-six percent of board members responded that they were very confident that their policy development system reflected best practices; however, 42% of public health nutrition directors responded they were not at all confident that the districts would use best practices when developing and reviewing the wellness policies. Agron found a larger discrepancy in perceived confidence with regards to the capacity to develop, implement and evaluate school wellness policies.

Conklin also found in a study of school nutrition program directors that although they had high levels of perceived organizational support, these levels were not associated with a perceived confidence with successful and timely development of a wellness policy (Conklin, 2009). It was concluded that even though there may be strong perceived organizational support for the development of wellness policies, there may be discussion gaps between interested parties that may diminish confidence in the policy development process (Conklin, 2009). Belanksy and colleagues also found through key informant interviews that the presence of a diverse wellness committee often resulted in more comprehensive nutrition policies than those drafted by one lead author (Belansky, 2009).

Policy Implementation

Barriers cited by research with regards to implementation of the wellness policy are varied. Many researchers cite the lack of adequate resources as one of the largest barriers to policy implementation (Schwartz, 2012; Agron, 2010; Longley, 2009). Agron stated in her study of perceived barriers that the lack of adequate funding hampered many implementation ideas of school districts, and Longley suggests that there are implementation tradeoffs when students need to use food as fundraising along with wellness policy implementation competing with other academic demands of the school. Belansky cited in her study of low-income Colorado elementary schools that competing academic pressures and declining enrollment led principals to implement few of the schools' wellness policies (Belansky, 2009).

Other organizational barriers are cited by researchers and included a lack of education and support for key non-staff policy stakeholders and a perception of a lack of need for a wellness policy (Wharton, 2008; School Nutrition Association, 2006; Argon, 2010; Longley, 2009). Organizational and resource barriers were also significantly associated with specific

school characteristics. Foodservice directors from high-income school districts had significantly fewer resource barriers than those in lower-income areas, and there were significant organizational barriers associated with school district size. Larger school districts had more organizational barriers than smaller school districts. Belansky cited a principal's unfamiliarity along with a lack of accountability that also inhibited implementation.

Schwartz (2012) and colleagues studied the implementation of school wellness policies after the 2004 mandate emerged. Using 151 wellness policies that were evaluated for strength and comprehensiveness and principal surveys collected before and after the 2006 mandate, Schwartz concluded that school wellness policy quality predicted the implementation of the policy, meaning that schools with stronger and more comprehensive wellness policies were more likely to fully implement health-promoting practices at the school level. Other notable predictors of policy implementation and quality were: (1) greater proportion of Democrats to Republicans within the school district; and, (2) urban districts higher proportion of students who qualified for free and reduced-priced lunch (Schwartz, 2012).

4) Goals to inform and update the public about the content and implementation of the wellness policies

This component is a recent addition and it also looks to strengthen the policy's accountability and transparency by mandating the publication of the implementation of the wellness policy. Strong and comprehensive policies, according to the WellSAT tool, require the school wellness teams and committee report policy compliance to a specific public audience (WellSat, 2012).

5) Methods to evaluate school compliance with the wellness policy, methods to evaluate how the district's wellness policy compared to model wellness policies, methods to measure the progress in attaining the wellness policy goals and publication of the previously mentioned items.

This is also a new addition to the school wellness policy addressed in the 2010 legislation, and this component further addresses accountability problems encountered in the past. Several researchers have found that although policies may be implemented, many times, the policies may not be followed.

Samuels (2009) found that policy compliance was low regarding competitive food policy implementation. In a representative sample of 50 public high schools in California that socio-economic status may be related to competitive food and beverage policy adherence. Adherence to competitive food and beverage policies were significantly lower in large urban, minority schools with higher percentages of FRPL participants (Samuels 2009). Moreover, Samuels also found that school race and ethnicity were strong predictors of policy adherence.

The Effectiveness of the Federal Mandate

Research regarding the success of school wellness policies in changing public school environments is mixed. In a recent systematic review published in April of 2011 (Metos and Murtaugh, 2011), researchers concluded that although school districts have complied with the federal mandate, the weak accountability measures have suggested little change in the physical activity and physical educational environment. The nutrition environment, which is strongly regulated by the National School Lunch Program and its requirements, is predicted to undergo substantial changes with the decrease in availability and consumption of foods of minimal nutrient value (Metos and Murtaugh, 2011).

A small number of dedicated research studies have appeared in the recent years that have empirically evaluated SWPs; five of them are from state perspectives and three are a national snapshot. The following section will address the literature regarding school wellness policies from national and regional perspectives.

From A National Perspective

The School Nutrition Association (School Nutrition Association, 2006) found in their random sample of 140 school districts throughout the United States that a large majority of the written policies addressed the requirements of the 2004 federal law. Moreover, the SNA found that larger urban districts (with more free and reduced-price lunch participation) tended to have stronger wellness policies when compared to their smaller, more rural counterparts (School Nutrition Association, 2006).

In the largest study to date using a sample of district policies from 47 of the 48 contiguous states, Chriqui (2011) found that although 99% of public school students in their

sample were in districts with a wellness policy, only 61% of students were in a district with a fully compliant wellness policy, meaning that the wellness policy met all 5 federal requisites. Although 61% met the federal requirements, many of the policies included weak and vague language, which required no action (Chriqui, 2010). The study suggests key policy opportunities for researchers, school administration and policymakers. Notable suggestions include: (1) creating a comprehensive health program that includes nutrition education and promotion; (2) providing extensive training and support for food service staff; (3) providing policy provisions that restrict food marketing and advertising; (4) expanding policies to address physical education; and (5) creating a high priority for implementation and evaluation (Chriqui, 2010).

Along with Chriqui's initial study, a follow-up study (Chriqui, 2011) concluded that the majority of wellness policies were weak and in need of transparency, or public availability. More than 50% of the wellness policies in Chriqui study were not accessible via the Internet; however, this lack of availability was not associated with wellness policy strength. Along with the measure of accessibility, Chriqui (2011) also measured whether or not the presence of advisory health councils was associated with stronger wellness policies. Although there was no association between mandated advisory health councils, there was a correlation between the strength of a wellness policy and the adoption of a voluntary health council (Chriqui, 2011).

Moag-Stahlberg (2008) found similar results in her study of a convenience sample of 256 school districts nationwide, 68% of the policies were consistent with the federal mandate. Thirty-two percent of the sample did not address one or more of the requirements, and 15% did not address the requirement regarding evaluation and monitoring (Moag-Stahlberg, 2008). Regarding implementation, 78% of the policies did not have an implementation plan with measurable objectives, dates and responsibilities. One conclusion of the study mentioned that

there is a notable failure of school wellness policies to address physical education as a strategy to increase physical activity.

In the other national snapshot of school wellness policies, similar results were found. Seventy-two percent of a stratified random sample of 847 schools across the nation met the federal requirements, and researchers noted from interviews with food service directors that the wellness policy implementation process brought many independent entities within the school system together for the first time (Longley, 2009).

Moreover, Longley and colleagues (Longley, 2009) recently evaluated how the adoption of a district-wide school wellness policy affects several aspects of the school community. They concluded that the mandate had positive effects on the integration of nutrition into a school curriculum, using foodservice staff to provide nutrition education, participation in nutrition education and professional requirements for nutrition educators. Likewise, the researchers saw improvements in the incorporation of physical education into a classroom setting and an increase in the daily duration of physical education (Longley, 2009).

Nutrition Standards

Chriqui (2010) found that the wellness policies in her study did not address all the federal requirements mentioned in the mandate for all competitive food and beverages. Many of the policies also included some of the 2007 IOM nutritional standards, and elementary schools had stronger competitive food policies than secondary schools. Few policies prohibited the marketing of unhealthy foods at school, and many policies did not meet the 2005 Dietary Guidelines. Moag-Stahlberg (2008) also found that 77% policies addressed nutrition standards for competitive foods and few mentioned (18%) food and beverage contracts. Only 11% had

nutrition goals that exceeded the USDA requirements. Also, only 33% of the policies included language about food and beverage marketing.

Nutrition Education

Chriqui (2010) also found that policies toward nutrition education tended to be stronger in state that had strong nutrition education laws and curricula. Using Action for Healthy Kids fundamentals to score policies, Moag-Stahlberg (2008) found that only 26% of policies addressed all components of nutrition education. Seventy-nine percent of her sample had a standards-based nutrition education, and 43% had goals for teacher training requirements or continuous professional development.

Physical Activity

Chriqui's study (2010) showed that physical activity policies were weaker than policies related to nutrition, and most wellness policies addressed physical education, which was not a component of the federal requirement. Seventy percent of the sample policies in Moag-Stahlberg's study (2008) included requirements for physical activity outside of physical education, and 48% of the policies had physical education standards that addressed time, frequency and intensity requirements and a curriculum.

Implementation

Only 2% of the policies in Moag-Stahlberg's study (2008) addressed funding to support policy implementation and/or evaluation, and these results were shared with Chriqui's study (2010), where only 1% of the sample identified a funding source for implementation. On the other hand, Schwartz and colleagues (2012) found that districts with more policy depth, that is more comprehensive policies, were more effective in implementing them.

State-level Perspectives

In the study of Pennsylvania's wellness policies, Probart found that most school districts met the five federal mandates; however, the wording of the policies was vague and general, which, she concluded, may lead to implementation problems (Probart, 2008). In an update to her initial study, Probart used a 39-item implementation tool designed to identify the required and recommended implementation steps (Probart, 2010). Within their sample of 368 districts, Probart found that 92% of the districts reported meeting the requirement to identity a person responsible for implementation; however, only 54% reported that they have started measuring implementation of the wellness policy. Twenty-four percent of the sample had written plans for policy measurement; however, although a large majority of school districts had prioritized implementation goals whether or not schools were taking an incremental approach to policy implementation (Probart, 2010).

Probart (2010) also studied the perceived improvement of the school food and physical activity environment after implementation of the wellness policy. Perceived improvement in competitive food offerings were found to depend on the food venue: three-quarters of the survey respondents noted improvements in a la carte and vending machine selection; however, little other improvements were found in other food choices. Fifty-eight percent of the respondents indicated that they also found improvements in nutrition education; however, only a quarter of the sample perceived improvements in opportunities for physical activity (Probart, 2010).

In Utah, Metos and Nanney (2007) found that 77% of the wellness policies met all five federal requirements, and they found no significant differences between districts based on school

size, location, percent of FRPL enrollment or race. However, the researchers found significant policy difference in the strength of the language of the written policies.

School districts with a higher percentage of participation in FRPL had significantly more mandatory policies than districts with low and medium enrollment. Regarding geographic locale, urban school districts were more likely to indicate stronger competitive food policies than rural and suburban school districts. Also, school boards with a higher FRPL participants were more likely than districts with low to medium FRPL participants to include recommendations for the content of vending machines on school campuses, wellness promotion for parents, USDA meal standards and physical education requirements in the core curriculum. However, they were less likely than school boards with low to medium FRPL participants to include provisions in their policies that mandated pricing that encouraged the consumption of healthy foods, safe walking and biking routes to the schools, prioritizing recess during the elementary school day and including fruits and vegetables where all food is sold (Metos and Nanney, 2007). Metos and Nanney (2007) concluded that although the federal mandate provides a promising step to improving the school food and physical activity environments of public schools in Utah, the mandate does not ensure a comprehensive or strong policy.

When studying wellness policies in Alabama, Gaines, Lonis-Shumate and Gropper (2011) found that 71% of the policies were in compliance with the federal guidelines. The most often addressed components of the wellness policy were physical activity, nutrition education and competitive foods; however, only 46% of the policies had nutrition education policies that were integrated into other places beyond the classroom. Fundraising was the most addressed competitive food while provisions requiring standards for food in classrooms were addressed

least. Also, most of the policies created a wellness committee, and 47% of the districts included the requisite members listed in the federal mandate.

Researchers concluded that there is need for a state-level surveillance system to provide a validated evaluation system. Along with an accountability mechanism, Gaines et al. (2011) concluded that district administration need assistance in translating national and state mandates into realistic, effective implementation processes to monitor and evaluate school wellness policies.

In a pre/post study of 45 low-income elementary schools in Colorado, Belansky and colleagues (2009) measured the effects of school wellness policies on the school food and physical activity before and after policy implementation. Time spent in physical education and recess tended to increase by an average of 18 minutes after policy adoption; however, there was no change in physical education time for districts that had mentioned PE quantity in their policy. The increase in PE was seen for districts that did not mention PE quantity in the wellness policy.

Using a comprehensive wellness policy-coding tool developed by Schwartz and colleagues (Schwartz, 2009) to measure strength and comprehensiveness, Belanksy noted that a majority of wellness policies met nearly half of the 96 items with physical education receiving the least attention. Also, the school wellness policies had low strength scores in all areas especially nutrition guidelines and physical education.

In 2007, Serrano and colleagues (2007) found that 54.3% of school districts in Virginia had drafted a school wellness policy, and 69.5% of the districts had used the state-mandated school health advisory board to draft the policy. However, only 34.1% of the districts met the federal requirement mandating a diverse inclusion of people on the wellness committee. Rural school districts were more likely to have more committee members than nonrural districts, and

those committee members were more likely to be parents, health professionals or an administrator. Regarding evaluation of the policies, 58.7% of the respondents indicated that they were interested in receiving evaluative help from university researchers, and data suggested that rural districts were more likely to seek out funding for implementation than nonrural districts (Serrano, 2007).

Conclusions

In looking at the literature regarding school wellness policies, several themes have emerged:

- Very few research studies appear regarding school wellness policies. As of 2011, only nine peer-reviewed studies solely evaluating school wellness policies have been published, and most research evaluates the content of the policy not the developmental, implementation and maintenance processes.

- In the large majority of literature regarding school wellness policies, one can conclude that many of adopted policies meet a large number of the federal guidelines; however, with the lack of an accountability mechanism, adopted wellness policies may not be implemented correctly or if at all.

- Diverse wellness committees are associated with stronger and more comprehensive wellness policies, and there needs to be a strong sense of perceived organizational support to develop diverse committees that include representatives from a local school board, parents, certified nutrition and/or wellness personnel, foodservice directors, teachers and students.

- Since there is no federal standard for the wording of school wellness policies, strength and comprehensiveness of a policy will vary from district to district within a state. State mandates regarding nutrition and physical activity may provide stronger, uniform

requirements for their districts; however, little research evaluates state policy mandates on school wellness.

- There is a methodology gap in school wellness policy literature. There are few reliable and valid tools to measure the strength and comprehensiveness of wellness policies; many researchers developed their own, non-validated coding and survey instruments. Moreover, many survey data obtained are not compared with objective, more reliable and valid, data collection methods.

- There are notable and measurable barriers to wellness policy development, implementation and maintenance. School districts will need to address organizational and resource allocation barriers in order to create and implement stronger and more comprehensive policies.

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Chapter 3: The Strength and Comprehensiveness of Wellness Policies within a Sample of Rural and Urban School Districts

Abstract

BACKGROUND AND PURPOSE: Public school policies related to physical activity and eating behaviors have recently become the focal point for policymakers to evaluate the effect of rules and regulations on the childhood obesity epidemic. However, little research has emerged that evaluates policy environments in general or across different geographic locales.
The purpose of this research project was to evaluate the strength and comprehensiveness of School Wellness Policies (SWPs) within areas where disparities exist in childhood obesity--rural and city school districts.

METHODS: Three city and 5 rural school districts that serve a total student population of 172,392 in 434 schools were selected in a tri-state region, and their respective SWPs were coded with a 96-item tool across 7 policy subgroups to improve access to healthful foods and regular physical activity. Strength, reflecting the degree to which a policy included detailed implementation information, and comprehensiveness, reflecting the breadth of policies, were calculated. Each policy subgroup was assessed on a 0-1 point scale with lower scores representing weak strength or less comprehensiveness.

RESULTS: Overall, the SWPs were extremely weak ($M=0.24 \pm 0.19$) and moderately comprehensive ($M=0.50 \pm 0.15$). The strongest and most comprehensive policy subgroup was

nutrition education (M=0.31 ± 0.22; M=0.67 ± 0.20 respectively). The weakest policy subgroup was communication and promotion (M=0.13 ± 0.13) while the least comprehensive subgroup was physical education (M=0.35 ± 0.29). When comparing policies across rural versus city school districts, we found that city district policies were stronger (M= 0.31± 0.12 vs M= 0.20 ± 0.22; ES=0.61) and more comprehensive (M= 0.59 ± 0.05 vs M= 0.44± 0.17; ES=0.96) than their rural counterparts.

CONCLUSION: While SWPs may be present across city and rural school districts, the low strength and lack of comprehensive strategies related to nutrition and physical activity may be contributing to the maintenance of an obesogenic environment in these public schools.

Introduction

From 1970 to 2004, the rates of obesity in children (who have a Body Mass Index above the 95th percentile) tripled (Ogden, 2010), and in 2006, more than 16 percent of children were obese, while some 30 percent were classified as overweight (having a BMI at or above the 85th percentile) (Ogden, 2010). Childhood obesity has been linked to the development of the early onset of cardiovascular diseases (Dietz, 2005), type 2 diabetes, high rates of hypertension, asthma (Visness, 2010) and some cancers (Danaei, 2005), and ethnic/racial minorities and low-income children are especially at risk for becoming overweight and/or obese (Ogden, 2010).

Recently, policy-related interventions have emerged as an avenue to effect broad environmental-level change, and in recent years, many health-related policies have been introduced to combat the growing challenge of reducing and preventing childhood obesity in the United States. Since every child attends school, researchers have begun to study the public school policy environment to evaluate what effect rules and regulations have on the eating and physical activity environments of the public schools.

In 2004, Congress passed the Childhood Nutrition and WIC Reauthorization Act, requiring all schools participating the USDA's reimbursable school lunch program create local school wellness policies (SWP). This federal mandate was the first federal policy initiative to address nutrition, eating behavior and physical activity (Smith, 2006), and Congress mandated each SWP include the following five components to promote student wellness: 1) goals for nutrition education, physical activity and other school-based activities; 2) nutrition guidelines for all foods available on each school campus during the school day; 3) assurance that guidelines for reimbursable school meals will not be less restrictive than federal regulations and guidelines; 4) a plan for measuring implementation and evaluation of the local wellness policy; and, 5)

community involvement in the development of the SWP (Story, 2009). Since there is no minimum standard for the SWP policy components, local educational agencies (LEAs) are responsible for writing, adopting, implementing and evaluating the policy. This lack of a unified SWP standard has led to extreme variability in the strength and comprehensiveness of the policies (Story, 2009).

Of the several studies that appear evaluating the strength and comprehensiveness of SWPs, researchers have concluded that a majority of school district policies meet the federal guidelines in policy content; however, researchers have reported that many of the wellness policies are extremely weak in the areas of policy implementation and policy evaluation (Metos, 2011). Moreover, very few studies appear that evaluate the strength and comprehensiveness of SWPs in low-income LEAs, areas that tend to be at higher risk for developing childhood obesity (Ogden, 2010b). In addressing access to school meals for low-income children, Moag-Stahlberg (2008) found in a national cross-sectional study that only 11 percent of policies had goals for increasing FRPL participation in a non-stigmatizing way. Little research has emerged, in recent years, that evaluate the strength and comprehensiveness of SWPs in low-income settings across different geographical locales. The purpose of this preliminary study was threefold. First, it was designed to: (1) develop a protocol for policy evaluation methods that would be used throughout this dissertation; (2) document the ability of the research team to reliably identified indicators of policy strength and effectiveness; and, (3) explore methods of policy comparison based on a small sample of policies from urban and rural low-income school districts across a tri-state.

Methods

Participants

Three city and 5 rural LEAs were selected from a total population of 157 LEAs across a tri-state region (Virginia, Maryland and the District of Columbia) for inclusion in this observational study. This tri-state region was selected for its diverse school populations, and our sample population was taken from a pending research study evaluating SWP implementation at the local school level. From a list of 1,107 total schools in the tri-state area, researchers sorted a list of total schools into Title I (low-income) and non-Title I schools. Title I is a federally designated program, where schools and/or LEAs that have more than 40 percent of the student population that qualifies for free and reduced-price lunch receive additional resources, funding and programs.

The Title I schools (n=1,107) were then sorted by grade level. Secondary Title I schools (n=76) were then stratified based on geographic locale as determined by the US Census, and from the resulting stratifications, schools within the following four most populated locales were chosen: city large, city midsize, rural distant and rural remote. According to the National Center for Educational Statistics, city large denotes an urbanized area with a population of 250,000 people or more. City midsize represents an urbanized area with a population greater than 100,000 people but less than 250,000. Rural distant denotes a rural area that is 5 miles to 25 miles away from an urbanized area. Rural remote designations are used to describe a rural area that is 25 miles or more away from an urbanized area.

Post-hoc participant analyses of the tri-state region show that within our sample of schools that 3 out of 17 urban LEAs were selected and 5 out of 64 rural LEAs were selected. The urban school districts were: Richmond City Public Schools, the District of Columbia Public

Schools and Baltimore City Public Schools. The five rural populations were: Kent County Public Schools (Maryland), Pittsylvania County Public Schools (Virginia), Lee County Public Schools (Virginia), Buchanan County Public Schools (Virginia), and Scott County Public Schools (Virginia).

Policy Coding

Researchers used a previously validated tool (Schwartz, 2009) to determine the strength and comprehensiveness of a LEA. This 96-item coding tool uses the following 7 policy subgroups to evaluate the school district's efforts to improve access to healthful foods and regular physical activity: (1) nutrition education; (2) standards for USDA child nutrition programs and school meals; (3) nutrition standards for competitive and other food and beverages; (4) physical education; (5) physical activity; (6) communication and promotion; and, (7) evaluation.

Each policy was coded using a 3-point scale. Items were coded as 0 if there was no mention of the component in the policy. A score of 1 was given to an item if the policy mentioned the component vaguely, and a policy received a 2 if the component was addressed with specific strategies. For example, item 61 states that the policy "addresses the frequency of required physical education (daily)" (Schwartz, 2009). The following statement-- "Students in K-8 will be required to take PE" --would be coded as a 1, while the statement—"Students in grade K-8 will be required to receive 50 minutes of daily PE instruction with a minimum of 30 minutes of moderate/vigorous PA" would be coded as 2.

Each of the 8 LEA policies were coded by three researchers, and consensus scores were determined for each school district through meetings to obtain agreement. Two junior researchers coded the policies separately and met jointly to develop a consensus score. The senior researcher coded the policies separately, and a Cohen's Kappa score was calculated show inter-rater agreement between the junior and senior researchers.

Policy Strength

A policy's strength reflected the degree to which a policy included detailed implementation information. To calculate the strength score of a SWP across a specific policy subgroup, researchers counted the number of items scored as 2 and divided the count by the number of items in the policy subgroup. The SWPs total strength score was the average of all the policy strength subgroups. The total scores could range from 0 (weakest) to 1 (strongest).

$$Subgroup\ Strength\ Score = \frac{no.of\ subgroup\ items\ coded\ 2}{no.of\ subgroup\ items}$$

$$Total\ Strength\ Score = \frac{Strength\ \sum_{i=1}^{N} x_1}{7}$$

Policy Comprehensiveness

A policy's comprehensiveness reflected the breadth of the policy across a particular subgroup. To calculate the comprehensiveness of a SWP across a specific policy subgroup, researchers counted the number of subgroup items coded as 1 or 2 and divided the count by the total number of items in the subgroup. The SWPs total comprehensiveness score was the

average of all the policy comprehensive subgroups. The scores could range from 0 (least comprehensive) to 1 (most comprehensive).

$$Subgroup\ Comprehensiveness\ Score = \frac{no.of\ subgroup\ items\ coded\ 1\ or\ 2}{no.of\ subgroup\ items}$$

$$Total\ Comprehensive\ Score = \frac{Comp.\sum_{i=1}^{N} x_1}{7}$$

Statistical Analyses

To compare rural and urban policy scores, researchers used SPSS v. 18 for all statistical analyses.

Results

Inter-rater agreement

By performing Cohen's Kappa (McHugh, 2012), the inter-rater agreement between the junior and senior researchers was 0.97 indicating near perfect agreement.

SWP Strength

Policy scores could range from 0 to 1, and, overall the SWPs were very weak (M=0.24 ± 0.19) (Table 1). The two weakest SWPs were two small rural counties located in Virginia: Scott and Buchanan County (0.06 ± 0.19, 0.07 ± 0.19) (Table 2). The strongest SWP was a small rural school district in Virginia: Lee County (0.59 ± 0.19). For policy subgroups, the strongest subgroup was *Nutrition Education* (M= 0.31 ± 0.22) while the weakest policy group was C*ommunication and Promotion* (M=0.13 ± 0.13). (Table 1). The urban school districts had stronger policies than the rural school districts (Urban= 0.31 ± 0.12; Rural=0.20 ± 0.22). The

urban school districts also outscored the rural school districts in nearly every policy subgroup except physical activity strength (Table 3) with an overall *strength* effect size of 0.61. However, this difference was not statistically significant (Table 4).

Comprehensiveness

The SWPs were moderately comprehensive (M=0.50 ± 0.15) with the most comprehensive SWP being Lee County (0.74 ± 0.15) (Table 2) and the least comprehensive being Pittsylvania County (0.30 ± 0.15). For the policy subgroups, *Nutrition Education*, *Physical Activity* and *Evaluation* were the most comprehensive parts of the SWPs (Table 1). The least comprehensive areas were *Communication and Promotion* and *Physical Education* (0.36 ± 0.24, 0.35 ± 0.29). The urban school districts outscored all the rural districts in six of the seven policy subgroups (Table 3) with an overall effect size of 0.97; however, this difference was not to be shown as statistically significant (Table 4).

Individual Policy Items

Out of the 96 policy components, eight policy components received a score of 0 across each individual SWP: (1) Nutrition information is available for foods other than school meals; (2) SWP addresses limiting fat content of drinks (other than milk); (3) SWP addresses limited calorie content per serving size of foods; (4) SWP addresses access to free drinking water; (5) SWP addresses teacher-student ratio for physical activity; (6) SWP specifies district use of CDC's Coordinated School Health model or other comprehensive for communication and/or promotion; (7) SWP addresses methods to solicit or encourage input from stakeholder groups; and, (8) SWP identifies funding support for wellness activities or policy evaluation. Of the eight

items, 50 percent pertained to *Competitive Foods* while 25 percent dealt with *Communication and Promotion.*

Overall

Although there was an observed difference between the comprehensiveness and strength scores between urban and rural school districts, an independent t-test did not prove significant ($p>0.05$) (Table 1); however, there was a strong correlation ($r=0.833$) between overall comprehensiveness and strength (Figure 1).

Discussion

The aim of this study was to determine methods necessary to evaluate policy quality from the perspective of strength and comprehensiveness of the policies and document the reliability of identifying indicators of different policy components. In general, the findings indicate that the protocol used provided good information on policy quality in a reliable way. When comparing between the coding completed by the junior and senior investigator, our results highlighted a strong inter-rater reliability. Further, the methods used to compare across groups of policies based on a unique independent variable provided systematic rankings of policies and a large effect size different between rural and urban policies.

Although the difference in mean scores between urban schools and rural schools was not shown to be significant, these preliminary results elucidate the need for further research evaluating SWPs in rural and urban environments. Overall, the policies were extremely weak with most of the rural LEAs exhibiting the weakest scores. We suggest that this discrepancy

may be due to the less number of policy development resources. Rural school districts may have less flexible budgets and more restrained costs when drafting and implementing policy when compared to their urban LEAs (Levin, 2011). Furthermore, the diseconomies of scale may inadvertently affect the policy developmental and implementation process (Levin, 2011). Rural districts tend to spend more per student than non-rural districts, and the district enrollment is the factor most associated with resource allocations (Levin, 2011).

Moreover, Mary Story argues that many states created model policies, which school districts copies to ensure compliances to federal and state regulations; however, this model language does not elicit important stakeholder input, another impediment to lasting population-wide change (Story, 2009). Our results confirmed this fact. During the coding process, we noted that many of the smaller school boards located in rural Virginia adopted extensively similar SWPs. These policies used similar formatting, similar language and had identical evaluation procedures. This model policy was provided by an independent school board association—The Virginia School Board Association, and the VSBA acts as a third-party advisor for school boards throughout the state of Virginia. Each school board pays a membership fee, and, in return, the board is supplied with policy development tools, procedural recommendations, governance support and model LEA policies. More research is needed to examine what effect the use of a model SWP has on the effect of policy strength and policy comprehensiveness.

Comprehensiveness versus Strength

Although nutrition education was the most comprehensive and strongest policy subgroup, the strength of the subgroup was relatively weak. Many other subgroups followed this tendency, which suggests that policymakers have put in place a large breadth of policy goals. However,

these components do not have any specific strategies included to reach and measure progress to these goals. Policymakers may be in a rush to be compliant to the federal mandate while neglecting the implementation process. Neglecting this critical piece may lead to creating superficial school health policies—policies that seem to attack a large number of health problems but provide no reasonable specific strategies to guarantee implementation.

Policy Subgroups

Nutrition Education

Our results confirmed the findings of previous literature that nutrition education is the strongest and most comprehensive policy subgroup. Many schools have developed comprehensive health programs, which many provide some nutrition education to students, and this curricular development may improve the depth and breadth of a LEA's wellness policy. However, we should note that some SWPs in Virginia had very low strength scores, and future research should be directed at the relationship between the presence of a state mandated health curriculum and the strength of nutrition education policy. Moreover, every LEA, except for Baltimore City, did not have any measures in place to evaluate their nutrition curriculum.

USDA Guidelines

The policies concerning USDA guidelines were relatively comprehensive and weak, and since many of the schools located in these LEAs are classified as low-income (through Title I designation), we expected the guidelines for USDA foods to be much more comprehensive. Many of the SWPs neglected to mention the following areas:

(1) Addressing access to the Summer Food Service Program

(2) Specifying the use of low-fat versions of foods and/or low-fat methods of food preparation

(3) Scheduling meals to improve the food service staff

(4) Hand washing access

(5) Qualification and training of food service staff

(6) Posting nutritional information for school meals

Clark et al. found in his study using data from the School Nutrition Dietary Association Study (SNDA-III) that 80 percent of American children had excessive intake of saturated fat and that 92 percent had an excessive intake of sodium (Clark, 2009). Recently, the USDA issued new school meal guidelines recommending schools lower students' salt intake by 53% over 10 years and serve meals where saturated fat intake is <10% of total calories.

Competitive Foods

Along with the USDA guidelines for school meals, the policy components regulating competitive foods was rather weak and moderately comprehensive. No SWP mentioned the following areas:

(1) Nutrition information is available for foods other than school meals

(2) Addresses limiting fat content of drinks (other than milk)

(3) Addresses limited calorie content per serving size of foods

(4) Addresses access to free drinking water

By analyzing data obtained by the SDNA-III, researchers noted that 22% of children consumed competitive foods at school. Those that consumed these foods had higher total calorie and sugar intake, while they decreased their intake of sodium, fiber, B vitamins and iron. FRPL

participants also saw a lower consumption of competitive foods than non-participants (Kakarala, 2010).

Physical Activity and Physical Education

Physical activity was another policy subgroup that had relatively high comprehensive scores, and although many school districts may not have mandated physical educational programs, many schools have addressed their lack of PE by including PA goals without any specific strategies in other curricular areas. Administrators and school board officials have urged teachers to incorporate PA when necessary in lesson plans. LEAs also offer extramural activities that can replace the need for PE during the school day. However, one of the weak components of PA policies is addressing safe routes to school.

Research shows that low-income and minority students are more likely to use active transport than whites or higher-income students (McDonald, 2008), however, only one LEA vaguely indicated they provide safe routes to school. The three large urban districts in our sample can easily increase the strength of their PA policies by adopting various active transport strategies for their campuses.

Communication, Promotion and Evaluation

Many of the policies did not have many guidelines indicating how the SWP was to be communicated to students, parents, stakeholders and other school official and lacked the following information regarding:

(1) Encouraging staff to model healthy behaviors

(2) Restricting marketing of unhealthful choices

(3) Locating funding sources for wellness policy implementation and revision

Policy evaluation was one of the most comprehensive pieces of the SWPs.

Conclusions, Future Directions and Limitations

This study is preliminary in nature and was designed in large part to develop methods to be used throughout this dissertation. As a result there are a number of limitations. Our sample size of 8 school districts is very small, which increases the amount of Type II error in our results. Had our sample size been larger, we may have detected a significant difference between the school wellness policies of urban and rural LEAs—especially in the components were effect size differences were large (i.e., >0.8). Another limitation of this study is the use of Schwartz's policy coding tool. Although the coding tool is extensive and comprehensive, the tool does not allow researchers to calculate an overall policy score, and by not providing an overall policy score for each LEA, our limited statistical analyses may neglect to accurately reflect the school wellness policy environment. Still, the tool proved to be reliable and allowed for a detailed evaluation of policy sub-components.

Moreover, very little extant literature examines wellness policy environments of rural and urban schools, and this preliminary study is one of the first. Along with our unique sampling method, we have also uncovered some additional research questions that may provide researchers and policymakers with tools to produce stronger and more comprehensive SWPs. With time and cost being determinants in policy development, we would like to continue or research to examine what effect model wellness policies have on the strength and comprehensiveness of a school district's wellness policy. Another future direction is to examine the policy developmental and implementation process to deduce why some LEAs develop and implement stronger SWPs while others do not.

With the passage of the Healthy and Hunger Free Kids Act, Congress has recently revised the mandate regarding school wellness policies, and continuing our research in SWPs can provide a valuable foundation for the creation of stronger wellness policies nationwide.

Figure 3-1: Relationship between Total Comprehensive Score and Total Strength Score of Local School Wellness Policies in a sample of Rural and Urban School Districts

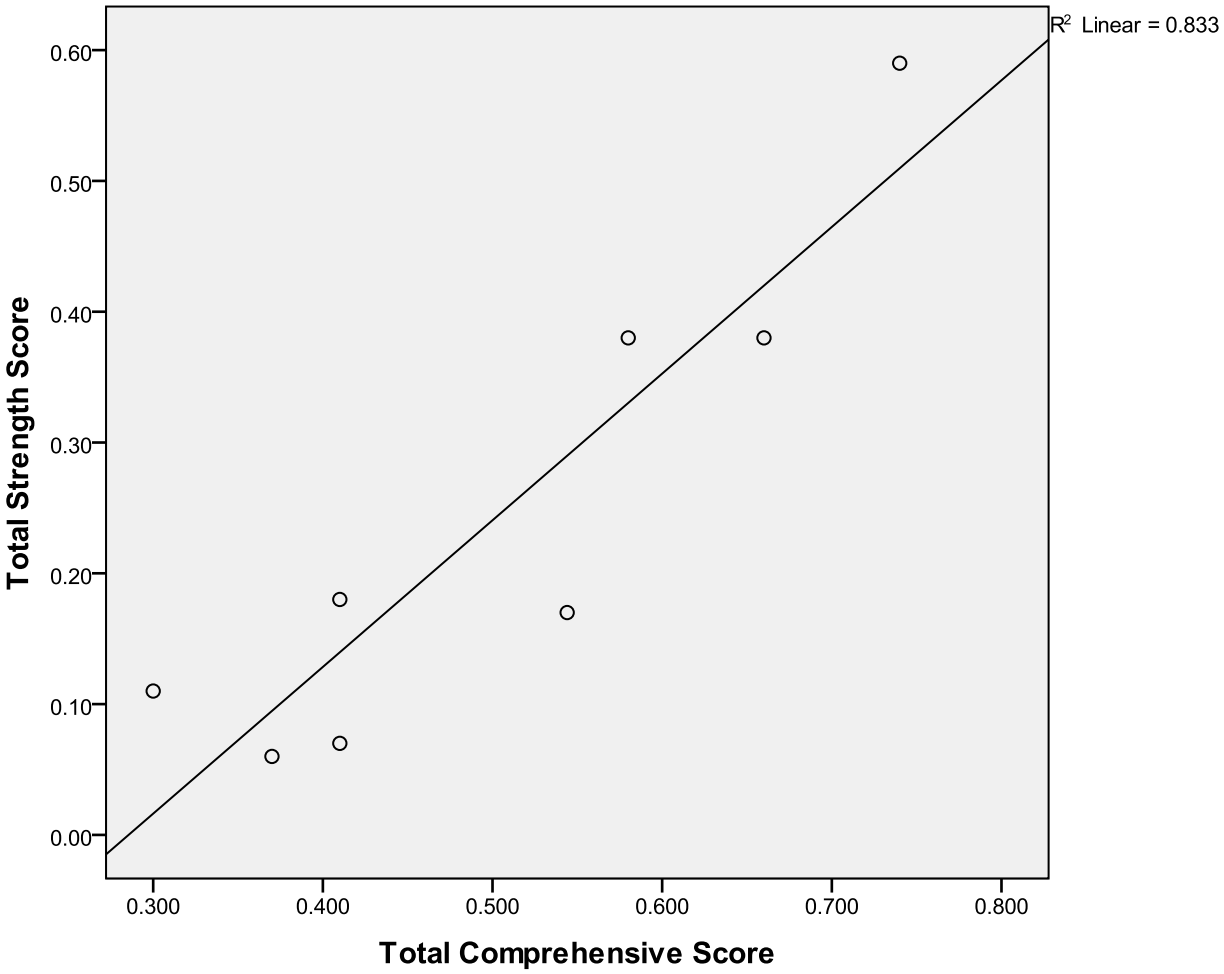

Table 3-1: Mean Comprehensive and Strength Scores of Urban and Rural LEAs and Mean Comprehensive and Strength Scores of Seven Policy Subgroups

	Comprehensiveness		Strength	
	Mean	SD	Mean	SD
Urban LEAs	0.59	0.05	0.31	0.12
Rural LEAs	0.44	0.17	0.20	0.22
Overall LEAs	0.50	0.15	0.24	0.19
Policy Subgroups				
Nutrition Education	0.67	0.20	0.31	0.22
USDA Guidelines	0.43	0.28	0.26	0.24
Competitive Foods	0.42	0.22	0.25	0.25
PE	0.35	0.29	0.22	0.22
PA	0.62	0.21	0.27	0.22
Communication and Promotion	0.36	0.24	0.13	0.13
Evaluation	0.64	0.16	0.27	0.34

Table 3-2: Policy scores for each LEA across 7 subgroups and LEA means for comprehensiveness and strength

	Baltimore City	Kent Co.	DC	Richmond City	Pittsylvania Co.	Lee Co.	Scott Co.	Buchanan Co.
Nutrition Education Comprehensive Score	1.00	0.44	0.89	0.44	0.56	0.67	0.67	0.67
Nutrition Education Strength Score	0.67	0.22	0.56	0.11	0.11	0.44	0.11	0.22
USDA Meals Comprehensive Score	0.31	0.31	0.46	0.85	0.00	0.85	0.38	0.31
USDA Meals Strength Score	0.15	0.15	0.46	0.54	0.00	0.64	0.08	0.08
Competitive Foods Comprehensive Score	0.45	0.66	0.69	0.59	0.14	0.48	0.10	0.31
Competitive Foods Strength Score	0.07	0.41	0.59	0.52	0.00	0.38	0.00	0.00
PE Comprehensive Score	0.35	0.12	0.65	0.65	0.35	0.71	0.00	0.00
PE Strength Score	0.18	0.12	0.41	0.47	0.00	0.59	0.00	0.00
PA Comprehensive Score	0.20	0.70	0.60	0.60	0.50	0.90	0.70	0.80
PA Strength Score	0.10	0.30	0.30	0.20	0.10	0.80	0.20	0.20
Communication and Promotion Comprehensive Score	0.67	0.17	0.50	0.25	0.08	0.75	0.25	0.25
Communication and Promotion Strength Score	0.08	0.08	0.17	0.17	0.08	0.42	0.00	0.00
Evaluation Comprehensive Score	0.83	0.50	0.83	0.67	0.50	0.83	0.50	0.50
Evaluation Strength Score	0.00	0.00	0.17	0.67	0.50	0.83	0.00	0.00
Total Comprehensive Score	**0.544**	**0.41**	**0.66**	**0.58**	**0.3**	**0.74**	**0.37**	**0.41**
Total Strength Score	**0.17**	**0.18**	**0.38**	**0.38**	**0.11**	**0.59**	**0.06**	**0.07**

Table 3-3: Effect Sizes between Urban School Districts and Rural School Districts among seven policy subgroups

	Urban LEAs	Rural LEAs	SD	Effect Size
Policy Subgroup				
Nut Ed Comprehensive	0.77	0.6	0.19	0.89
Nut Ed Strength	0.44	0.22	0.22	1.00
USDA Meals Comprehensive	0.53	0.36	0.28	0.61
USDA Meals Strength	0.38	0.18	0.24	0.83
Competitive Foods Comp	0.57	0.33	0.22	1.09
Competitive Foods Strength	0.39	0.15	0.25	0.96
PE Comprehensive	0.55	0.24	0.29	1.07
PE Strength	0.35	0.14	0.23	0.91
PA Comp*	**0.46**	**0.72**	**0.21**	**-1.24**
PA Strength*	**0.2**	**0.32**	**0.22**	**-0.55**
Communication/Prom Comp	0.47	0.3	0.24	0.71
Communication/Prom Strength	0.13	0.11	0.13	0.15
Evaluation Comp	0.77	0.56	0.16	1.31
Evaluation Strength	0.27	0.26	0.34	0.03
Total Comp	0.594	0.446	0.153	0.97
Total Strength	0.31	0.2	0.18	0.61

*This effect size was skewed due to a rural outlier (Lee County).

Table 3-4: T-test results for comparison of means between Urban and Rural LEAs

	Locale	n	Mean	SD	F (sig)	t	df	p
Total Comprehensive Score	Urban	3	0.594	0.059	1.276 (0.302)	1.421	6	0.102
	Rural	5	0.446	0.170				
Total Strength Score	Urban	3	0.310	0.121	0.539 (0.491)	0.761	6	0.234
	Rural	5	0.202	0.222				

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Chapter 4: School Wellness Policies: The Effects of Standard Templates

Abstract

BACKGROUND AND PURPOSE: Public school policies related to physical activity and nutrition have recently become the focal point for policymakers to evaluate the effect of regulations on the childhood obesity epidemic. State school board associations have begun to provide school districts template wellness policies, and little research exists that evaluates the effect of a template on the strength and comprehensiveness of these policies.

METHODS: In 2011, a random sample of wellness policies from school districts in Virginia (10 locally developed wellness policies and 10 template-based policies) was selected, and researchers coded each policy for comprehensiveness and strength using a previously validated audit tool.

RESULTS: A majority of the policies did not meet federal requirements, and both samples were extremely weak ($M=0.16 \pm 0.13$) and only mildly comprehensive ($M=0.37 \pm 0.16$). There was a significant difference in policy comprehensiveness and strength between locally developed policies and template-based policies. Locally developed policies were stronger ($t(2,21)=-1.82$, $p<0.05$) and more comprehensive ($t(2, 21)= -2.5$, $p<0.05$) than template-based policies. There were also significant differences ($p's<0.05$) indicating locally developed policies were superior

to template-based policies on policy subgroups of evaluation strength, communication strength and comprehensiveness, physical activity strength, and physical education strength and comprehensiveness.

CONCLUSION: Locally developed policies significantly outperformed template-based policies not just in overall terms of strength and comprehensiveness but also in subcategories such as physical activity and physical education. School boards are encouraged to provide training on adapting the template to facilitate stronger and more comprehensive policies at the district level.

Introduction

Public school policies related to physical activity and eating behaviors have recently become the focal point for policymakers to evaluate the effect of rules and regulations on the childhood obesity epidemic (Cullen, 2007; Finkelstein, 2008; Foster, 2008; Frieden, 2010; Lee, 2010; Naylor, 2009; Probart, 2008; Story, 2009; Weber, 2007). Although previous literature has demonstrated a link between school physical activity, nutrition environments and many health related outcomes (Cullen, 2007; Brescoll, 2008; Brownson, 2010; Kubik, 2003; Mendoza, 2010; Neumark-Sztainer, 2005; Ballard, 2011; SNA, 2006), school wellness policies (SWPs) may provide the spark to implement environmental change (Story, 2009). Further in 2004, Congress passed the Childhood Nutrition and WIC Reauthorization Act that required all schools participating in the USDA's reimbursable school lunch program to create these local SWPs (Story, 2009).

This mandate was the first federal policy initiative to address nutrition, eating behavior and physical activity, and Congress mandated each SWP include the following five components to promote student wellness: 1) goals for nutrition education, physical activity and other school-based activities; 2) nutrition guidelines for all foods available on each school campus during the school day; 3) assurance that guidelines for reimbursable school meals are not less restrictive than federal regulations and guidelines; 4) a plan for measuring implementation and evaluation of the local wellness policy; and, 5) community involvement in the development of the SWP (Story, 2009).

Previous research includes a small number of evaluations of SWPs that have investigated the degree to which policies addressed the federal requirements or the goals identified during policy planning. Seventy-one percent of schools identified in a sample of Alabama schools

adhered to the federal school wellness policy requirements (Gaines, 2011), and these high rates were also observed by Metos and Nanney (2007) in Utah, where 78% of school districts complied with the federal mandate. In Pennsylvania, Probart (2008) found that 100% of public schools had developed a wellness policy, and a large majority (from 86% to 100%) of the districts met the federal requirements. In Virginia, researchers have yet to measure federal compliance of SWPs; however, as of March 2006, only 54% of school districts had drafted a specific school wellness policy (Serrano, 2007). Although these are positive outcomes regarding adoption of school wellness policies, few have evaluated quality beyond the simple adherence to the federal requirements.

Local educational agencies are responsible for writing, adopting, implementing and evaluating the SWP; however, state school board associations have emerged as a dissemination tool of pertinent governance and wellness policy information across school districts. Specifically, many state school board associations are providing model wellness policy templates for local school boards to adopt and refine to comply with the federal mandate (Agron, 2010), and in Virginia, a majority of the districts have adopted a third-party wellness policy provided by the Virginia School Boards Association (VSBA), a private nonpartisan organization that provides service, training and advocacy to school boards throughout the Commonwealth of Virginia (VSBA, 2011).

The provisions of a third-party SWP template is intended to aid local school boards in the efficient development of compliant policies; however, there is also the potential that a third-party state association template may result in SWPs that may be slower or infeasible to implement. Moreover, these policies may also reduce the degree that local districts consider a broad array of strategies that align with the local context.

The purpose of this pilot study was to determine the degree to which third-party SWP templates either improve or reduce the quality of local SWPs. To achieve this purpose, we randomly selected an equal number of SWPs in the Commonwealth of Virginia that were either developed locally or used the third-party template and compared the strength and comprehensiveness of the wellness policies.

Methods

Participants

Each local educational agency (i.e., a school district of primary and secondary schools) was identified in the Commonwealth of Virginia using the National Center for Education Statistics in 2010 after receiving approval from Virginia Tech's Institutional Review Board. Charter schools designated as local educational agencies or any school district that was designated by the National Center for Educational Statistics as a regional educational agency or a state educational agency (i.e. regions or states that run correctional institutions, alternative educational programs and any other regional/state educational program) were excluded in the sample.

From the resulting 130 districts, each district wellness policy was classified either as a locally developed policy with no Virginia School Boards Association (VSBA) influence or as a policy influenced or provided by the VSBA. The distinction was made based on consistent language used across SWP sections, and 20 policies (10 VSBA and 10 Non-VSBA) were randomly selected for comparison. Selected school wellness policies were obtained using a public search system in 2011.

Policy Coding

Researchers used a previously validated tool (Schwartz, 2009) to determine the strength and comprehensiveness of each district's SWP. This 96-item coding tool was used to systematically evaluate each school district's efforts to improve access to healthful foods and regular physical activity in the following seven subgroups: (1) nutrition education; (2) federal standards for USDA child nutrition programs and school meals; (3) nutrition standards for competitive and other foods and beverages; (4) physical education; (5) physical activity; (6) communication and promotion; and, (7) evaluation.

Each item was coded using a 3-point scale (see Appendix A for a detailed description of the coding protocol), and items were coded 0 if there was no mention of the component in the policy. A score of 1 was given to an item if the policy mentioned the component vaguely, and an item received a 2 if the component was addressed with specific strategies. For example, item 61 states that the policy "addresses the frequency of required physical education (daily)" (Schwartz, 2009). The following statement-- "Students in K-8 will be required to take PE" --would be coded as 1 while the statement—"Students in grade K-8 will be required to receive 50 minutes of daily PE instruction with a minimum of 30 minutes of moderate/vigorous PA" would be coded as 2. SWPs with no mention of a PE requirement would be assessed as 0.

Three researchers-- two junior researchers and one senior researcher-- coded the 23 policies. Two junior researchers separately coded the policies and met to develop a consensus score. The senior researcher independently coded the policies, and a Cohen's Kappa was calculated to determine inter-rater agreement between the junior and senior researchers (Berry, 1988). The inter-rater reliability of the researchers for this study was strong (κ=0.72).

Policy Strength

A policy's strength reflected the degree to which a policy included detailed implementation information including specific strategies for each policy component based on the equations below (Schwartz, 2009). To calculate the strength score of a SWP across a specific policy subgroup, researchers counted the number of items scored as 2 and divided that count by the total number of items in the policy subgroup. The *Total Strength Score* was the average of the seven policy strength subgroups for each SWP. The policy subgroup scores along with the *Total Strength Score* could range from 0 (weakest) to 1 (strongest).

$$Subgroup\ Strength\ Score = \frac{no.of\ subgroup\ items\ coded\ 2}{no.of\ subgroup\ items}$$

$$Total\ Strength\ Score = \frac{Strength\ \sum_{i=1}^{N} x_1}{7}$$

Policy Comprehensiveness

A policy's comprehensiveness reflected the breadth of the policy across a particular subgroup (see equations below (Schwartz, 2009)). To calculate the comprehensiveness of a SWP across a specific policy subgroup, researchers counted the number of subgroup items coded as 1 or 2 and divided that count by the total number of items in the subgroup. The *Total Comprehensiveness Score* was the average of all the policy comprehensive subgroups for each SWP. The policy subgroup along with the *Total Comprehensiveness Scores* could range from 0 (least comprehensive) to 1 (most comprehensive).

$$Subgroup\ Comprehensiveness\ Score = \frac{no.of\ subgroup\ items\ coded\ 1\ or\ 2}{no.of\ subgroup\ items}$$

$$Total\ Comprehensive\ Score = \frac{Comp.\ \sum_{i=1}^{N} x_1}{7}$$

Compliance with Federal Requirements

Compliance to the federal requirements was determined by assessing six specific items developed to indicate if a SWP either generally (i.e., coded as 1) or specifically (i.e., coded as a 2) addressed: (1) nutrition education—item 1; (2) USDA meals—item 10; (3) competitive foods—item 23, (4) physical activity goals—item 69; (5), communication and promotion of the policy with parents and surrounding community—item 79; and, (6) implementation plans—item 91 (23). Therefore, any SWP that received a coding of 1 or 2 on each of these items would be considered compliant.

Statistical Analyses

To compare VSBA-influenced and locally developed SWPs, researchers used SPSS v. 18 for all statistical analyses. Descriptive statistics were used to summarize the proportion of local educational agencies that used the VSBA template and the strength and comprehensiveness of the SWPs. To determine if policy type influenced if each component of the SWPs met federal requirements chi squared analyses were used (i.e., VSBA versus non-VSBA). Independent t-tests were used to compare SWP subcategories and overall strength and comprehensiveness scores based on different policy types. Finally, standardized effect sizes were calculated to document the magnitude of any differences that emerged.

Results

Of the 130 local educational agencies surveyed in Virginia, 67% of the districts adopted wellness policies provided by or strongly influenced by the VSBA. Fifteen percent of the

schools did not have public access to their wellness policies, and 17% had locally developed wellness policies with no VSBA influence. Table 1 shows selected descriptive information of the sample of randomly selected school districts.

Overall, a large majority of local educational agencies met many of the federal requirements; however, only 17% of SWPs met all federal requirements (Table 2). Independent t-tests showed on average locally developed policies met 5 out of the 6 federal requirements, while VSBA policies only met 4 of the federal requirements ($t(2, 21) = 2.161$ $p<0.05$). Also, non-VSBA policies were significantly more likely to meet federal guidelines for communication and promotion ($\chi^2 = 7.304$ $p<0.05$) and USDA meals ($\chi^2 = 7.740$ $p<0.05$).

In terms of strength, the SWPs of both samples were extremely weak ($M=0.16 \pm 0.13$) and mildly comprehensive ($M=0.37 \pm 0.16$). The two most comprehensive policy subgroups were Evaluation ($M= 0.51 \pm 0.25$) and Nutrition Education ($M= 0.41 \pm 0.20$), and the two strongest subgroups were Physical Activity ($M=0.26 \pm 0.20$) and Evaluation ($M=0.22 \pm 0.30$). The least comprehensive policy subgroup was Physical Education (0.23 ± 0.25) and Communication and Promotion was the weakest policy subgroup ($M=0.07 \pm 0.10$).

For overall strength and comprehensiveness, there was a significant difference between local educational agencies that adopted the VSBA-form policy and those that adopted locally developed policies (FIG 1). Locally developed SWPs were stronger ($t(2,21)=-1.82$, $p < 0.05$) and more comprehensive ($t(2,21)= -2.5$, $p <0.05$) than those influenced or provided by the VSBA.

When comparing policy subgroups in VSBA-form policies with locally developed policies, the locally developed policies were rated significantly higher than the VSBA-form policies in the following categories: (1) Evaluation Strength ($t(2,21)= -1.81$, $p < 0.05$); (2)

Communication Strength ($t(2,21)= -2.59$, $p < 0.01$); (3) Communication and Promotion Comprehensiveness ($t(2,18)=-2.33$, $p < 0.05$); (4) Physical Activity Strength ($t(2,21)= -2.35$, $p < 0.05$); (5) Physical Education Strength ($t(2,21)= -2.20$, $p < 0.05$); and, (6) Physical Education Comprehensiveness ($t(2,21)=-2.69$, $p < 0.01$). Across other policy subgroups, the non-VSBA policies tended to have stronger and more comprehensive policies; however, these mean differences were not statistically significant (Table 3).

Furthermore, by calculating effect sizes across the significant policy subgroups, locally developed school wellness policies had large magnitude of effects in comprehensiveness and strength ($d= 0.90$ and 1.43, respectively) and Table 3 shows the effect sizes across all policy subgroups.

Discussion

These findings, from a random sample of SWPs, support previous literature in that a large percentage of our sample population addressed federal wellness policy requirements (Probart, 2008; Gaines, 2011; Metos and Nanney, 2007; Serrano, 2007) but also highlights the discrepancy between wellness policy quality (i.e., strength and comprehensiveness) and adherence to federal requirements. When a local educational agency adopts a third-party policy—in this case, a wellness policy provided or influenced by the VSBA—the strength and comprehensiveness of the policy were negatively impacted. Policy strength appears to be most affected, and this is documented by the magnitude of effect sizes between the locally developed and VSBA wellness policies. This may be the result of a district's adoption of vague components included within the template that lack specific strategies to address certain policy components within a given school district.

There also is an absence of variability in SWPs developed using the third-party template. No third-party policy scored higher than 0.2 for *Total Strength Scores*, which indicates the presence of extremely weak policies. Furthermore, on average, only 9 percent of the policy components in the VSBA policies included specific strategies to address indicated concerns across the seven policy subgroups. The weakness of the third-party policy also encumbered the strength scores of several subgroups, notably: (1) Physical Education; (2) Physical Activity; (3) Communication and Promotion; and, (4) Evaluation.

Many of the VSBA influenced policies incorporated ambiguous language to address the above subgroups; for example, Buchanan County addressed Communication and Promotion through the following language, "[o]utreach strategies to encourage families to reinforce and support healthy eating and physical activity are in place" (Buchanan County School Board, 2008). Although "outreach strategies" are mentioned, the wellness policy fails to delineate specific approaches to reinforce the healthy eating and physical activity habits in the familial environment. The absences of specific strategies may further reveal potential problems in the policy implementation and evaluation processes, which are ripe areas for future research.

Locally developed school wellness policies also outperformed the VSBA policies in the measure of comprehensiveness, or the breadth of addressing policy components in each policy subgroup. Most notably, the largest and most significant gap between local and VSBA policies occurred within the Physical Education and Communication and Promotion subgroups. In contrast to the VSBA policies, many of the locally developed policies had specific policies outlining their physical education requirements and/or curriculum. For example, Lee County included comments regarding that funding for physical education be included in the school district budget along with time requirements for moderate to vigorous physical activity (Lee

County School Board, 2006). However, Pittsylvania County, a local education agency that adopted a VSBA wellness policy, only devoted 2 lines to its physical education program, saying that students will "participate in a physical education program" (Pittsylvania County School Board, 2008).

Little Attention Given to Physical Activity and Physical Education Guidelines

Much of the research concerning the effectiveness of school wellness policies has evaluated the nutrition and food environment of public schools (Cullen, 2007; Probart, 2008; SNA, 2006; Gaines, 2011; Belansky, 2009), and the constant attention districts receive regarding competitive food policies, a la carte offerings and school breakfast/lunch offerings may have led many districts to adopt stronger food and beverage policies along with nutritional curricula while potentially turning away from the challenge of current physical activity standards. Our findings support this hypothesis in that a substantial policy quality difference was detected in three of the four policy subgroups regarding physical activity and physical education. No significant quality differences were found in any of the policy subgroups looking at the nutritional environment and the food and beverage practices.

Moreover, physical education seems to be the policy subgroup that reported one of the largest significant discrepancies between VSBA-form policies and locally developed policies in comprehensiveness and strength. This may be due to the perception of local education agencies using the terms physical education and physical activity interchangeably. The National Association of Sport and Physical Activity cite that physical education provides instruction, learning opportunities, meaningful content and student and program assessment, while physical activity refers to any opportunity for bodily movement (Ballard, 2011). Physical activity may

happen in physical education; however, the terms are not interchangeable (Ballard, 2011). For example, many schools districts in this sample did not delineate the differences between physical activity and physical education and, thus, did not address physical educational instruction, learning opportunities and/or student/program assessment in their wellness policies. This semantic issue may be inadvertently creating a gap in wellness policies, and the policies studied with little to no mention of physical education, scored consistently lowest in policies addressing the physical activity environment.

Conclusions, Future Directions and Limitations

This study showed that in Virginia many local educational agencies adopted the sample policies provided to them, and researchers have yet to study the rationale behind their choices to adopt weak and incomprehensive polices. We hypothesize that ease, efficiency, and assumption that third-party policies address the federal requirements are the primary foundations of these decisions. However, there is paucity in research related to adoption decisions. Further, our study only examined the quality of the policy as written, not as implemented. We would hypothesize based on the degree to which communication and evaluation components were included in these policies that likely the implementation is not ideal. The study of implementation of SWPs is a logical next step for future research.

Our study includes a number of limitations. First, we did not evaluate all SWPs in the commonwealth; however, policies were randomly selected to aid in collecting a representative sample. Second, while analyses show that the VSBA template led to weaker policies, it is possible that this template was intended to be tailored or used as part of a policy development

training process. Third, written documents were only assessed, and researchers did not evaluate the associated school environments to determine policy implementation.

Finally, our study presents a number of opportunities for state school board associations to act upon. With Congress reformulating school wellness policy mandates as part of the Healthy Hunger-Free Kids Act of 2010, school board members are at a crucial point in the wellness policy adoption process. The VSBA, along with other state boards, has the opportunity to reformulate their weak and incomprehensive SWP templates into stronger and more comprehensive policies. State school board associations should work with state health departments for content guidance and local districts to tailor and expand their SWP templates into one that can be easily differentiated and personalized for each district before, during and after the adoption process.

Figure 4-1: Total Strength Scores and Total Comprehensive Scores of VSBA and Non-VSBA (Locally Developed) SWPs

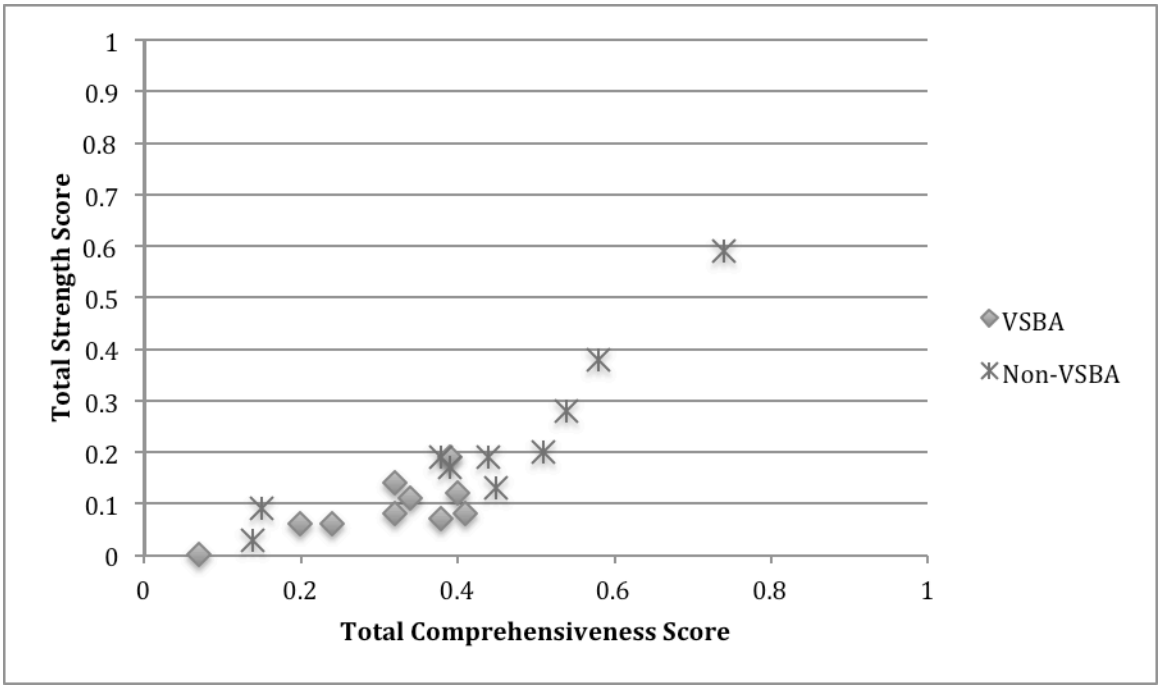

Table 4-1: Sample Characteristics

Characteristic		Present Study N (%)	Virginia N (%)
District Type			
Urban		3 (15)	15 (11.3)
	VSBA	1	
	Non-VSBA	2	
Suburban		6 (30)	19 (14.3)
	VSBA	1	
	Non-VSBA	5	
Rural		11 (55)	98 (74.2)
	VSBA	8	
	Non-VSBA	3	
Enrollment			
0-4999		9 (45)	82 (63.1)
	VSBA	7	
	Non-VSBA	2	
>5000		11 (55)	48 (36.9)
	VSBA	3	
	Non-VSBA	8	
Percent Eligible for Free and Reduced-Price Meals			
0-39.9%		13 (60)	55 (42.3)
	VSBA	5	
	Non-VSBA	8	
40-100%		7 (40)	75 (57.7)
	VSBA	5	
	Non-VSBA	2	

Table 4-2: Compliance of Sample Population to Federal Wellness Policy Requirements

Federal Component			%
Nutrition Education Goals	% Addressed		91.3
		%VSBA	92.3
		%Local	90.0
USDA Meals*	% Addressed		69.6
		%VSBA	46.2
		%Local	100.0
Competitive Foods	% Addressed		86.9
		%VSBA	92.3
		%Local	80.0
PA Goals	% Addressed		95.6
		%VSBA	100.0
		%Local	90.0
Communication and Promotion*	% Addressed		30.4
		%VSBA	7.6
		%Local	60.0
Implementation	% Addressed		86.9
		%VSBA	84.6
		%Local	90.0
Met All Federal Guidelines	% Addressed		17.4
		%VSBA	0.0
		%Local	17.4
*** chi-squared analysis showed significant differences $p<0.05$**			

Table 4-3: Descriptive Statistics for Policy Subgroups for VSBA and Locally Developed SWPs

	Type of SWP	M	SD	ES
Nutrition Education Comprehensive Score	VSBA	.407	.147	0.06
	Local	.419	.242	
Nutrition Education Strength Score	VSBA	.154	.092	0.48
	Local	.220	.201	
USDA Meals Comprehensive Score	VSBA	.349	.148	0.65
	Local	.479	.275	
USDA Meals Strength Score	VSBA	.140	.111	0.50
	Local	.222	.206	
Competitive Foods Comprehensive Score	VSBA	.180	.149	0.65
	Local	.300	.220	
Competitive Foods Strength Score	VSBA	.044	.038	0.90
	Local	.159	.212	
PE Comprehensive Score	VSBA	.097	.168	1.26
	Local	.361	.261	*
PE Strength Score	VSBA	.027	.046	1.22
	Local	.172	.204	*
PA Comprehensive Score	VSBA	.500	.194	0.21
	Local	.550	.279	
PA Strength Score	VSBA	.160	.096	1.17
	Local	.350	.236	*
Communication and Promotion Comprehensive Score	VSBA	.163	.134	1.07
	Local	.347	.210	*
Communication and Promotion Strength Score	VSBA	.016	.033	1.34
	Local	.122	.125	*
Evaluation Comprehensive Score	VSBA	.465	.268	0.41
	Local	.564	.223	
Evaluation Strength Score	VSBA	.099	.261	0.82
	Local	.333	.314	*
Total Comprehensive Score	VSBA	.308	.109	0.90
	Local	.431	.183	*
Total Strength Score	VSBA	.091	.048	1.43
	Local	.226	.159	*
*independent t-tests showed significant differences ($p < 0.05$) between the groups				

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Chapter 5: The Quality of Physical Activity Policies in Maryland and Virginia

Abstract

BACKGROUND AND PURPOSE: Since the adoption of the Healthy Hunger-Free Kids Act of 2010, many researchers have examined changes in the school nutrition environment; however, far less research has focused on the evaluation of physical activity (PA) policies within public schools.

METHODS: School district wellness policies (n=144) of Virginia and Maryland were coded using a previously validated audit tool with a 0 (weakest, least comprehensive) to 1 (strongest, most comprehensive) scale.

RESULTS: Mean policy strength was weak (.20 ±.15), and on average policies were moderately comprehensive (.40 ±.22). The strongest (.73 ±.44) and most comprehensive (.79±.40) policy subgroup addressed daily recess in elementary schools. Virginia had significantly higher scores in 9 policy groups, while Maryland had higher significant policy scores in the two following groups: (1) the strength and comprehensiveness of a written PE curriculum for each grade level (p's<.05) and (2) the strength and comprehensiveness of addressing the use of PE waivers (p's<.05)

CONCLUSIONS: PA wellness policies in a tri-state area are extremely weak and only moderately comprehensive; it is unlikely that these policies will significantly influence school-based physical activity.

Introduction

The health benefits of physical activity in children and adolescents have been well documented in the literature (Sothern, 1999; Warburton, 2006; Janssen, 2010). Regular physical activity in children and adolescents has shown to be positively associated with strong academic outcomes, and regular physical activity can build healthy bones and muscles, control weight, increase self-esteem and improve blood pressure and cholesterol levels (Physical Activity Guidelines Advisory Committee, 2008). Thus, increasing physical activity in children and adolescents is a primary goal of Healthy People 2020; however, the 2011 Youth Behavioral Surveillance System showed that only 29% of public high school students met the national recommendation of performing at least 60 minutes of physical activity per day (YRBSS, 2011).

Public schools have a great opportunity to enact policy interventions to increase physical activity in children and adolescents, and since the adoption of the Healthy Hunger Free Kids Act of 2010, the federal government required that all public schools participating in federal meals programs provide physical activity and nutrition goals for each school district. Unlike the federal meals program, there are no federal requirements regarding the quality of physical activity offered by public schools, and Brener (2011) and colleagues found that school districts are more likely to address the nutrition-related mandates in their wellness policies than those that pertain to physical activity.

The purpose of this study is to determine the quality of physical activity policies located within the school wellness mandate. Strong and comprehensive physical activity policies may contribute positively to the school environment in their effort to increase the physical activity of their students while reducing the health risks associated with sedentary behaviors.

Methods

Participants: School Districts

Local wellness policies were obtained from school districts located within Maryland and Virginia. This area was selected due to the heterogeneous mixture of school district sizes, locations and pupil demographics.

To evaluate the physical activity policies located in the region, researchers identified all public school districts using the Common Core Data set published by the National Center of Educational Statistics, or the NCES, in the spring of 2012. To be eligible, school districts had to be designated as local educational agencies. Charter schools designated as LEAs and any school districts that was designated by the NCES as a regional educational agency or a state educational agency (e.g. regions or states that run correctional institution, alternative educational programs and any other regional/state educational program) were excluded from the study population due to the varied policy development, adoption and implementation processes employed.

From the resulting 156 LEAs, initially 138 districts had their school wellness policies publically available via Web site. For those not initially available, researchers contacted the missing districts twice (once via e-mail-if provided—and secondly via telephone) and requested that they send their policy via e-mail to the researchers. Four out of initial missing 18 were due to the following: one district's wellness policy was in the process of being updated and would not be available within the timeframe of the study; two districts operated under their respective county LEAs; and, one district's server was destroyed in a natural disaster and was in the process of being rebuilt. In the end, 144 out of 152 remaining policies (94%) were obtained.

The districts were also classified by locale and other demographic information provided by Common Core of Data by NCES. That is, from the resulting 144 school districts, the mean percentage of students eligible for free and reduced-priced lunch was 40% ± 16. Our sample had a total student enrollment of 1,966,336 with a median pupil/teachers ratio of 16.09 ± 1.9. The median expenditure per student was $11,428 ± $2,636.47 with a total number of schools at 3266. The mean number of schools in each district was 22.68 ± 39 with an average number of students at 13,655 ± 26165. Finally, the majority of the districts (n=80) were classified as rural, while 23 districts were located in towns, 25 were classified as suburb and 16 were located within a city.

Policy Coding

Researchers used the abbreviated Wellness School Assessment Tool (Schwartz, 2009) to determine the strength and comprehensiveness of the district's physical activity policies. This previously validated 14-item coding tool systematically evaluated school district's efforts to address physical education curriculum, time spent in physical education across all grade levels, the qualifications and training of those involved in physical education, the amount of physical activity breaks during instructional time for elementary school students, the provision of daily recess in elementary school, the use of school facilities for community recreation and the use of physical activity as punishment.

Each item was coded using a 3-point scale. Items were coded 0 if there was no mention of the component in the policy. A score of 1 was given to an item if the policy mentioned the component vaguely, and an item received a 2 if the component was addressed with specific strategies. Two researchers coded the 145 policies independently and then met to develop a

consensus score for each district. Cohen's Kappa, which measures agreement between coders, of the researchers for this study was strong (r=0.77), and any discrepancies were resolved through discussion and reference to the policy documents.

Policy Strength

A policy's strength reflected the degree to which a policy included detailed implementation information including specific strategies for each policy component (Schwartz, 2009). To calculate the strength score of the physical activity policies within a district's school wellness policy, researchers counted the number of items that were scored a 2 and divided that count by 14, the number of physical activity policy components evaluated. The physical activity strength score could range from 0, representing 0 items that included specific strategies, to 1, meaning that each of the 14 physical activity components were addressed and included specific strategies (Schwartz, 2009).

Policy Comprehensiveness

Comprehensiveness reflected the breadth of the policy across the 14 physical activity policy components evaluated (Schwartz, 2009). To calculate the comprehensiveness of the physical activity policies, researchers counted the number of components coded as 1 or 2 and divided that count by 14, the total number of components evaluated. The comprehensiveness score of the physical activity policies could also range from 0, representing a district that did not address any of the 14 physical activity components to 1, meaning a district addressed each of the 14 policy components (Schwartz, 2009).

Statistical Analyses

To compare the physical activity and physical educational policies for all the school districts, researchers used SPSS v.20 for all statistical analyses. Descriptive statistics were used to outline policy strength and comprehensiveness and bivariate correlations were used to examine the relationships. Comparisons based on school characteristics that were continuous (e.g., school size) were completed using regression analyses, and independent t-tests and one-way ANOVAs were used to compare across states and geographic locales.

Results

There were no significant differences on policy quality based on school size, pupil-teacher ratio, median expenditures per students, school district size, or percent eligible for free and reduce-priced lunch. Overall, mean physical activity policy strength was extremely weak (0.20 ± 0.15) and only moderately comprehensive (0.40 ±0.22). PA policy strength was also strongly correlated with the comprehensiveness of the physical activity policy (r=0.83 p=0.00), meaning that weaker policies were also the least comprehensive.

Seventy-nine percent of the sample addressed the provision of daily recess in elementary schools, and 73 percent of the sample offered specific recess times or other strategies. The strongest policy group addressed the provision of physical activity before and after school through intramurals, extracurricular activities and interscholastic activities (0.55± 0.49). Only 3 percent of the sample addressed the student/teacher ratio provision, and no school district provided specific guidelines as to the maximum number of students enrolled in a single physical education class. The next most comprehensive policy components addressed regular physical

activity breaks for elementary school students (0.70 ± 0.45) and structured physical activity before of after school through intramurals and extracurricular activities (0.74± 0.43).

There were significant differences in policy subgroups (Table 2) based on which state the district was located in. Maryland had significantly higher policy strength (t=9.55, df=142, p<0.01, MD= .65 ± .49, VA= .05 ± .21) and comprehensiveness (t=4.73, df=142, p<.01) MD= .70 ± .47, VA= .23 ± .42) scores than Virginia when addressing a written PE curriculum for each grade level. Districts located in Virginia had higher policy strength and comprehensiveness for several components, most notably: (1) Addressing structured physical activity before or after school (Strength-t=3.10, df=142, p<.01, MD= .26 ± .44, VA= .60 ± .49; Comprehensiveness-t=3.85, df=142, p<.01, MD= .43 ± .50, VA= .80 ± .40) and, (2) providing daily recess for elementary school students (Strength-t=3.61, df=142, p<0.1, MD=.43 ± .50, VA= .79 ± .41; Comprehensiveness-t=3.61, df=142, p<.01, MD=.52 ± .51, VA= .84 ± .36). (Figure 1).

A one-way ANOVA showed significant policy differences between locale (Table 3). Districts located in towns (Comprehensiveness-F (3, 141) 4.13, p<0.01, M=0 ± 0) had significantly weaker policies when addressing access to adequate facilities and equipment for physical education. Districts located in suburbs outperformed many of the other locales in the following policy subgroups: Addressing access to adequate facilities and equipment for PE (strength and comprehensiveness); addressing qualifications of PE instructors; and, providing district training for PE teachers (Table 3).

Discussion

State-based Policy Quality Differences

Districts located in Virginia had stronger recess policies than those districts in Maryland. This could be due to the differences of state-based recess policy requirements. According to the National Cancer Institute's Classification of Laws Associated with School Students, Maryland does not require schools to provide recess in elementary school, and Virginia requires schools to provide at least 20 minutes of daily recess time for elementary school students (CLASS, 2012). Research regarding PA policy diffusion from state to district level is relatively new. One recent study has concluded that districts tended to have stronger policies in states with stronger state-based nutrition and physical activity policies (Taber, 2012). Our results seem to support the hypothesis that a state with more stringent state-level policy requirements (e.g., Virginia versus Maryland state recess policy) is more likely to have stronger and more comprehensive local wellness policies when compared to states that do not have explicit policies. Similarly, districts located in Maryland had stronger policy quality scores for PE curriculum requirements than districts located in Virginia. Again, differences in state-level mandates may be related to this. Maryland requires that all school districts adopt all of the National Association for Sport and Physical Education's PE curriculum standards (Fuller, 2011). Virginia, on the other hand, provides the NASPE's curriculum standards as a framework for school districts to use (CLASS, 2012), and this effect is seen on the policy quality of the PE curriculums between the two states.

Physical Activity Before and After School

Based on our results, a large majority of school districts allow students to compete in intramurals, extracurricular and varsity sports before and after school, and this policy may be an

opportunity for researchers to provide PA interventions. Researchers have seen a positive association between the presence of intramural sport programs and the physical activity found within a school. In a sample of 10 secondary schools in Canada, Fuller and colleagues found that students had higher rates of physical activity in schools that offered more intramural sport opportunities (Fuller, 2011) than other schools. However, only a fraction of students across the United States participate in varsity sports during the school year (Johnston, 2007), and those participation rates, researchers have found, correlate with socio-economic status and racial status. Lower-SES students along with black and Hispanic students were less likely to participate in intramural and varsity sports (Johnston, 2007). Racial minorities and lower-income students are at higher-risk of becoming overweight (Johnston, 2007), and intramural, varsity athletic programs may not be the key to increasing the physical activity of these groups.

Locale and Physical Activity

Districts Located in Towns

Districts located in towns and rural settings (Table 3), as defined by the U.S. Census, were largely associated with physical activity policies that did not mention having access to adequate physical education equipment or facilities. This means that the policies make generic statements about safe environments; however, they fail to mention the physical education environment or the use of adequate equipment. Towns also scored lowest in the area of providing qualified PE instructors. It may be that schools with lower access to equipment or facilities would be those that could benefit most from having a qualified physical education teacher who could adapt classes to ensure high levels of activity with fewer resources. With the lack of adequate equipment and qualified teachers, towns may be discouraging physical activity among children. School districts should also inventory PE equipment and facilities to evaluate their

adequacy and safety each year. This can easily be done by PE instructors, school or district personnel. Furthermore, school districts should incorporate that they provide adequate and safe equipment/facilities in their local wellness policy.

Districts Located in Suburbs

Those school districts that were located in suburbs showed significant differences in addressing the qualifications of PE instructors and providing specific requirements in their wellness policies. Districts located in suburbs consistently required their PE instructors to be licensed and/or certified or required that the school follow the National Association of Sport and Physical Education's recommendation for qualified physical education instructors.

Recess

Recess was one of the more positive results of this study. Recess for elementary school students was specifically addressed by a large majority of school districts, and a large majority also offered minimum recess time allotments. Recess has been shown to increase physical activity during a school day, and in a recent systematic review and meta-analysis, researchers (Ridgers,2012) found that facility access, removable equipment and perceived encouragement during recess were associated with more physical activity. Balls, jump ropes, hacky sacks and other removable equipment may spur children to play more, and school districts should incorporate these unfixed pieces of equipment into everyday procedure. However, boys are more likely than girls to participate in physical activity during recess (Ridgers, 2012; Beighle, 2006), and school districts, policymakers and researchers may want to seek out more quality recess programs to increase the PA of schoolgirls.

Physical Education

PE Curriculum for Each Grade Level

Our results show that only 31% of our sample mentioned having a written PE curriculum available for each grade level. A written PE curriculum is based on knowledge and skills, and a curriculum can provide students with quality PE time (Barroso, 2005). Quality PE programs are shown to have positive associations with physical activity, and school districts should strive to provide quality PE for each grade level (Barroso, 2005; Sallis 1997).

PE Time Per Week for Middle and High School Students

One stark difference in our sample is that although 41% of school districts mentioned providing at least 150 minutes of physical education to elementary school students, only 6% of our sample met the National Association of Sport and Physical Education's recommendations of 225 minutes for middle and high school students. As children tend to grow and age, they tend to become less physically active (YRBSS, 2011), and in a study published in 2007, Johnston (2007) found that there was a severe drop off in PE participation from 8th grade to 12th grade, from 87% to 20%, respectively. School districts should increase the time allotted for physical education from 150 minutes to at minimum 225 minutes per week in secondary schools and include high-school PE requirements based on NASPE's recommendations.

Student-Teacher Ratio

These results also show much room for districts to improve their policy quality in one area that was neglected by nearly all school districts in our sample: student-teacher ratio of PE classes. Small PE classes afford more individualized attention (Bevans, 2010), and researchers

have noted that large PE class sizes are the most often cited barriers to providing quality PE programs (Barroso, 2007). Some states have placed caps on academic class sizes, and school districts should also follow suit regarding PE. This may mean that more qualified PE teachers may need to be hired, which may pose economic strains on tight budgets. There may be ways to attenuate the economic strain by hiring part-time instructors.

Conclusions, Future Directions and Limitations

This study has several limitations. First, this study does not evaluate the implementation of physical activity policies, and conclusions based on implementation cannot be made. Local schools are in charge of implementing their district's wellness policy, and some schools may have policies and procedures not codified by the district. Future research is needed to evaluate these possible discrepancies and the effects PA policies may have on the school environment. Secondly, many of the district policies evaluated were adopted according to the 2004 wellness mandate. Although we did evaluate the policies based on a tool using the 2004 wellness mandate as a template, several school districts may be in the process of policy development and adoption of the 2010-wellness policy standards. Furthermore, our results indicate that there are large differences between the policy environments of districts located in different states. Further research is need to measure what interaction effects state-based policy requirements have on the PA policy quality of school districts.

This is one of the first studies that have evaluated a large number of physical activity policies across a two-state region. The school wellness mandate was the first requirement that made school districts offer goals for physical activity within their district; however, like much of the research regarding wellness policies, our results seem to echo that PA policy quality is

severely lacking. Our results show that the physical activity policy environment has much room for improvement, and policymakers and researchers may be able to use our results to inform and improve physical activity policies to better combat childhood obesity.

Table 5-1: **Sample Characteristics**

State	(N)	Mean PA Policy Scores		Demographic Information					
		Comp.	Strength	No. of Schools	% of FRPL	Total Enrollment	Median Pupil/Teacher Ratio	Median Expenditure per Student	Per Capita Income
MD	23	0.37 ± 0.18	0.18 ±0.17	1456	35%	835,922	14.1	$15,114	$22,795
VA	121	0.40 ± 0.20	0.20 ± 0.14	1810	41%	1,130,414	16.2	$11,122	$19,855
Total	144	0.40 ± 0.22	0.20 ± 0.15	3266	40%	1,966,336	16	$11,428	$20,325

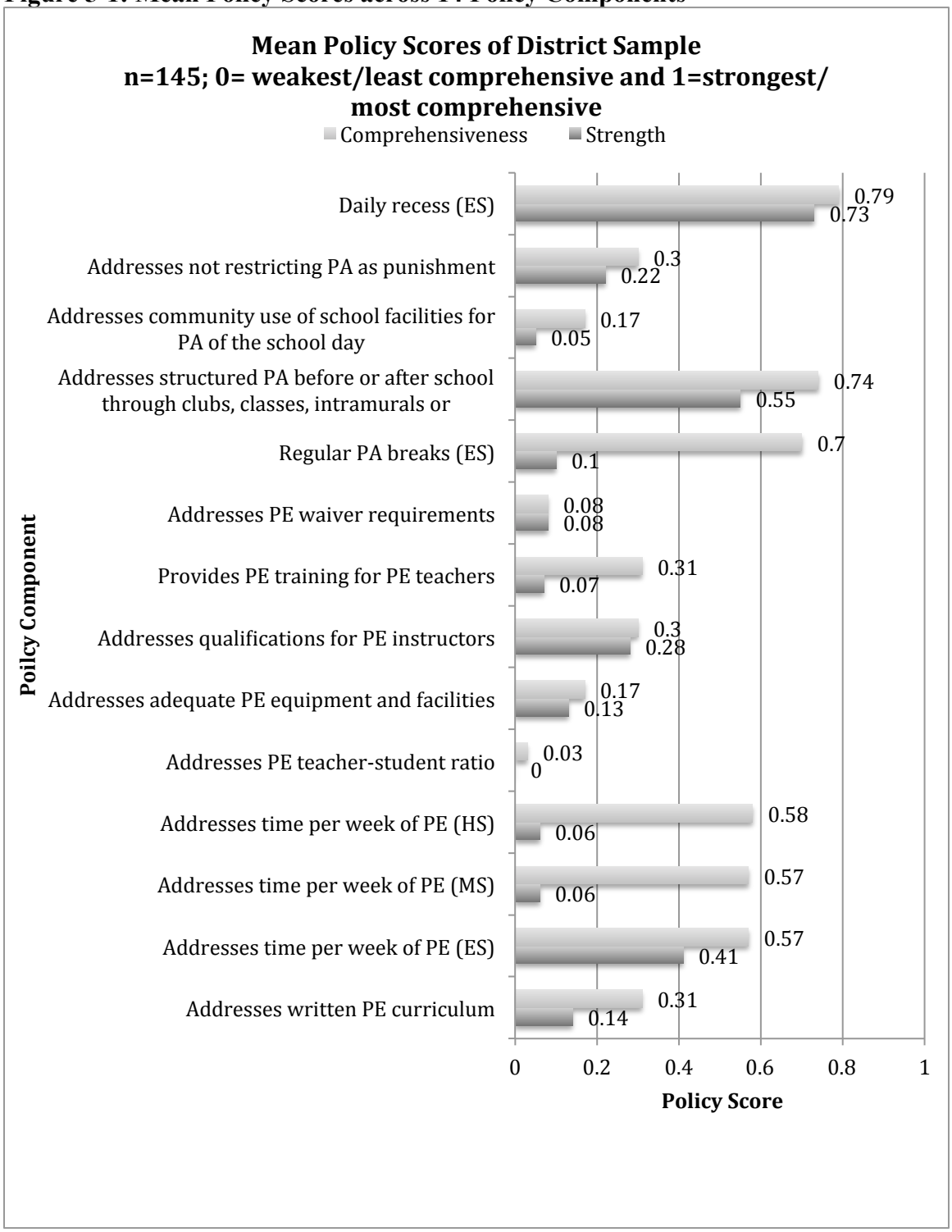
Table 5-2: Significant mean (p's <0.01) policy differences between state

Components where Virginian Districts Outscored Maryland LEAs						
	State				t	Effect Size
	MD	SD	VA	SD		
Addresses time per week of PE for elementary students (Strength)	0.04	0.28	0.48	0.5	4.09	1.13
District provides PE training for PE teachers (Compre.)	0.4	0.2	0.7	0.26	2.52	1.30
Addresses a PE waiver (Strength)	0.09	0.28	0.35	0.47	2.83	0.69
Addresses structured PA before or after school (Strength)	0.26	0.44	0.6	0.49	3.1	0.73
Addresses structured PA before or after school (Compre.)	0.43	0.5	0.8	0.4	3.85	0.82
Addresses provision of daily recess in elementary schools (Strength)	0.43	0.5	0.79	0.41	3.6	0.79
Addresses provision of daily recess in elementary schools (Compre.)	0.52	0.51	0.84	0.36	3.6	0.74
Components where Maryland Districts Outscored Virginian LEAs						
	State				t	Effect Size
	MD	SD	VA	SD		
Addressing a written PE curriculum/program for each grade level (Strength)	0.65	0.48	0.05	0.21	9.55	1.74
Addresses a PE waiver (Compre.)	0.22	0.42	0.05	0.21	2.83	0.54
Addressing written PE curriculum/program for each grade level (Compre.)	0.7	0.47	0.23	0.42	4.73	1.06
Regular PA breaks in elementary school (Compre.)	0.51	0.1	0.43	0.04	2.69	1.14

Table 5-3: Mean differences by local for significant policy components

Component: Addressing qualifications of PE instructors (Strength)			
	N	M	SD
Town*	23	0.04	0.20
Rural	80	0.26	0.44
City	17	0.29	0.47
Suburb*	25	0.56	0.5
			F= (3, 141) 8.761 p<0.01
Component: Providing access to adequate equipment and facilities for PE (Compre.)			
	N	M	SD
Town*	23	0.00	0
Rural	80	0.14	0.35
City	17	0.35	0.49
Suburb*	25	0.28	0.45
			F=(3, 141) 4.130 p<0.01
Component: Addressing qualifications of PE instructors (Comprehensiveness)			
	N	**M**	SD
Town*	23	0.04	0.20
Rural	80	0.29	0.45
City	17	0.29	0.47
Suburb*	25	0.60	0.50
			F (3, 141) 6.60 p<0.01
Component: Addressing a written PE curriculum for each grade level (Strength)			
	N	**M**	SD
Town	23	0.04	0.40
Rural	80	0.08	0.26
City	17	0.18	0.39
Suburb*	25	0.44	0.507
			F (3, 141) 8.76 p<0.01
Component: Addressing a written PE curriculum for each grade level (Comprehensiveness)			
	N	**M**	SD
Town*	23	0.13	0.34
Rural	80	0.26	0.44
City	17	0.41	0.50
Suburb*	25	0.56	0.50
			F = (3, 141) 4.40 p< 0.01

Figure 5-1: Mean Policy Scores across 14 Policy Components



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Chapter 6: The Association Between Physical Activity Policy Scores, Physical Activity Rates And School Characteristics Within A Sample Of Middle-Schools In A Mid-Atlantic Region

Abstract

BACKGROUND AND PURPOSE: With the recent passage of the Healthy Hunger-Free Kids Act of 2010, public schools are becoming the focus of policy interventions aimed at preventing and reducing childhood obesity. Much of the literature examines the school wellness mandate from a policy evaluation perspective, and there is lack of literature on policy implementation at the local school level. The purpose of this preliminary study is to evaluate the relationship between physical activity policy quality and the physical activity rates of selected schools.

METHODS: School districts from a tri-state region of Virginia, Maryland and DC were selected based on a previous physical activity wellness policy evaluation. All 145 school districts were ranked on policy strength, and the top and bottom 10 school districts were recruited for study inclusion. Seven school districts agreed to participate, and one middle school from each district was randomly chosen for observation using the System of Observing Play and Leisure Activity in Youth, or SOPLAY. School physical activity characteristics were measured using SOPARC, or the System for Physical Activity in Recreational Communities.

RESULTS: The mean energy expenditure of the sample was 19.34 ± 23.74 kcal/kg/min with no difference between girls and boys (Girls-M=9.88 ± 12.58 kcal/kg/min, Boys-M=9.46 ± 11.55

kcal/kg/min). Our sample had 1.9 million square footage dedicated to physical activity space with 49 target areas. Seventy-five percent of the target areas were located outside. Ninety percent of target areas were accessible; 98% usable, 12% supervised; 6% provided organized play and 15% were equipped. Significant differences ($t(47)= -2.171$ $p<0.05$) were found in target areas that provided organized play in schools with stronger policies. Schools located within districts with stronger policies had higher mean rates of energy expenditure than schools with weaker policies; however, these differences were not significant (Strong-M= 30.99 ± 35.39; Weak- M= 10.61 ± 7.4; $t(5) = -1.15$ $p=0.30$).

CONCLUSION: These preliminary data suggest that schools that adopt stronger policies may have higher physical activity rates. Given the small sample included in this preliminary study, more research is needed to establish what impact policy quality may have on local behavior.

Introduction

With the recent passage of the Healthy, Hunger-Free Kids Act of 2010, public schools are becoming the focus of policy interventions aimed at preventing and reducing childhood obesity with the adoption and implementation of school wellness policies (HHFKA, 2011). These wellness policies required that schools adopt strategies to improve the nutrition and physical activity environment through the regulation of the goals regarding nutrition education, physical activity, federal meal standards, competitive foods and policy development and evaluation.

The HHFKA also pushed through federal nutrition standards for all foods located on school campuses, and with this requirement, researchers have begun to study the effect of these new standards on the nutrition environment (Kraak, 2012; Crawford, 2011; Cradock, 2012; Thorton, 2012; Wojcicki, 2012; Schneider, 2012; Nanney, 2012; Taber, 2012; Turner, 2012). On the other hand, there are no federal physical activity requirements for public schools, and there is a gap in research evaluating what impact these policies may have on physical activity at local schools. The benefits of physical activity in children are well supported in literature (Janssen, 2010), and since a child spends a majority of time in public school, these environments may have a responsibility to adopt policies and practices that expand physical activity opportunities. Moreover, research has shown that physical activity levels begin to decrease as children age (Gortmaker, 2012), and studies have found large drops in physical activity as students move from elementary school to middle school (Gortmaker, 2012).

The purpose of this study is two fold: 1) To provide a preliminary evaluation of the associations between physical activity policy quality and physical activity rates of selected middle schools; and, 2) to provide an evaluation of physical activity spatial characteristics and

their associations with policy quality. Districts that adopt strong physical activity policies may have schools with higher physical activity rates; moreover, those physical activity rates may be also be associated with local physical activity spatial characteristics.

Methods

School District Sample

Researchers used a previous sample from a prior study evaluating physical activity policies within the Mid-Atlantic region of the United States (Smith, 2013). 139 policies from Virginia, Maryland and DC were coded for strength and comprehensiveness using the WellSat tool (WellSAT, 2012), and policies were ranked based on policy strength. The top and bottom ranked 10 local education agencies, or school districts, were selected for inclusion.

Recruitment

From the 20 resulting school districts, each district superintendent was contacted primarily via e-mail to participate in the study (see Appendix C). After initial contact, one school district agreed to participate. Twelve districts indicated that they had a formal review process, and researchers sent a recruitment packet to those districts. After the formal review process, six districts approved participating in the project. In total, 7 school districts (35% participation rate) agreed to participate. Reasons for not participating varied from PE teachers being involved in various research projects over the past two years (n=2), budget cuts (n=1),

academic intrusion (n=2), no reason given (n=1). Seven school districts did not respond to repeated inquiry.

Measures

WellSat

Researchers used the abbreviated Wellness School Assessment Tool (WellSAT, 2012) to determine the strength and comprehensiveness of the district's physical activity policies. This previously validated 14-item coding tool systematically evaluated school district's efforts to address physical education curriculum, time spent in physical education across all grade levels, the qualifications and training of those involved in physical education, the amount of physical activity breaks, the provision of daily recess in elementary school, the use of school facilities for outside recreation and the use of physical activity as punishment.

Each item was coded using a 3-point scale. Items were coded 0 if there was no mention of the component in the policy. A score of 1 was given to an item if the policy mentioned the component vaguely, and an item received a 2 if the component was addressed with specific strategies. Two researchers coded the 145 policies independently, and the inter-rater reliability was strong at 0.77. Coders resolved discrepancies through discussion and policy document review.

Policy Strength

A policy's strength reflected the degree to which a policy included detailed implementation information including specific strategies for each policy component. To

calculate the strength score of the physical activity policies within a district's school wellness policy, researchers counted the number of items that scored a 2 and divided that count by 14, the number of physical activity policy components evaluated. The physical activity strength score could range from 0, representing no items included specific strategies to 1, meaning that each of the 14 components included specific strategies.

SOPLAY

To evaluate physical activity rates, researchers used a validated and reliable measurement that has been used in other studies evaluating physical activity in children (Saint-Maurice, 2011; Janssen, 2013; Beets, 2012; Suau, 2012; Bocarro, 2012; Brink, 2010). The System for Observing Play in Youth was developed by McKenzie and colleagues and assesses physical activity before school, during school and after school (McKenzie, 2000). Prior to using SOPLAY, both researchers were trained in the protocols and practices of the audit. Children's activity levels were coded as sedentary (sitting on the ground or standing), walking (walking, shuffling or another physical activity at a normal gait) or vigorous (running, climbing, wrestling, playing a sport, or any other activity at a faster gait than normal).

Target Areas

Target areas, or areas where physical activity could take place, were coded for the following variables: (1) Fixed Setting—if the target area was indoors or outdoors; (2) Location—if the target areas were within designated school boundaries or adjacent to the school; (3) Area Type—if the area was used as a court space, play space, field, pool, weight room, gym, a multipurpose room and an auditorium; (4) Area Improvements—if the target area had permanent

modifications and if so, how many were present; (5) Improvement Overlap—if the target area had permanent improvements for more than one non-simultaneous activity; and, (6) Primary and Secondary Surface Area—if the target area was made of sand, dirt, gravel, mats, cement, tile, water or wood. The square footage of the target areas were also measured.

After coding the target areas, the target areas were numbered to guide the researchers through the observational scans.

Observational Scans

According to the SOPLAY protocol, scans were completed before school, during lunch and after school. Before school scans were completed by 15 minutes before the first school bell rung, lunch scans (for each lunch period) were completed the first 15 minutes after lunch began and 10 minutes later, and after school scans were completed 15, 45 and 75 minutes after school was dismissed.

During each scan, researchers walked through the designated target areas making note of the following: (1) Accessibility—if the target area was accessible for physical activity; (2) Usability—if the target area was usable for physical activity; (3) Organized—if the target area had organized activity taking place; (4) Supervised—if the target area was supervised by school personnel; and, (5) Provided Equipment—if equipment used was provided by the school or by students.

Researchers completed two separate scans for boys and girls at each target area using mechanical counters. The results were entered onto SOPLAY forms.

Calculation of Energy Expenditure

SOPLAY data was condensed for each school, and energy expenditure was calculated by summing the number of sedentary children multiplied by 0.051 kcal/kg/min, the number of walking children multiplied by 0.096 kcal/kg/min, and the number of vigorous children multiplied by 0.144 kcal/kg/min (Appendix F). The physical activity rates determine by SOPLAY will be used as comparisons between groups, not as an indicator of meeting physical activity recommendations.

Statistical Analysis

Researchers used SPSS v20.0 for all statistical analyses. Descriptive statistics were used to gauge total energy expenditure as well as to outline the characteristics of physical activity spaces located at the schools. Bivariate statistics were used to calculate any correlations between continuous variables, chi square tests of associations between categorical variables (policy strength and target area characteristics), and t-tests were used to calculate any mean differences between groups (weak policy schools versus strong policy schools).

Results

Target Areas

The sample of middle schools had a total of 1,912,917 sq. feet divided among 49 target areas of space dedicated to physical activity (Table 2). Outdoor fields (n=25) were the most often-present physical activity space, while indoor gymnasiums (n=8) and indoor and outdoor court spaces (n=6) were present at nearly each middle school. The majority of the physical activity space was located outside (n=37; 75.5%), and the primary surface area of the target areas

was grass (n=20). Fifty-five percent of the target areas had no improvement overlaps, meaning that the space was dedicated for one type of physical activity.

Overall, 90% of the target areas were accessible, 93% were usable, 12% were supervised, 6% provided organized play, and 15% were equipped. When broken down by time period (Figure 1), accessibility and usability remained high throughout the day (before school, during lunch, and after school); however, there were slight increases over time in the targets areas being supervised and providing organized play. There was a slightly higher increase seen in the target areas regarding providing equipment as time passed from During Lunch to After School (During Lunch- M=0.10±0.30; After School-M=0.29±0.45)

When analyzed by policy strength, a student t-test ($t(47)=-2.171$ $p<0.05$) showed significant differences between target areas providing organized play (Figure 2). Schools located in a district with strong policies had higher organized play scores (M=0.102±0.30) than schools located in districts with weaker policies (M=0.014±0.12). There were no significant differences found in the accessibility, usability, supervision or equipped characteristics by policy strength.

Energy Expenditure

The mean energy expenditure of our school sample was 19.34 ±23.74 kcal/kg/min (Table 3). A large majority of observations were sedentary (n=1020). Walking activity accounted for 437 observations, vigorous activity accounted for 311. There was no significant energy expenditure difference between girls and boys (Girls-M=9.88±12.58 kcal/kg/min; Boys-M=9.46 ± 11.55 kcal/kg/min).

By Observation Time Period

There was an observed increase in mean EE throughout the day (Figure 3). The mean EE before was 1.68 ± 4.14, while the mean EE during lunch was 8.23 ± 8.12, and the mean EE after school was 9.43 ± 14.4. Boys trended to have higher EE scores than girls (Figure 3); however, girls reported higher EE than boys After School. (Girls- M=5.49±8.7 kcal/kg/min; Boys- M=3.9±6.2 kcal/kg/min). This difference was not statistically significant either ($t(12)=0.385$ $p>0.05$).

Physical Activity Rates and Physical Activity Space

There was a significant linear correlation ($r=0.66$ $p<0.05$) between physical activity space and physical activity rates (Figure 4), meaning schools with higher square footage of physical activity space reported higher physical activity rates.

Physical Activity Rates and Policy Strength

Schools located within districts with stronger PA policies had a trend towards higher mean rates of EE than schools with weaker policies (Strong-M=30.99 ± 35.39; Weak-M=10.61±7.4); however, independent t-tests showed this difference was not significant ($t(5)=-1.15$ $p>0.05$) (Table 2). Moreover, there was an observed difference between policy strength and the EE depending on observation time period (Figure 5). Schools with stronger policies had higher mean EE during each time point (Before school-M=3.6 ± 6.3, During Lunch-M=9.8± 9.3 After School-M=17.4± 19.9) with a sharp increase during afterschool. Schools with weaker policies had lower scores with a decrease in EE afterschool (Before School-M=0.17± 0.2; During Lunch- M=6.9± 8.2; After School-M=3.4±6.5). These differences, however, were not significant

(Before School-t(5)=-1.138 p>0.05; During Lunch-t(5)=-0.433 p>0.05; After School-t(5)=-1.34 p>0.05).

Discussion

This is one of the first studies to measure wellness policy strength and their possible implications on physical activity rates at the local level. Our results show that there seems to be a difference between the physical activity rates of those schools with stronger wellness policies than those schools located in districts that adopt weak physical activity policies.

Physical Activity Space

Physical activity space was positively correlated to physical activity rates. Schools with more space for students to engage in physical activity may create more opportunities for physical activity for the students; however, there is mixed evidence in the current literature. Our results seem to contradict many studies (Hillsdon, 2006; Kaczynski, 2008) that did not find strong associations between physical activity space and physical activity rates; however, several research studies have concluded that the size of the land area reserved for physical activity may influence physical activity levels (Giles-Corti, 2005; Sugiyama, 2010; Li, 2005). Much of the research investigating the effect public space may have on physical activity deals with park access and distance to the park; however, in a mixed methods study evaluating environmental determinants to physical activity in Australia, researchers found that when park size was taken into account with easy access, participants were twice as likely to engage in physical activity (Giles-Corti, 2005). In a multilevel analysis, the area of the green space was significantly related

to neighborhood walking (Li, 2005), and in this context, outside open spaces at school may influence the physical activity of the students.

In our sample, 75% (n=37) of the target areas were located outside, and there may be improved physical activity rates if a larger number of target areas were indoor. Sallis (2001) also found a lower amount of students participating in moderate-to-vigorous physical activity indoors when compared to outdoors. Related to increasing the number of physical activity spaces indoors, a large number of the target areas in our sample (n=27) were dedicated to one type of physical activity. A basketball court only had basketball goals and/or court markings reserved for basketball. It has been suggested in research (Giles-Corti, 2005) that physical activity spaces that allow for more than one activity may increase physical activity rates. If school personnel can permanently equip the basketball court with markings for other sport (e.g.four-square markings) physical activity frequency and usage may increase. In a study comparing usage and physical activity rates of non-renovated schoolyards and renovated schoolyards, Anthamatten found that the redesigned schoolyards that provided a variety of area improvements were utilized greater than the non-renovated schoolyards (Anthamatten, 2011). Although the researchers were not able to conclude that the redesigned schoolyards increased actual physical activity rates, they summarized that the school may, in fact, encourage greater physical activity with the new schoolyards.

One significant difference we detected was that schools with stronger policy scores more often had physical spaces with more organized activity (organized sport) than those schools with weaker policy scores. Participation in organized sport during childhood has been linked to predicting physical activity as an adult (Tammelin, 2003; Curtis, 1999; Hirvensalo, 2000). One researcher found in a survey of afterschool programs in Hong Kong, that that children

participating in organized physical activity programs are engaged in more vigorous physical activity than those not involved in organized physical activity.

The schools in our sample had physical activity spaces that were accessible to students and usable for physical activity. Accessibility and usability have been noted barriers to physical activity in adults by many researchers (Humpel, 2002 and Giles-Corti, 2003); however, research is mixed on the role of accessibility and physical activity rates in children. In a review of potential PA determinants in chidren, Sallis (2000) found that accessibility was positively associated with physical activity in children, and our results show that 90% of spaces studied were accessible and 93 percent of them were kept in well repair for PA use.

On the other hand, many of the physical activity spaces were not supervised nor equipped for physical activity, and many of these spaces were not used for physical activity when supervision was not present. Sallis (2001) found a strong relationship between supervision and physical activity rates of students at 24 middle schools in Southern California; however, in a more recent study evaluating the effect of supervision on adolescent physical activity at school, Bocarro (2012) found no associated between supervision and physical activity in a sample of schools with interscholastic and intramural sport programs.

We saw an incremental increase in the amount of physical activity spaces becoming equipped as the day moved toward after school. This increase was expected due to the many sport programs (e.g. football, lacrosse, basketball, volleyball) that held practices after school. Furthermore, many of the schools observed had afterschool programs, which involved some form of physical activity, and these afterschool programs may have also accounted for the increase in equipped, supervised and organized activity.

Energy Expenditure and Physical Activity Rates

Before School and During Lunch

Researchers observed very little physical activity before school (M=1.68 ± 4.14 kcal/kg/min) and during lunch (M=0 ± 0 kcal/kg/min) that was not part of an organized, physical education class. Before school, many of the students at the schools did not have access to the school building(s), although 94% of the physical activity spaces were accessible for physical activity. The middle schools observed were very structured as to when students could enter/exit the building; however, two particular middle schools had morning incentive programs, which allowed well-behaved students access to several physical activity spaces for supervised play.

During the school day, teachers and administrators forbade access to most of the physical activity spaces for the children. During lunchtime, researchers observed little to no physical activity outside of physical education programs. Children were to remain in the lunchroom, even with the presence of several outdoor eating spaces.

The American Association of Health, Physical Education, Recreation and Dance (www.letsmove.org) advocates that schools use non-curricular means (e.g. free play during lunch) as a means to increase PA. In a recent review (Jago, 2004) showed that schools were able to increase physical activity 17-60 percent during break time (i.e. lunch time and recess) by low-cost interventions that included painting playground equipment, teaching playground games and introducing more structured PA breaks throughout the school day. Dale et al. concluded that when schools begin restricting physical activity opportunities, elementary-aged children do not compensate for the missed activity after the school day (Dale, 2000). In a focus group of New Zealand high school students, an often-cited barrier to physical activity was the restriction of PA during lunchtime (Hohepa, 2005).

However, physical activity opportunities during lunchtime in our sample were scarcely found. This could be due to time allotted for eating. In our sample, all of the schools had less than 30 minutes for lunch (M=22.34 ± 5.65) and as many as 6 lunch periods. Serving these large student populations along with perceptions of increased behavioral problems during a less structured lunch (Henderson, 2004) may be physical and perceived barriers to increasing PA opportunities during lunchtime.

After School

Researchers observed the most physical activity (9.43 ± 14.4 kcal/kg/min) after school, which is consistent with literature regarding youth physical activity prevalence during a school day (Tudor-Locke, 2006). Three schools had no observed physical activity after school, and these three schools did not have formal sport practices at the school or an afterschool program. Upon dismissal, the students at these three schools immediately loaded busses to be bussed home.

Relationship of Policy Strength and Physical Activity Rates

Schools with stronger district PA policies tended to have higher rates of physical activity among their student populations. Although our result is not significant, we hypothesize that with a larger sample of schools, we would continue to see higher physical activity rates in schools with stronger PA district policies. Moreover, our results also show that the physical activity rates of those schools with stronger policies continued to increase during the day while PA rates decreased from lunchtime to afterschool in schools with weaker policies.

Conclusions, Future Directions and Limitations

Since this is one of the first studies to measure policy quality and its association with observed physical activity rates, there are several limitations to this study. First, our study sample was very small, and the number of recruited schools was not large enough to detect significant differences between schools with stronger PA policies and those with weaker policies. Secondly, although our results show some difference between schools that have stronger PA policies, we cannot determine that the higher physical activity rates are a result of the adoption of the stronger policy. There may be other confounding variables present (e.g. strong PE programs, PA champions, strong history of sport on campus) that may be associated with these higher physical activity rates. These possible extraneous variables should be explored fully at a later point. Moreover, there have been some methodology limitations associated with SOPLAY that have been described elsewhere that may underestimate the amount of physical activity observed at schools. In our study, we only measured physical activity taking place in dedicated physical activity spaces; our study did not capture active transport measures to and from school and students commuting to various classes. Also, lunchtime measurements may be overreported due to the presence of PE data in our sample. Lunchtime observation may not be an appropriate time to measure physical activity in students.

Despite these limitations, our study sheds important light on physical activity rates and spaces in a sample of middle schools in Virginia and Maryland. There are many areas in which physical activity rates can be increased, and future research should incorporate qualitative factors (key informant interviews) to produce a much clearer picture of physical activity in middle schools.

Notable conclusions from our study are:

- Measured energy expenditure in our sample was low, indicating that the physical activity rates of our sample were low.
- There were significant differences in physical activity spatial characteristics between strong and weak policy schools, which may influence student physical activity rates.
- Schools do not provide students with ample amount of physical activity opportunities; students are missing out on free play opportunities before school and during lunchtime due to the highly structured nature of the schools we observed.

Table 6-1: Target Area Characteristics by School

	Total Sq. Footage	# of Target Areas	Type of Target Area				
			Court Space	Play Space	Field	Gym	Other*
School 1	52,651	7	0	3	3	1	0
School 2	187,766	5	2	0	2	1	0
School 3	227,720	7	1	2	3	1	0
School 4	149,200	3	0	0	2	1	0
School 5	561,581	8	1	0	4	2	1
School 6	481,610	11	1	0	8	1	1
School 7	252,389	8	1	0	3	1	3
Total	**1,912,917**	**49**	**6**	**5**	**25**	**8**	**4**

***other denotes multipurpose rooms, weight rooms or other spaces for designated PA**

Table 6-2: Sample Characteristics and Mean Energy Expenditure (kcal/kg/min) by School and Policy Strength

School	State	Ranking	PA Compre.	PA Strength	Total Energy Expen.	EE (Girls)	EE (Boys)	Locale	No. Schools	Enrollment	%FRPL	P:T	Mean Student Expenditures	Per Capita Income	Median Household Income
School 1	VA	Top	0.71	0.43	1.38	.30	1.08	Rural	3	732	0.36	15.5	12,955	23,092	41,276
School 5	VA	Top	0.86	0.71	70.19	36.87	33.32	Suburb	83	73917	0.31	19.2	12,160	25,912	72,268
School 6	MD	Top	0.71	0.64	21.40	8.18	13.22	Rural	29	16209	0.31	13.8	12,959	21,384	56,469
		Mean	**0.76**	**0.60**	**30.99***	**15.11**	**15.87**		**38.3**	**30286**	**0.32**	**16.1**	**12,691**	**23,463**	**56,671**
School 2	VA	Bot	0.00	0.00	17.98	7.71	10.27	Rural	21	10999	0.31	15.4	10,193	19,744	48,579
School 3	VA	Bot	0.00	0.00	.44	.10	.35	Rural	4	2212	0.29	16.4	9,976	21,558	53,072
School 4	VA	Bot	0.00	0.00	10.45	4.87	5.58	Rural	8	4675	0.41	18.9	11,744	19,122	47,961
School 7	MD	Bot	0.00	0.00	13.59	11.16	2.44	Rural	13	4560	0.53	12.1	16,957	18,929	41,917
		Mean	**0.00**	**0.00**	**10.61***	**5.96**	**4.66**		**11.5**	**5611.5**	**0.38**	**15.7**	**12,218**	**19,838**	**47,882**

*no significant difference found $t(5)=-1.15$, $p > 0.05$

Figure 6-1: Mean Conditions of Target Areas at Time Period by Policy Strength

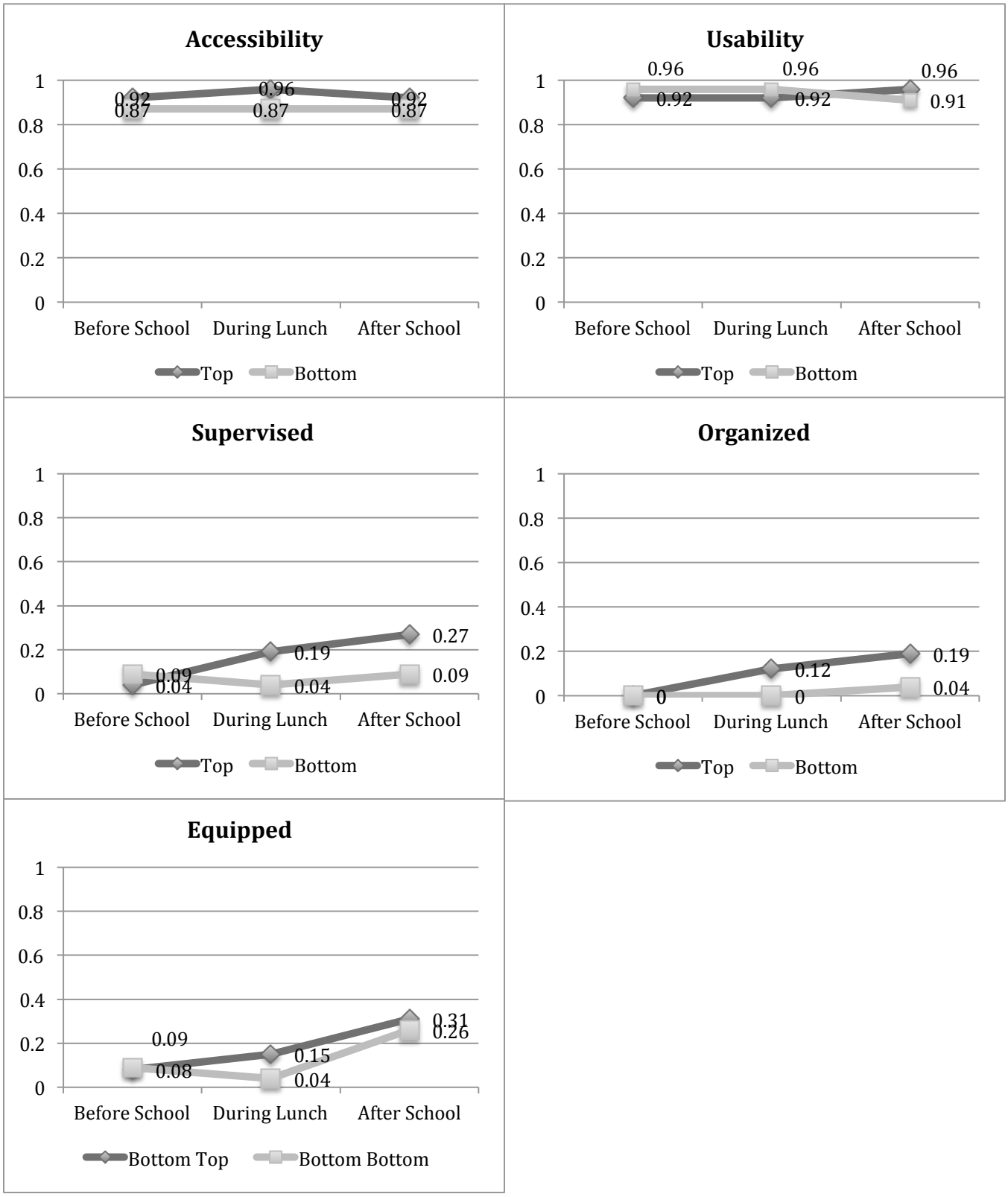
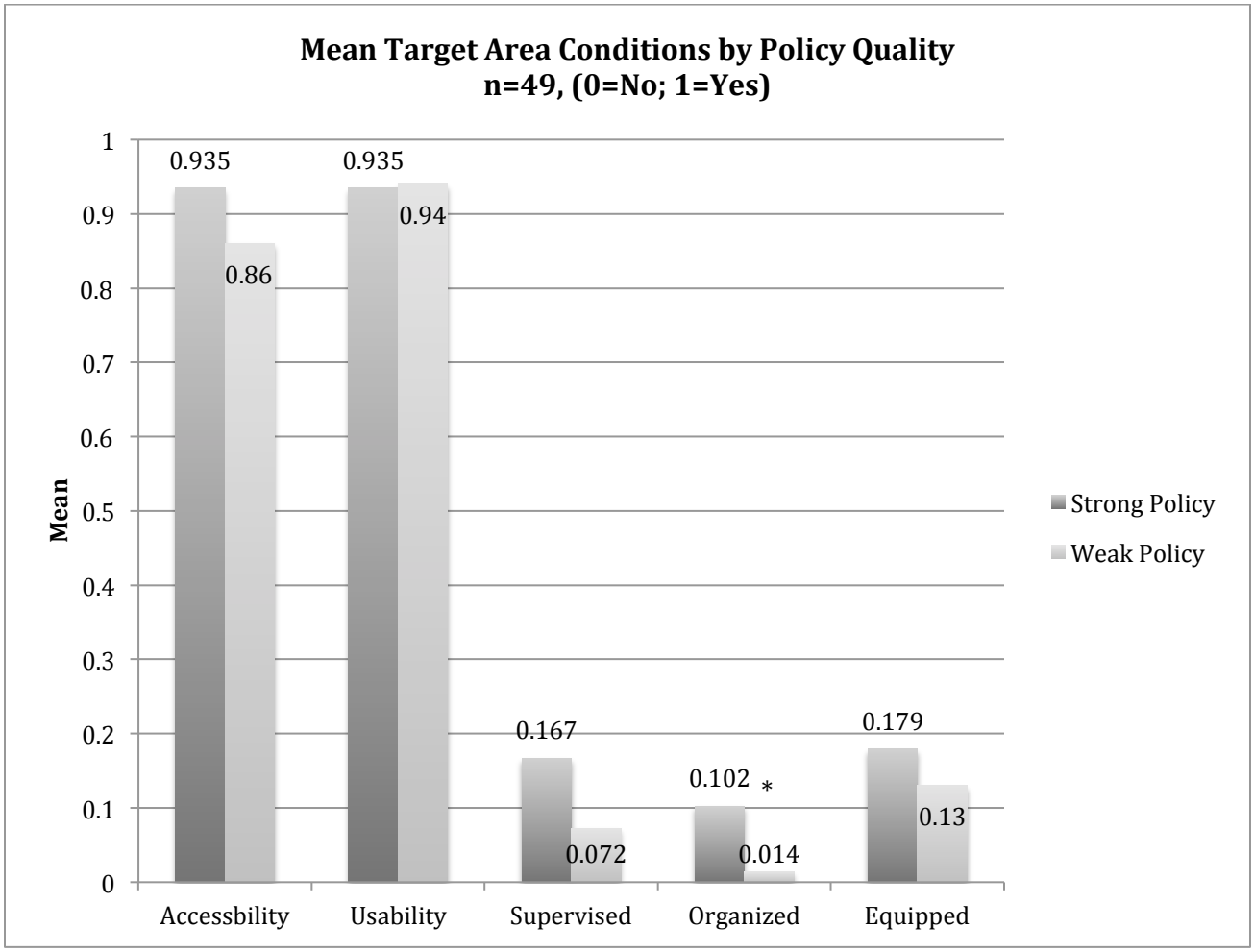


Figure 6-2: Mean Target Area Conditions by Policy Strength



*Significant difference at the $p<0.05$ level ($t(47)= -2.171$), strong policy n=26, weak policy n=23

Figure 6-3: Mean Energy Expenditure of Sample by Observation Time Period; Mean Energy Expenditure of Sample by Gender and Observation Time Period

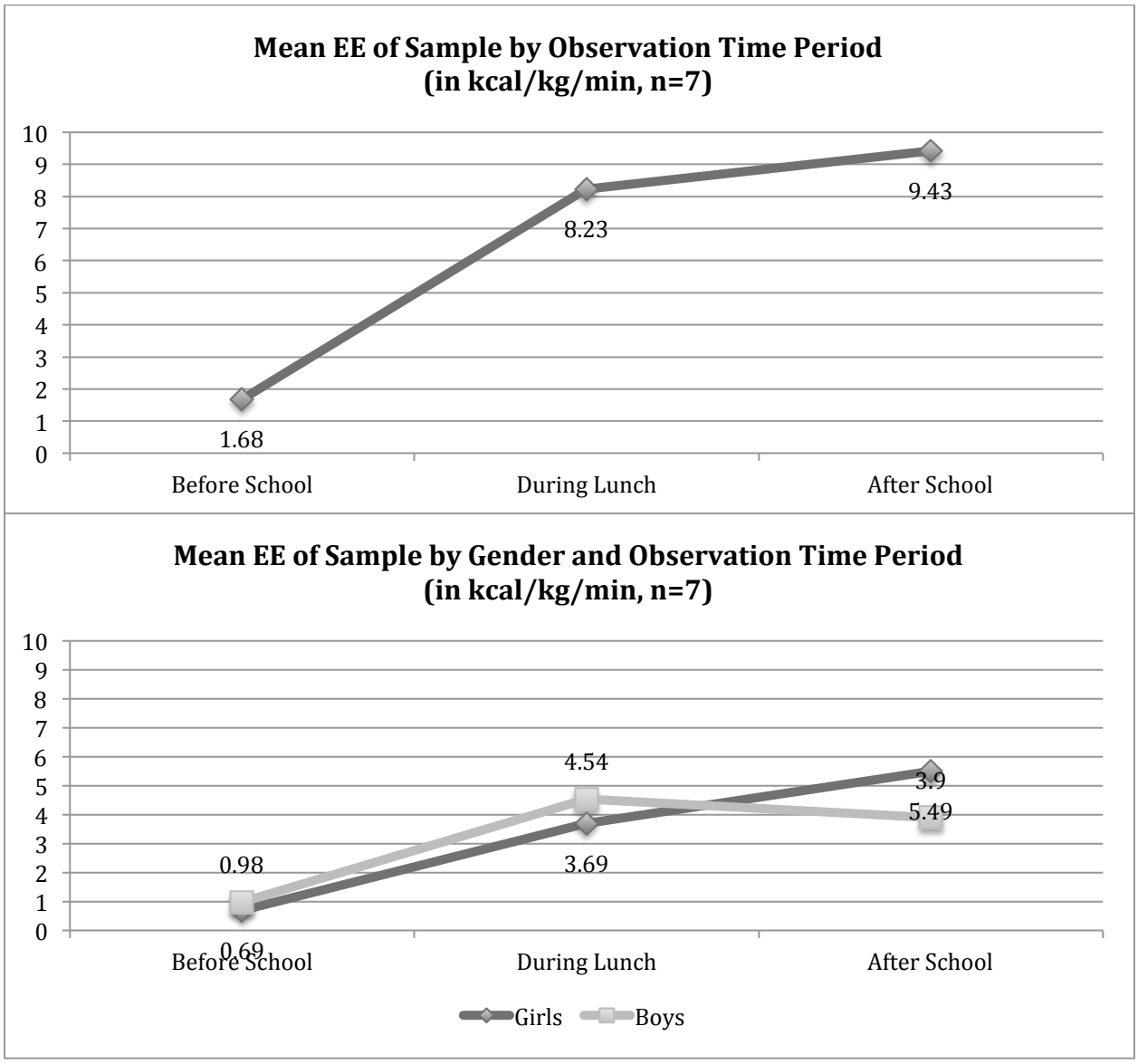


Figure 6-4: Correlation between PA Space and Total Energy Expenditure of Sample

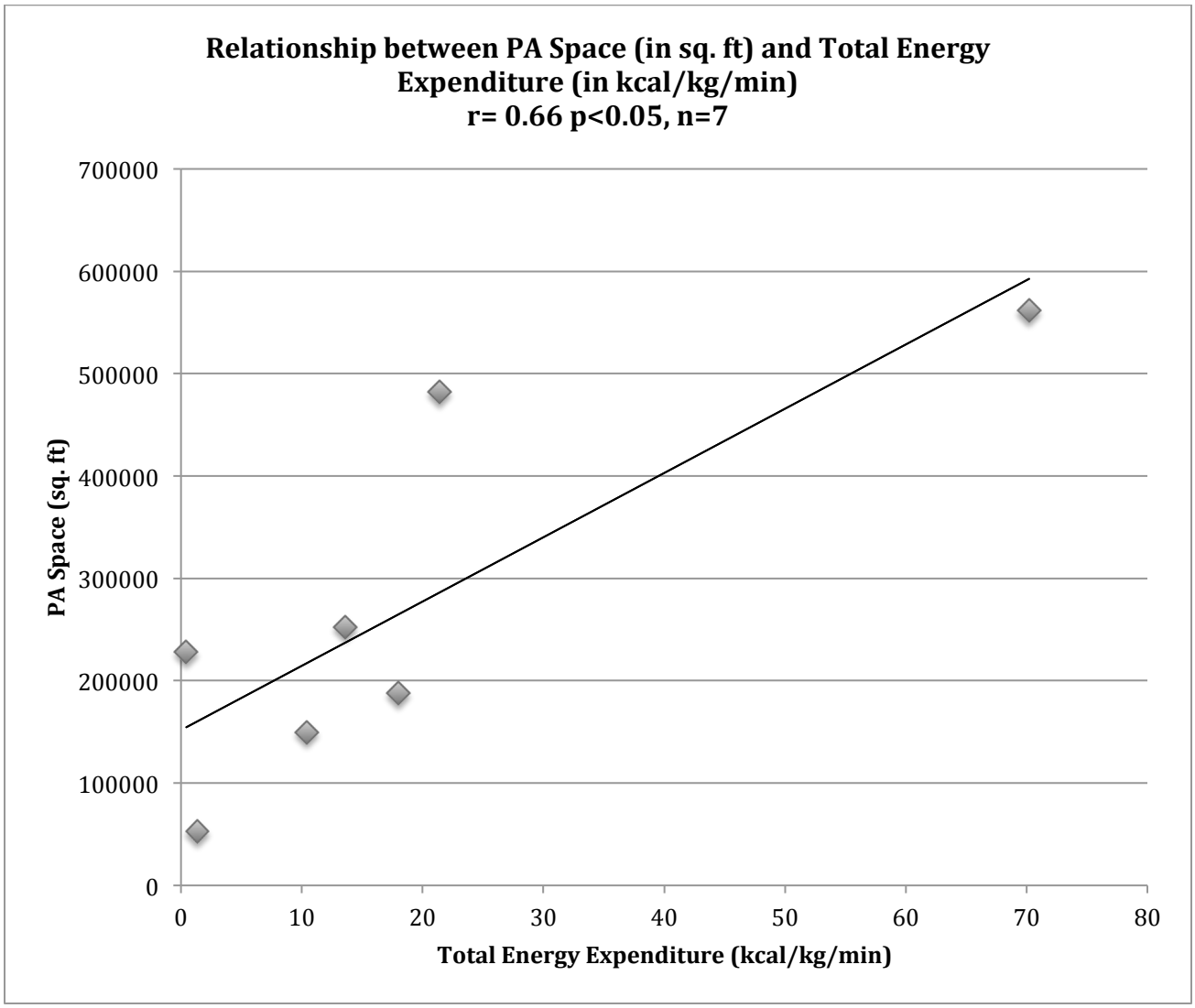
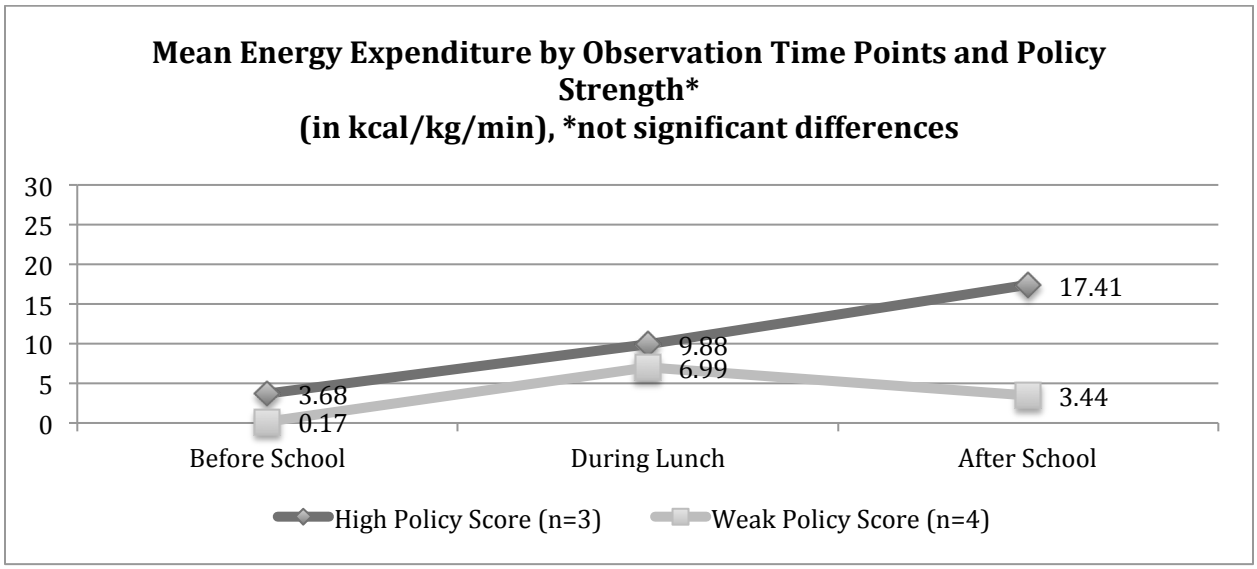


Figure 6-5: Mean Energy Expenditure by Observation Time Point and Policy Strength



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Chapter 7: Conclusion

> "The obesity epidemic is one of the greatest public health, social, and economic challenges of the 21st century. Without a strong contribution from schools, we are not likely to reverse the epidemic. Improving and intensifying efforts to promote physical activity and healthy eating is entirely consistent with the fundamental mission of schools: educating young people to become healthy, productive citizens who can make meaningful contributions to society." (Wechsler, 2004.)

What is the public school's role in preventing and reducing obesity in children? Do public schools bear considerable responsibility for the health of their students? With the passage of the 2004 wellness mandate, the federal government resoundingly embraces that schools are at the forefront of fighting the obesity epidemic. Schools are to regulate what children eat while prescribing specific amount of time spent in physical education. The mandate has been in place for nearly 10 years, and even though the effects of the mandate are mixed, school environments are beginning to undergo some transformation. With this evaluation of the school wellness mandate and its effects on the school nutrition and physical activity policy environments of public schools, three central themes have begun to emerge from our research.

Key Finding #1: Wellness policies are vague and inadequate.

In all of our studies, the wellness policies lacked specific strategies when addressing many concerns; for example, a policy would state that students would be offered adequate time to eat lunch. The policy would not explain "adequate" lunchtime or offer specific eating time requirements. Moreover, many policies did not address a large number of valid concerns to paint

the picture of the wellness environment located in the district. For instance, one could not ascertain from a mere reading of a school's policy if that district: (1) provided students access to water fountains; (2) limited brand marketing in the cafeteria; or, (3) address class size limits of physical education. This weak language may hamper policy implementation at the local level, and school districts should strive to include more concrete language in their wellness policies.

Key Finding #2: The policy adoption process may determine the quality of a local school district's wellness policy.

We also found that policy strength and comprehensiveness was associated with what type of policy was approved during the adoption process. School districts that adopted a wellness policy based on a third-party template were more likely to have weaker, less comprehensive policies than those who adopted locally developed policies.

This finding is in contrast to several conclusions in current literature that support the adoption of model policies (Story, 2009). Model wellness policies can provide essential timesaving tools to disencumber the policy development and approval process; however, model policies may also use a "too broad of a brush" to appeal to a wide variety of school districts. In our sample, the model wellness policy provided by a third-party organization was too broad to effectively address the federal requirements of the wellness mandate.

Key Finding #3: School district policy quality may be associated with local rates of policy implementation.

Our results show that school districts with higher policy quality scores are also associated with higher physical activity rates. Higher policy quality districts also have more physical space dedicated to physical activity. This finding reinforces the purpose of the federal wellness mandate. It suggests that policies actually may affect local behavior, and with this study, we were able to suggest that physical activity policies may be associated with local physical activity rates.

This third finding, furthermore, highlights the importance of this research. This dissertation is among the first to evaluate the wellness policy environment of school districts located in Virginia, DC and Maryland. With this research, we have begun to paint a picture of school wellness throughout the Mid-Atlantic, and more research is needed to thoroughly assess the impact of the federal mandate on the wellness environments in these schools and school districts.

Areas for Future Research

Although our research showcased the importance third-party model policies play in Virginia's wellness environment; many of the model policies recommended by national organizations such as the Alliance for A Healthier Generation or the Centers for Disease Control and Prevention have not been evaluated for strength and comprehensiveness. In the 2010 Healthy, Hunger-Free Kids Act, the USDA has required that every state make available exemplary model policies to localities; however, there is no federal standard to ensure that model policies are exemplary. Research evaluating these model policies is lacking, and in additional to

evaluating model policies for policy quality, more research needs to evaluate physical activity policies at the local and district level.

Furthermore, state wellness policies may play a more important role than the federal wellness mandate in the adoption of strong, comprehensive local wellness policies. Our research showcases significant state-based differences in many aspects regarding physical activity policies, and researchers may want to evaluate how state policy may influence the adoption of local wellness policy. If states do moderate wellness policy strength, as we believe, federal policymakers may begin to require states to adopt specific state-based wellness policies.

In conclusion, wellness policies are vague and inadequate. Their strength can be heavily dependent on how they were adopted, and the strength of a policy may affect local policy implementation. Although our research shows that school districts are adopting weak policies, wellness policies are the starting point for change. Childhood obesity is our problem to solve, and public schools have the fundamental mission of "educating young people to become healthy, productive citizens who can make meaningful contributions to society" (CDC, 2004). Public schools must rise to the challenge of fighting childhood obesity from a variety of places—the classroom, the school gymnasium, the cafeteria, and the pens and pencils of policymakers.

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Appendix A: School Wellness Policy Coding Tool

Nutrition Education

1. Includes goals for nutrition education that are designed to promote student wellness in a manner that the local education agency determines is appropriate (Federal Requirement)
2. Nutrition curriculum provided for each grade level
3. Coordinates nutrition education with the larger school community
4. Nutrition education extends beyond the school environment
5. District provides nutrition education training for all teachers
6. Nutrition education is integrated into other subjects beyond health education
7. Nutrition education teaches skills that are behavior focused and/or interactive and/or participatory
8. Specifies number of nutrition education courses or contact hours
9. Nutrition education quality is addressed

Standards for United States Department of Agriculture (USDA) Child Nutrition Programs and School Meals

10. Assures that guidelines for reimbursable school meals shall not be less restrictive than USDA school meal regulations (Federal Requirement)
11. Addresses access to and/or promotion of the USDA School Breakfast Program
12. Addresses access to and/or promotion of the Summer Food Service Program
13. Addresses nutrition standards for school meals beyond USDA (National School Lunch Program/School Breakfast Program) minimum standards
14. Specifies use of low-fat versions of foods and/or low-fat methods for preparing foods
15. Specifies strategies to increase participation in school meal programs
16. Optimizes scheduling of meals to improve student nutrition
17. Ensures adequate time to eat
18. Addresses access to hand-washing before meals
19. Requires nutrition qualifications of school food service staff
20. Ensures training or professional development for food service staff
21. Addresses school meal environment
22. Nutrition information for school meals (eg, calories, saturated fat, sugar) is available

Nutrition Standards for Competitive and Other Foods and Beverages

23. Includes nutrition guidelines for ALL foods available on school campus during the school day with the objective of promoting student health and reducing childhood obesity (Federal Requirement)
24. Regulates vending machines
25. Regulates school stores
26. Regulates food service à la carte
27. Regulates food served at class parties and other school celebrations
28. Regulates food from home for the whole class
29. Regulates food sold before school
30. Regulates food sold after school that is not part of a district-run after school program
31. Regulates food sold at evening and community events on school grounds
32. Regulates food sold for fundraising
33. Addresses limiting sugar content of foods
34. Addresses limiting fat content of foods
35. Addresses limiting sodium content of foods
36. Addresses limiting calorie content per serving size of foods
37. Addresses limiting serving size of foods
38. Addresses increasing "whole foods," eg, whole grains, unprocessed foods, or fresh produce
39. Addresses limiting the use of ingredients with questionable health effects in food or beverages (eg, artificial sweeteners, processed or artificial foods, *trans* fats, high fructose corn syrup)
40. Addresses food not being used as a reward and/or withheld as a punishment
41. Nutrition information (eg, calories, saturated fat, sugar) available for foods other than school meals
42. Addresses limiting sugar content of beverages
43. Addresses limiting fat content of drinks (other than milk)
44. Addresses limiting calorie content per serving size of beverages
45. Addresses limiting regular (sugar-sweetened) soda
46. Addresses limiting beverages other than soda containing added caloric sweeteners such as sweetened teas, juice drinks, energy drinks, and sports drinks
47. Addresses limiting sugar/calorie content of flavored milk
48. Addresses limiting fat content of milk
49. Addresses serving size limits for beverages
50. Addresses limiting caffeine content of beverages (with the exception of trace amounts of naturally occurring caffeine substances)
51. Addresses access to free drinking water

Figure 1. Brief descriptions of all school wellness policy coding items.

Physical Education

52. Addresses physical education curriculum for each grade level
53. Addresses time per week of physical education for elementary school students
54. Addresses time per week of physical education for middle school students
55. Addresses time per week of physical education for high school students
56. Physical education promotes a physically active lifestyle
57. Specifies competency assessment (ie, knowledge, skills, practice)
58. Addresses physical education quality
59. Physical education promotes inclusive play
60. Addresses physical education classes or credits
61. Addresses frequency of required physical education (daily)
62. Addresses teacher–student ratio for physical education
63. Addresses safe and adequate equipment and facilities for physical education
64. Addresses amount of time devoted to moderate to vigorous activity in physical education
65. Addresses qualifications for physical education instructors
66. District provides physical education training provided for teachers
67. Addresses physical education waiver requirements (eg, substituting physical education requirement with other activities)
68. Requires students to participate in an annual health assessment (eg, fitness or body mass index)

Physical Activity

69. Includes goals for physical activity that are designed to promote student wellness in a manner that the local education agency determines is appropriate (Federal Requirement)
70. Physical activity provided for every grade level
71. Includes physical activity opportunities for school staff
72. Regular physical activity opportunities are provided throughout the school day (not including recess)
73. Addresses physical activity through intramurals or interscholastic activities
74. Addresses community use of school facilities for physical activity outside of the school day
75. Addresses safe active routes to school
76. Addresses not using physical activity (extra or restricted) as punishment
77. Addresses recess frequency or amount in elementary school
78. Addresses recess quality to promote physical activity

Communication and Promotion

79. Involves parents, students, and representatives of the school food authority, the school board, school administrators, and the public in the development of the school wellness policy (Federal Requirement)
80. Includes staff wellness programs specifically addressing the health of staff
81. Addresses consistency of nutrition messages
82. Encourages staff to role model healthy behaviors
83. Specifies who in the district is responsible for wellness/health communication beyond required policy implementation reporting
84. Specifies district use of Centers for Disease Control and Prevention's Coordinated School Health model or other coordinated/comprehensive method
85. Addresses methods to solicit or encourage input from stakeholder groups (eg, two-way sharing)
86. Specifies how district will engage parents or community to meet district wellness goals
87. Specifies what content/information district communicates to parents
88. Specifies marketing to promote healthful choices
89. Specifies restricting marketing of unhealthful choices
90. Establishes a health advisory committee or school health council that is ongoing beyond policy development

Evaluation

91. Establish a plan for measuring implementation of the local wellness policy, including designation of one or more persons within the local educational agency or at each school, as appropriate, charged with operational responsibility for ensuring that the school meets the local wellness policy (Federal Requirement)
92. Addresses a plan for policy implementation, including a person or group responsible (initial or ongoing)
93. Addresses a plan for policy evaluation, including a person/group responsible for tracking outcomes
94. Addresses the audience and frequency of a report on compliance and/or evaluation
95. Identifies funding support for wellness activities or policy evaluation
96. Identifies a plan for revising the policy

Figure 1. Continued

Coordinates nutrition education with the larger school community	0	Not mentioned
	1	Vague and/or suggested **Example:** *"The entire school environment, not just the classroom, shall be aligned with healthy school goals to positively influence a student's understanding, beliefs, and habits as they relate to good nutrition and regular physical activity."*
	2	Requires specific strategies **Example:** *"The nutrition education program shall work with the school meal program through school gardens and by having the cafeteria serve as a learning lab."*
Specifies strategies to increase participation in school meal programs	0	Not mentioned (Notifying parents of eligibility requirements for free and reduced price meals is a federal requirement and does not qualify for "1" or "2.")
	1	Vague and/or suggested **Example:** *"School meals shall be made attractive to students by appealing to their taste preferences."*
	2	Requires specific strategies, such as promotional mailings or events, alternative breakfast systems, altered bus schedules, closed campus, student input on the menu, or "Grab and Go" or "Fun on the Run" promotions **Examples:** • *"Students will have the opportunity to provide input on local, cultural, and ethnic favorites."* • *". . . shall provide periodic food promotions to encourage taste testing of healthy new foods being introduced on the menu."*
Addresses limiting regular (sugar-sweetened) soda	0	Not mentioned
	1	**Either of the following:** • Regular soda is limited but not prohibited • Prohibition of regular soda is suggested, time- or location-specific, or subject to principal's discretion
	2	**Either of the following:** • Regular soda is prohibited • Foods of Minimal Nutritional Value (FMNV) are prohibited at all times on school grounds. Prohibiting FMNV qualifies for a "2" because the definition of FMNV includes soda. **Examples:** • *"Soda will not be available on school grounds."* • *"Only water, 100% juice, and milk will be available at school."*
Physical education promotes a physically active lifestyle	0	Not mentioned
	1	**Any of the following:** • Suggests that physical education classes promote a physically active lifestyle • Suggests National Association for Sport and Physical Education (NASPE) standards • Suggests that physical education programs focus on self-assessment **Example:** *"Physical education programs should promote an active lifestyle."*
	2	**Any of the following:** • Requires physical education to teach lifetime activities • Requires schools to follow NASPE standards • Focuses on self-assessment through a "Fitnessgram" or "Activitygram" **Examples:** • *"Physical education shall focus on personal fitness."* • *". . . shall provide all students physical education that teaches them the skills needed for lifelong physical fitness."*
Regular physical activity opportunities are provided throughout the day (not including recess)	0	**Either of the following:** • Not mentioned • Only addresses physical activity before or after school
	1	Vague and/or suggested **Example:** *"Classrooms shall incorporate, where possible, appropriate, short breaks that include physical movement."*
	2	**Either of the following:** • Regular physical activity throughout the day is required • Policy requires training for teachers on activities that incorporate physical activity throughout the day **Examples:** • *"Physical activity opportunities shall be offered daily during the school day."* • *"Shall provide Take 10! training to all teachers."*
Addresses consistency of nutrition communication	0	Not mentioned
	1	Vague and/or suggested **Examples:** • *"The entire school environment shall be aligned with healthy school goals"* (although "shall" is required, "aligned" is vague). • *". . . will encourage menu choices linked with the nutrition education curriculum."*
	2	Specific and required **Example:** *"The school environment, including cafeteria and classroom, shall provide clear and consistent messages that reinforce healthy eating."*

Figure 2. Sample school wellness policy topic items and coding guidance.

Appendix B: Abbreviated School Wellness Policy Tool (Flyer)

Appendix C: Recruitment Letter to Superintendent

VirginiaTech

College of Agriculture and Life Sciences
Department of Human Nutrition, Foods and Exercise
338 Wallace Hall
Virginia Tech Blacksburg, VA 24061

Happy new school year!

My name is Erin M. Smith, and I'm currently a Ph.D. candidate at Virginia Tech in the Department of Human Nutrition, Foods and Exercise. I'm writing to request approval to conduct a small data collection for my dissertation at one of your middle schools.

My research evaluates physical activity policy implementation in secondary schools, and the data collection will be purely observational, meaning that school administrators, faculty, staff and students will not be expected to complete anything. We have received IRB approval from Virginia Tech, and to minimize any intrusion to your school environment, we expect the data collection to only take 1 to 2 days.

The data collection team will consist of two trained researchers who will not have any contact with students, faculty or staff to observe the following: (1) students arriving at and departing from school; (2) student activity during lunchtime; and (3) student activity during any physical education/activity opportunities during the day. The researchers will also note any environmental aspects that may impact students' physical activity (e.g. presence of stairs, layout of the campus, etc.).

The data collection will only consist of recording count data using clicker devices. We will not videotape or audio record any part of the data collection process.

Please let me know what needs to be done to seek proper approval of observing one of your middle schools. I will be happy to provide the school board with any additional documents (research proposal and rationale, data instruments and protocols, IRB approval notices, etc.) to expedite the approval process.

I hope to be finished with my observational audits by the beginning of October, and I would like to set up at time within the next two months to observe a school.

Thanks for your time!

Erin M. Smith
Ph.D. Student
Human Nutrition, Foods and Exercise
Virginia Tech
(662) 419-2128
erinsmith@vt.edu

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Appendix D: IRB Approval Notices

VirginiaTech

Office of Research Compliance
Institutional Review Board
2000 Kraft Drive, Suite 2000 (0497)
Blacksburg, Virginia 24060
540/231-4606 Fax 540/231-0959
e-mail irb@vt.edu
Website: www.irb.vt.edu

MEMORANDUM

DATE: September 9, 2011

TO: Paul Estabrooks, Erin Smith

FROM: Virginia Tech Institutional Review Board (FWA00000572, expires May 31, 2014)

PROTOCOL TITLE: Analysis of Implementation and Effectiveness of School Wellness Policies Between Low-Income and Moderate/High-Income Schools

IRB NUMBER: 10-491

Effective September 27, 2011, the Virginia Tech IRB Chair, Dr. David M. Moore, approved the continuation request for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report promptly to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at http://www.irb.vt.edu/pages/responsibilities.htm (please review before the commencement of your research).

PROTOCOL INFORMATION:
Approved as: **Expedited, under 45 CFR 46.110 category(ies) 7**
Protocol Approval Date: **9/27/2011 (protocol's initial approval date: 9/27/2010)**
Protocol Expiration Date: **9/26/2012**
Continuing Review Due Date*: **9/12/2012**
*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

FEDERALLY FUNDED RESEARCH REQUIREMENTS:
Per federally regulations, 45 CFR 46.103(f), the IRB is required to compare all federally funded grant proposals / work statements to the IRB protocol(s) which cover the human research activities included in the proposal / work statement before funds are released. Note that this requirement does not apply to Exempt and Interim IRB protocols, or grants for which VT is not the primary awardee.

The table on the following page indicates whether grant proposals are related to this IRB protocol, and which of the listed proposals, if any, have been compared to this IRB protocol, if required.

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Appendix E: Data Collection Proposal Packet for School Boards

This research proposal packet was given to school district superintendents and school boards during the sample recruitment process. The packet included the observational protocols, which are attached in a separate appendix.

Data Collection for Physical Activity Policy Implementation Study

Principal Investigator: Erin M. Smith, M.A.T, Virginia Tech
Ph.D. Committee Chair and Adviser: Dr. Paul A. Estabrooks, Virginia Tech

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Letter from Principal Investigator

Dear Superintendent and/or School Board Member:

Hi! Thank you for expressing interest in participating in this small data collection for my dissertation. My name is Erin M. Smith, and I'm a graduate student at Virginia Tech working under Dr. Paul A. Estabrooks. I am hoping to graduate this Fall with a Ph.D. in Human Nutrition, Foods and Exercise, and my research focuses on what role public schools play in reducing and preventing childhood obesity.

I got into this research primarily by accident. As a former public school teacher in Baltimore, I was able to see how the school environment along with my students' home environments affected the day-to-day food choices of my students. Many of my students' mothers were Type 2 diabetics and worked two jobs, and the children were mainly responsible for the day-to-day food choices, usually processed meals with high saturated fat, sodium and few fruits and vegetables offered by local corner stores or fast-food restaurants.

I believe public schools have some responsibility in educating children about healthful choices and providing them with safe, healthy environments that encourage physical activity and good nutrition. With your help, we can began to fill the gap in policy-related research by evaluating the effect of the federal school wellness policy mandate has had on the physical activity environment of your public school. Our results may shift current research from the importance of wellness policy evaluation to the importance of how the policy was developed and implemented.

This packet includes pertinent information for you and your school board members regarding the approval request for collecting data at one middle school in your district. This packet consists of a short FAQ for school board members along with a research rationale and purpose, any Institutional Review Board approval notices, any data collections protocol and survey instruments. If you have any questions or concerns, please feel free to contact me.

We both know that healthy students are associated with strong academic outcomes, and it is my hope that every student in the region has the opportunity to attend a safe and healthy school that will encourage them to become life-long learners.

Thanks, and I look forward to hearing from you.

Erin M. Smith
erinsmth@vt.edu
M.A.T. Johns Hopkins University
Ph.D. Candidate at Virginia Tech

Letter from Dissertation Committee Chair

To Whom It May Concern:

Ms. Smith has been working in my lab for the past three years, and I'm unequivocally happy to write a letter of support for her current observational auditing research. Her dissertation, tentatively titled, "An Analysis of Implementation and Effectiveness of School Wellness Policies," is exciting new research that will offer real-world analysis of school wellness policy implementation and their effectiveness.

She has also published and presented various analyses of school wellness policies found in Virginia, Maryland and DC, and I'm really looking forward to the audits of school environments as she progresses through her dissertation. She is a very professional student, and since she has a background in public education, I believe she will handle the auditing process in a professional and courteous manner.

Cheers,

Dr. Paul A. Estabrooks
Professor
Virginia Tech
Department of Human Nutrition, Foods and Exercise
1 Riverside Circle SW, Suite 104
Roanoke, VA 24016
United States
E-mail: estabrkp@vt.edu
(540) 857-6664

Purpose and Rationale for Research

Specific Aims

Public school policies related to physical activity and eating behaviors have recently become the focal point for policymakers to evaluate the effect of rules and regulations on the childhood obesity epidemic (Story, 2009; Weber, 2007; Probart, 2007; Naylor, 2009; Lee, 2010; Frieden, 2010; Foster 2008; Finkelstein, 2008; Cullen, 2007). Some research has concluded that school policy-related interventions are not changing student behavior, and of the more recent literature, research suggests that this is due to the fact that these federally mandated school wellness policies are extremely weak and ineffective (Probart, 2007, 2008; Nanney, 2010; Metos, 2007; Jaime, 2009).

Preliminary data from a random sample of school wellness policies in one state also concluded that on average many of the local wellness policies were weak and mildly comprehensive; however, the study also concluded that a large majority of school districts had adopted sample wellness policies provided from a private third-party association (Smith, 2012). These sample policies were much weaker and less comprehensive than locally developed policies, and these distinctions illuminated the process of policy adoption and development. Currently no research has evaluated why some school systems develop, adopt and implement stronger wellness policies than other schools. By evaluating this policy development, adoption and implementation process based in the theoretic framework of diffusion of innovations (Rogers, 2006), we may be able to determine key school policy environmental characteristics that schools can employ to develop, adopt and implement stronger wellness policies overall.

Our proposed study will be a retrospective non-experimental study to evaluate the development, adoption and implementation of physical-activity (PA) and physical educational policies within the tri-state area of Maryland, the District of Columbia and Virginia. To develop our LEA audit sample, we will evaluate physical activity language found in all 157 school districts' local wellness policies. We will then select the highest and lowest scoring policies for our audit sample. We expect our sample to be at least 10 schools. Once our sample has been established, we will collect data through on-site school observational audits using SOPLAY and SOPARC measurement tools.

To establish our measurement of policy development and adoption, we will mail a round of validated surveys to all 157 LEAs evaluating the policy formation process.

After analyzing our data, we will be able to establish the key diffusion characteristics of strong PA policies (e.g. the presence of change agents, opinion leaders and/or policy brokers, the presence and/or the strength of a school wellness committee, etc.) in tandem with strong characteristics of policy implementation. With the impending Childhood Nutrition Act revisions in Congress, this research will provide an early blueprint for LEAs to adopt and implement strong—and possibly more effective—physical activity and physical educational policies in the future.

Our primary specific aims of the project are:

1. To describe the key diffusion elements of PA and PE policy interventions from LEA policy development, adoption and implementation from district to school and within school levels.
2. To determine which characteristics of school policies are easiest to diffuse through the adoption and implementation phases of the policy process.
3. To identify possible guidelines to promote a more rapid diffusion of strong PA and PE policy elements among states, districts and schools.

Research Significance

Policy-related interventions have been an effective way to effect broad population-change, and in recent years, many childhood obesity-related policies have been introduced into public schools to combat the epidemic facing the United States (Story, 2009; Weber, 2007; Probart, 2007; Naylor, 2009; Lee, 2010; Frieden, 2010; Foster 2008; Finkelstein, 2008; Cullen, 2007). Emerging school wellness policy-related obesity research suggests that school wellness policies are not having the intended effect on childhood obesity (Moag-Stahlberg, 2008; Probart, 2008; Nanney, 2010; Metos, 2007; Jaime, 2009), and many studies have been recently published that evaluate the strength of these wellness policies. Recent research has found that many of these school wellness policies were weak (Metos, 2007; Belanksy, 2009; Longley, 2008), and our preliminary data from a policy evaluation pilot study of a tri-state region (Virginia, Maryland and DC) seem to reflect the many conclusions of previous research.

Our data suggest that although many of the policies are weak, there are vast differences between policies adopted by locales and by policy type. Preliminary data show, although not significant, that urban school systems have stronger and more comprehensive school wellness policies than rural school districts while districts that adopt locally developed polices have stronger and more comprehensive policies than districts who adopt sample wellness policies provided by a third-party.

Our proposed research will extend our preliminary studies by evaluating why certain school districts adopt and implement stronger policies than other school districts. We plan to not only compare policy adoption methods but also evaluate policy implementation methods through on-site observation audits that may provide a clear picture of wellness policies in action from adoption to implementation. Researchers have failed to evaluate the differences in wellness policy adoption and implementation among different school systems, and we will be using a diffusion of innovations approach as theorized by Everett Rogers (2003) to guide our research.

Diffusion is the theory that innovations can be communicated through certain channels within members of social system over time (Rogers, 2003), and by looking through what channels school wellness policies developed along with the presence and/or strength of members of a particular social system, we may be able to see which characteristics of a strong school PA policy are most easiest diffused. Also, researchers have found that diffusion can be expedited by using opinion leaders, change agents and/or policy brokers (Yancey, 2009; Burt, 1999; Mintrom, 1997; Valente and Davis, 1999), and we would like to test for the presence of these moderators in our proposed study. By looking at how these actors are utilized, we may be able to issue recommendations or guidelines for school systems to adopt when developing new wellness policies.

With the Institute of Medicine and the US Congress enacting new mandates for public schools regarding wellness policies, our proposed research will add to the small, but growing, body of knowledge to help public schools adopt and implement stronger and more effective school wellness policies.

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Design of Research Activity

This research will collect data through direct observation of students. The purpose of this research is to collect data regarding physical activity in the school, and the data collection process is expected to take from 1 to 2 days, depending on the size of the middle school.

A typical data collection day has three data collection periods: (1) Before School; (2) During Lunchtime; and (3) After School.

1) *Before School*: Researchers will arrive an hour to 1.5 hours before school starts to prepare the data forms, measure and map target areas. Depending on the number of target areas designated, researchers will then begin scanning target areas, counting the number of students engaged in physical activity. The last scan should begin 15 minutes before school starts.

2) *Lunchtime*: There are two scans during lunchtime. The first scan begins at Lunch Start plus 15 minutes. The second scan will begin at Lunch Start plus 25 minutes.

3) *After School*: Scans will take place when school ends along with +15, +45 and +75 minutes after school ends.

Researchers will use the following auditing system developed by Dr. Tom McKennzie et al. from San Diego State University: (1) SOPLAY—the System of Observing Play and Leisure Activity in Youth; and (2) SOPARC—the System of Play and Recreation in Communities.

SOPLAY is a validated tool for directly observing physical activity and associated environmental characteristics in free play settings (e.g., recess and lunch at school). SOPLAY provides objective data on the number of participants and their physical activity levels during play and leisure opportunities in targeted areas. Separate scans are made for males and females, and simultaneous entries for contextual characteristics of areas including their accessibility, usability, and whether or not supervision, organized activities, and equipment are provided. The predominant type of activity engaged in by area users is also recorded (e.g., basketball, dance) (via http://www.activelivingresearch.org/node/10642)

SOPARC is a validated direct observation tool for assessing park and recreation areas, including park users' physical activity levels, gender, activity modes/types, and estimated age and ethnicity groupings. It also collects information on park activity area characteristics (e.g., accessibility, usability, supervision, and organization) (via http://www.activelivingresearch.org/node/10654).

We will be using clicker-like devices to measure students that are sedentary, walking or very active during our scans.

Clicker-type device to be used

Timeline for Research Activity

We hope to complete all of our observational audits by the end of October. Each observational audit should only take 1 to 2 days at each school.

Audience for the Information

This research project will be disseminated to academic audiences primarily through oral presentations, academic conferences and peer-reviewed journal articles. It may be submitted as a white paper to the Virginia Department of Education to suggest ways that LEAs may increase student physical activity throughout the school environment.

Description of What Will Be Included in Summary Report

The data collected from your school will be aggregated with the other schools and reported on as means. Characteristics of exemplary schools and/or school districts may be shared in the reporting process, and we will make every effort to limit the amount of identifying details for these schools and/or districts. The following data may be included in our report:

- LEA demographic information
  - # of total enrollment
  - % FRPL
  - # of total schools in district
  - locale
  - pupil/teacher ratio
  - total expenditure per student
- Energy expenditure rates for observed middle school
- Description of Target Areas

You may request your district's audit results by contacting Erin M. Smith; however, you will not be able to access the raw data collection of your school's audit.

Intrusion Upon Instruction Time

Your school should be impacted minimally during the data collection process. There will only be two trained researchers present for 1 to 2 days. We expect them to not interact with your student body, staff or faculty.

We do not expect to interrupt your instructional time since observations are only completed three times during non-instructional parts of the school day.

Staff Time Required for Participation and Coordination of Research Activities

Your school will not be responsible for assisting in any part of this project. Since this project is purely observational, students, parents, faculty and staff do not need to provide written consent to participate in this project. **We will NOT be collecting body measurements or fitness-level type data.** Moreover, we will provide all of our materials; we will not need any materials, supplies or equipment from the LEA.

Privacy Compliance

This study will not collect any identifying information regarding students, and therefore, this research study complies with the federal, state and LEA requirements for student privacy.

Potential Benefit of Study to School and Community

This research study is one of the first to measure physical activity policy implementation in secondary schools, and our results may begin to show how schools can create more active environments through the policy development, adoption and implementation process.

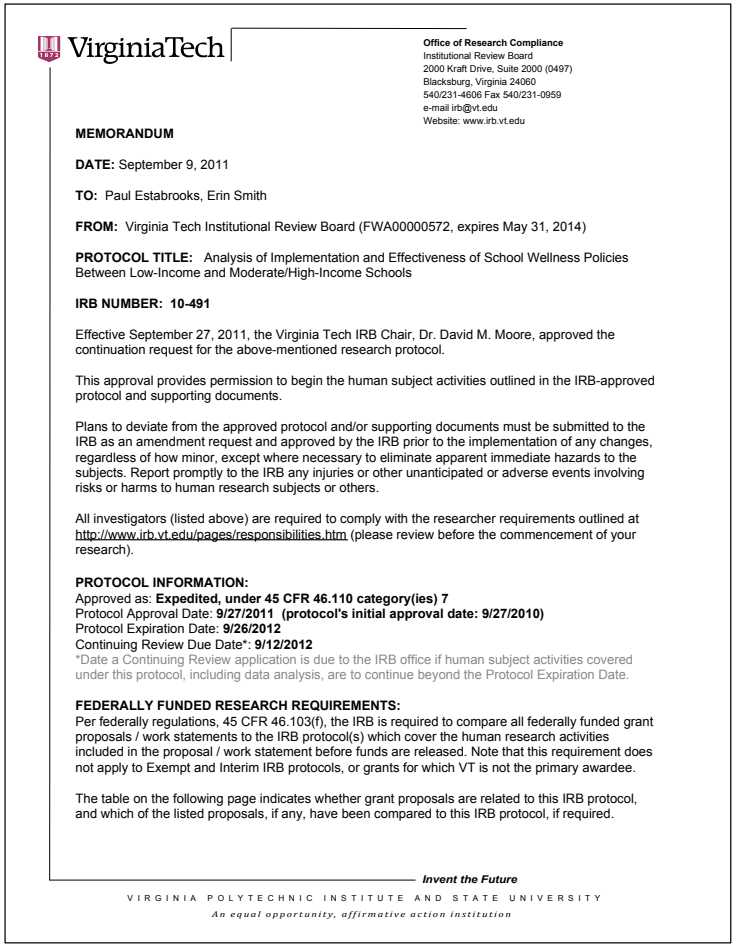
Healthy students are associated with strong academic outcomes, and with this research, we can begin to evaluate the effectiveness of federal policy mandates on the school physical activity environment.

How LEA Was Selected

Your school district was selected based on a previous evaluation of physical activity policies located in your general student wellness policy. If you would like to learn more about your district's wellness policy evaluation, please feel free to contact the principal investigator, Erin M. Smith, at erinsmth@vt.edu.

IRB Approval Notice

*Note: Our protocol expiration date is 9/26/2012, and we will be requesting an extension on 9/12/2012. Also, this data collection is part of the larger dissertation evaluating the implementation and effectiveness of wellness policies.



VirginiaTech

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MEMORANDUM

DATE: September 9, 2011

TO: Paul Estabrooks, Erin Smith

FROM: Virginia Tech Institutional Review Board (FWA00000572, expires May 31, 2014)

PROTOCOL TITLE: Analysis of Implementation and Effectiveness of School Wellness Policies Between Low-Income and Moderate/High-Income Schools

IRB NUMBER: 10-491

Effective September 27, 2011, the Virginia Tech IRB Chair, Dr. David M. Moore, approved the continuation request for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report promptly to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at http://www.irb.vt.edu/pages/responsibilities.htm (please review before the commencement of your research).

PROTOCOL INFORMATION:
Approved as: **Expedited, under 45 CFR 46.110 category(ies) 7**
Protocol Approval Date: **9/27/2011 (protocol's initial approval date: 9/27/2010)**
Protocol Expiration Date: **9/26/2012**
Continuing Review Due Date*: **9/12/2012**
*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

FEDERALLY FUNDED RESEARCH REQUIREMENTS:
Per federally regulations, 45 CFR 46.103(f), the IRB is required to compare all federally funded grant proposals / work statements to the IRB protocol(s) which cover the human research activities included in the proposal / work statement before funds are released. Note that this requirement does not apply to Exempt and Interim IRB protocols, or grants for which VT is not the primary awardee.

The table on the following page indicates whether grant proposals are related to this IRB protocol, and which of the listed proposals, if any, have been compared to this IRB protocol, if required.

Appendix F: SOPARC and SOPLAY Protocols

SOPARC

(System for Observing Play and Recreation in Communities)

Description and Procedures Manual

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January 10, 2006

SOPARC
(System for Observing Play and Recreation in Communities)

PURPOSE

SOPARC was designed to obtain direct information on community park use, including relevant concurrent characteristics of parks and their users. It provides an assessment of park users' physical activity levels, gender, activity modes/types, and estimated age and ethnicity groupings. Additionally, it provides information on individual park activity areas, such as their levels of accessibility, usability, supervision, and organization.

Relevant Target Areas within a park are first measured, coded, and mapped. Certified assessors then visit the target areas during specific time periods on randomly scheduled days. During the RAND PARKS study, SOPARC observations will be made throughout the day, and include specified times in the morning, noon, afternoon, and evening (7:30AM; 11:30AM; 3:30PM; 6:30PM).

RATIONALE

Physical activity and recreation are positively associated with good health. Investigations of activity participants in "open" environments (e.g., recreation and leisure settings) have been hampered by the lack of an objective tool for quantifying physical activity and user characteristics. Measurement in these settings is complicated because the number of participants and their activity modes and intensity levels change frequently.

SUMMARY

SOPARC is based on momentary time sampling techniques in which systematic and periodic scans of individuals and contextual factors within pre-determined target areas in parks are made. During a scan the activity of each individual is mechanically or electronically coded as Sedentary (i.e., lying down, sitting, or standing), Walking, or Very Active. Separate scans are made for females and males, and for estimating the age and ethnic groupings of participants. Simultaneous entries are also made for time of day, area accessibility, area usability, presence of supervision and equipment, and presence and classification of organized activities. Summary counts describe the number of participants by gender, activity modes and levels, and estimated age and gender groupings. The instrument permits physical activity level comparisons to be made among different environments or within the same setting over different time periods. Energy expenditure estimates (Kcal/kg/min) for a Target Area of park can be calculated based on previously validated constants for each level of activity.

VALIDITY & RELIABILITY

Validity

Validity of the activity codes used by SOPARC has been established through heart rate monitoring (McKenzie et al., 1991; Rowe, Schuldheism, & van der Mars, 1997). These provide support for the initial construct validity of SOPARC. Providing measures of persistent behaviors (i.e., physical activity) are taken frequently and at random, momentary time sampling techniques have shown to yield valid behavioral samples. Because only brief episodes are recorded, response and recording occur simultaneously with observations occurring at an approximate rate of one person per second.

Reliability

Reliability data for a similar instrument (SOPLAY) were collected during 14 days of field assessments in middle schools. A pair of assessors simultaneously and independently made counts of boys and girls in each activity category in selected target areas. Activity counts from a total of 186 target areas were used in the reliability analysis. Interobserver agreements for the five contextual variables were 95%, 97%, 93%, 96%, and 88%, for area accessibility, usability, presence of supervision, presence of organized activity, and provision of equipment, respectively. To examine the reliability of activity counts made by different assessors, a series of intraclass correlations were computed. Correlations were high for sedentary girls (R=.98) and walking girls (.95), although lower for counts of very active girls (.76). For boys, correlations were high for sedentary (.98), walking (.98), and very active (.97) behavior. It was concluded that all interobserver agreements and intraclass correlations met acceptable criteria (IOA=80%, R=.75) for reliable assessment.

OBSERVATION AREAS

Direct observations are made in designated ***Target Areas*** that represent all standard locations likely to provide opportunities for park users to be physically active. These Areas will be predetermined and identified for observations prior to baseline assessments. A map is provided to identify areas and a standard observation order for each park. Additional target areas may be added by observers on site and then documented.

During occasions of high user density, Target Areas are subdivided into smaller ***Subtarget Areas*** (scan spaces) so that accurate measures can be obtained. Observers use standard court or field markings to determine appropriate Subtarget Areas within each Target Area. Data from these smaller spaces are summed to provide an overall measure for each Target Area.

> NOTE: A decision to subdivide a Target Area depends upon the (1) number of park users in the area and (2) the type of user activity. Fast moving activities with people clustered together and moving in diverse directions (e.g., during soccer) require smaller scan spaces.

OBSERVATION PREPARATION

1. Prior to leaving for the park, prepare observation materials including: synchronized wristwatch, counter, clipboard, sufficient SOPARC recording forms, target area map, and pencils.

2. Arrive at the park site at least 20 minutes prior to the official start of coding. Review the sequence for observing Target Areas. Visit each Target Area in order and plan how to sub-divided it into Subtarget Areas if necessary. Mentally rehearse by scanning each area a few times.

SOPARC CODES and RECORDING

Date Enter the date (mm/dd/yyyy) of the observation.

Park ID# Enter the designated Park ID. This is generally a two-letter abbreviation of the park name (e.g., Pecan Park is represented by "PP").

Observer ID Enter your ID code.

Period Check the appropriate box to indicate whether observations were made in the morning, lunch, afternoon, or evening.

Target Area Refers to the number of a previously designated Target Area (see the park map). If necessary, assign Sub-target Area numbers when you divide the area into multiple scan spaces.

Start Time Enter the start time of the scan for that designated area.

Area Condition Check "Yes" or "No" to describe specific conditions for each scan area.

Accessible = Code "YES" if area is accessible to the public (e.g., area is not locked or rented to a private party).

Usable = Code "YES" if area is usable for physical activity (e.g., is not excessively wet or roped off for repair). For example, code "YES" when the space is usable, even though it may be locked. Code "NO" when there is insufficient lighting to use the space (e.g., no outdoor lights permitting play after sunset).

Equipped = Code "YES" if equipment (e.g., balls, jump ropes) provided by the park is present during the scan. Code "NO" if the only equipment available is permanent (e.g., basketball hoops and climbing apparatus) or owned by park users themselves (e.g., frisbee, ball, or bicycle brought by a family).

Supervised = Code "YES" if area is supervised by designated park or adjunct personnel (e.g., park rangers, playground supervisors, volunteers, sport officials, teachers). The supervisor must be in or adjacent to that specific area (e.g., available to direct park users and respond to emergencies), but does not have to be instructing, officiating, or organizing activities.

Activity Organized = Code "YES" if an organized physical activity is occurring in the scan area (e.g., a scheduled sporting event or exercise class is being lead by park staff or adjunct personnel).

Dark = Code "YES" to indicate the area has insufficient lighting to permit active play. Observers should not enter a target area unless there is sufficient lighting.

Empty = Code "YES" when there are no individuals present during the scan. Also, code "YES" when the area is dark.

Comments Enter relevant additional information about the condition, people, or activities within the Target Area.

Activity Write in the most prominent (primary) physical activity that females and males are doing in the area. If applicable, write in the second most prominent physical activity (secondary) that females and males are doing. A space is also provided to write in the most prominent activity attracting female and male onlookers/spectators to the area (this only applies to organized activities).

During scans of the target area, all people should be accounted for as either participating in the primary activity, secondary activity, or as a spectator.

Some physical activity modes are:

Fitness Related Codes:
aerobics (dance/step aerobics)
fitness stations
jogging/running
strengthening exercises (pull ups)
walking

Sport Related Codes:
baseball
basketball
cheer leading
dance
football
gymnastics
handball
horseshoes
soccer
tennis/racquet
tetherball
volleyball

Active Game Related Codes:
climbing/sliding
jumping (rope, hoops, hop scotch)
manipulatives/racquet activities
tag/chasing games

Sedentary Related Codes:
artwork
chess/checkers/cards
lying down
picnicking (food involved)
reading
standing
sitting

Age Group Determine age according to the following criteria:

Child = Children from infancy to 12 years of age as children.

Teen = Code adolescents from 13 to 20 years of age as teenagers.

Adult = Code people from 21 to 59 years of age as adults.

Senior = Code people 60 years of age and older as seniors.

Ethnicity Code whether the primary ethnicity for each individual is Latino (L), Black (B), White (W), or Other (O).

Activity Scanning left to right, determine the activity level based on the following criteria:

Sedentary (S) = Individuals are lying down, sitting, or standing in place.

Walking (W) = Individuals are walking at a casual pace.

Vigorous (V) = Individuals are currently engaged in an activity more vigorous than an ordinary walk (e.g., increasing heart rate causing them to sweat, such as jogging, swinging, doing cart wheels).

Participants Include all individuals who are participating in the primary activity in the target area (e.g., baseball). If more than one significant activity is going on, record the information for the group in the "secondary" activity.

Spectators When spectators are at an organized event, write in the name of the activity they are watching and describe their characteristics. Spectators can be watching from the sidelines or bleachers.

RECORDING PROCEDURES

1. On the observation form, enter the **Date**, **Park ID**, **Observer ID**, **Period,** and **Target Area.**

    - Observers are encouraged to complete this section prior to the start of the observation period.

2. If there are too many people to count in any area, divide it into separate **Subtarget Areas** and follow the below procedures for each Subtarget Area separately. Use letters to distinguish the Subtarget Areas (i.e., A, B, C).

    - When people move to a different Subtarget Area while you are scanning, count only those who are present at the time you are scanning. In rare cases you may count people twice or miss them as they change Subtarget Areas. Make sure that all space in each main target area is included within the Subtarget Areas.

3. Enter the **Start Time** for each area scan.

4. Record the conditions for each area (Accessible, Usable, Equipped, Supervised, Organized, Dark, and Empty).

    - When there are people are in the area, continue with action #5.
    - When the area is "dark" or "empty," complete the conditions and then move to the next Target Area.

5. Determine if there are **Females** within the target area.

    - If no females are located within the target area, write "none" and move to action #13.

6. For **Females**, decide which is the main activity in the target area and record it under **Primary Activity**. Refer to the codes listed on the SOPARC data form (or this protocol) to determine the appropriate terminology for the activity (e.g., aerobics, baseball, climbing).

    - If no females are participating in a primary activity, write "none" and move to action #11.

7. Scan the target area for **Females** who are participants in the primary activity**.** Use the counter to record the number of females by age and ethnicity groupings.

    - Use the top row of the counter to help with age grouping, with children on the left (chartreuse), teens (light green), adults (dark green), and seniors (gray). Use the second row of buttons is ethnicity, (tan=Latino, Black= African American, White=Caucasian, Yellow=other). Count age first, and then ethnicity, for each person.

    - Always scan from LEFT to RIGHT. Observe each person for each category in the area only once. If an observed person reappears in the scan area, do not record a second time. Do not backtrack to count new people entering the area.

8. Transfer these data to the SOPARC Observation Form and reset the counter.

9. Now scan all participating females in the primary activity and record their activity level (sedentary, walking, or vigorous).

10. Transfer these data to the SOPARC Observation Form and reset the counter.

11. Now scan the entire target area again for **Females** who are participating in a **Secondary Activity.** Describe the activity and scan for age, ethnicity, and activity level.

    - If there are no females participating in the secondary activity, write "none" under Secondary Activity and move to action #12.

12. Scan the entire target area again for **Females** who are **Spectators.** Describe the activity they are watching and scan for age, ethnicity, and activity level (they will typically be sedentary, but could be walking or vigorously involved).

    - If there are no female spectators, write "none" under organized activity and move to action #13.

13. Repeat actions #5 through #12 for **Males**, scanning first for participants in the primary activity, then secondary activity, and finally spectators.

14. Move to the next Target Area.

RECORDING PROCEDURES FOR WALKING/JOGGING TRACKS

1. Prior to observing in the park, a research team member will walk the path/track and record the length of time, in minutes, it took to complete one full lap around it (e.g., seven minutes). The Target Area will be observed for this length of each time a scan of the area is conducted.

2. A standard location from which all scans will be made will be identified. This location is referred to as the ***Coding Station*** and will easily identifiable.

3. On the SOPARC Observation Form, enter the **Date**, **Park ID**, **Observer ID**, **Period,** and **Target Area.**

    - If possible, complete this section prior to the start of the observation period.

4. Enter the **Start Time** for the area scan on the SOPARC Observation Form.

5. Record the conditions for each area (Accessible, Usable, Supervised, Organized, Equipped, Dark, and Empty).

    - If the area is "dark" or "empty," complete the conditions and then move to the next Target Area. If one or more people are in the area, continue with action #6.

6. Enter the **Start Time** and **End Time** on the Path Coding Form.

7. Count ALL people as they walk by the *coding station* and record their characteristics on the Path Coding Form. You may count some people more than once (e.g., runners), and some (e.g. slow walkers) may not pass by the area and will not be counted.

    - When two observers with counters are present during the scan, one counts for females and the other for males.

    - When recording data on the Path Coding Form, place a one (1) in each column that represents the individual characteristics (e.g., male, adult, Latino, walking).

8. Once time has expired, transfer the data from the Path Coding Form to the SOPARC Observation Form.

    - Use CAUTION when transferring data onto the SOPARC Observation Form. If time permits after the park scans are completed, check the form for errors.

    - Attach the Path Coding Form to the SOPARC Observation Form before submitting the data.

9. Move to next Target Area.

MORNING OBSERVATION PERIOD

The objective is to obtain an accurate measure of people engaged in the park Target Areas between 7:30AM and 8:30AM. Make sure that you are in Target Area 1 and ready to begin the first rotation of scans at preciously **7:30AM** (07:30 hours).

When there is sufficient time, do a second complete rotation of scans during the time period. The second rotation always begins 30 minutes after the start of the first rotation. For the morning observation, start the second rotation at Target Area 1 at **8:00AM** (08:00 hours).

LUNCHTIME OBSERVATION PERIOD

The objective is to obtain an accurate measure of people engaged in the park Target Areas between 12:30PM and 1:30PM. Make sure that you are in Target Area 1 and ready to begin the first rotation of scans at preciously **12:30PM** (12:30 hours).

When there is sufficient time, do a second complete rotation of scans during the time period. The second rotation always begins 30 minutes after the start of the first rotation. For the lunchtime observation, start the second rotation at Target Area 1 at **1:00PM** (13:00 hours).

AFTERNOON OBSERVATION PERIOD

The objective is to obtain an accurate measure of people engaged in the park Target Areas between 3:30PM and 4:30PM. Make sure that you are in Target Area 1 and ready to begin the first rotation of scans at precisely **3:30PM** (15:30 hours).

When there is sufficient time, do a second complete rotation of scans during the time period. The second rotation always begins 30 minutes after the start of the first rotation. For the afternoon observation, start the second rotation at Target Area 1 at **4:00PM** (16:00 hours).

EVENING OBSERVATION PERIOD

The objective is to obtain an accurate measure of people engaged in the park Target Areas between 6:30PM and 7:30PM. Make sure that you are in Target Area 1 and ready to begin the first rotation of scans at preciously **6:30PM** (18:30 hours).

When there is sufficient time, do a second complete rotation of scans during the time period. The second rotation always begins 30 minutes after the start of the first rotation. For the evening observation, start the second rotation at Target Area 1 at **7:00PM** (19:00 hours).

SAMPLE OBSERVATION SCHEDULE

MORNING OBSERVATION PERIOD
7:15am Check Target Areas and prepare SOPARC data forms
7:30am Initiate SCAN in Target Area 1 (following established sequence)
7:50am Complete SCAN of final Target Area
8:00 am Initiate second rotation SCAN in Target Area 1 (continue established sequence)

KEY WORDS

Coding Station: Identified location from which scans are conducted.

Condition: Descriptive characteristics (contextual variables) of a Target Area.

Counter: Device used to record data during park observations.

Observation Period: A predetermined period of time in which scans are conducted.

Primary Activity: The activity in which a majority of individuals are participating during the observation.

Scan: A single observation movement from left to right across a Target or Sub-target Area. During a scan, each individual person in the area is counted and coded for age, ethnicity, and activity level.

Scan Space: The geographical area within a Target or Subtarget Area.

Secondary Activity: The second most prominent activity occurring in a Target Area.

SOPARC: System for Observing Play and Recreation in Communities. This research method is used to observe physical activity in area parks.

Subtarget Area: A subdivision of a predetermined Target Area. Subtarget areas are created for a specific observation time and apply only to the scan space during that specific observation period. Activity level and the number of people located in a Target Area determine whether Subtarget Areas are necessary during a given observation period.

Target Area: A predetermined observation area in which park users may potentially engage in physical activity. A number of Target Areas will be established for each park.

SPEICAL CODING CONVENTIONS

Unidentifiable Person. This coding situation applies IF a person is observed sleeping in the area, but cannot be seen directly (i.e., due to blankets or sleeping position).

Gender: Code as “male”

Activity: Code as “Sleeping”

Age Group: Code as “Adult”

Ethnicity: Code based on the “majority” of park users in the neighborhood (i.e., if the community is primarily Latino, code as such).

Activity Level: Code as “Sedentary”

Comments: In the comments section of the data form, write a notation indicating that one or more individuals could not be identified due to sleeping position.

SCORING (FOR DATA ANALYSES ONLY)

Depending on the unit of analysis (gender, area, period, park, etc.), raw counts in each activity level are aggregated (sums or means) according to the variables of interest.

Example: To calculate the most active areas for females and males at a park on a given day

Steps:

a. Reduce data. Calculate mean activity counts from the double-scan data to provide a single count for each activity level of females and males. For multiple scans, sum these counts across periods to compute a single TIME PERIOD count for each level of user activity.

b. Sum across the park observation day. Aggregating by area, calculate a mean for each activity level (females and males separately) across all four periods observed to arrive at single counts for females and males at each level of activity in each area. Repeat for age and gender groupings.

c. Calculate energy expenditure rates. To estimate kilocalories/kg expended, the number of people counted in the sedentary, walking, and very active categories are multiplied by the constants .051kcal/kg/min, .096kcal/kg/min, and .144kcal/kg/min, respectively. Kilocalories/kg from each category can be summed to provide a measure of the total kilocalories/kg expended by park users in a given area. These values can be interpreted as the number of kilocalories per kg of body weight per minute expended in each area during the observed day. These energy expenditure rates are dependent on the number of people observed.

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ACKNOWLEDGEMENT:

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SAMPLE SOPLAY/SOPARC MAPPING STRAGEGIES

This document provides examples for the initial mapping of Target Areas.

Procedures for Describing Target Areas

1. Obtain a detailed map from school (PARK) officials.
2. Walk throughout the entire school campus.
3. Indicate precisely (draw) on the map each area that is available for physical activity anytime (e.g., before school, during lunch, and after school. Include areas that are used for physical education classes too.
4. Be sure to include all Target Areas, including: (a) basketball, volleyball, tennis, handball, and wall ball courts; (b) tracks, baseball, hockey, soccer, and other playing fields; (c) gymnasiums, weight training and multipurpose rooms; (d) grass, dirt, cement, matted, tiled or carpeted areas specifically available for users (e.g., students) to be physically active.
5. Number the Target Areas sequentially--in the specific order they will be observed during each rotation rotation. Establish a logical route (e.g., The first Target Area is the one closest to the main cafeteria door).
6. Store the finalized map of Target Areas in a specific "records" office.
7. Occasionally it may be necessary to add or delete a Target Area (e.g., campus/park construction). Designate only ONE person to add/delete Target Areas (e.g., the leader of the field observation team). This person makes the changes on the master map and provides revised copies to field observation team members.

Sample Operational Definitions of Environmental Variables (for Schools)

This section provides definitions and instructions to be used in completing mapping variables identified on the data collection sheet (see attached).

I. Fixed Setting:

Code Target Area as either (1) Indoors or (2) Outdoors.

II. Location of Target Area:

On School Campus. Area within the designated school boundaries.
Adjacent to Campus = Area, typically within an adjacent park or community center, used by students for school-related activities.

III. Area Type:

Assign each Area one of these codes. If not sure of the correct code, complete the comments box at bottom of data form.

1. Court Space: area marked for basketball, tennis, volleyball, and/or other court games. Contains permanent markings specifically for court games.
2. Play space: Self-contained outdoor area designated for physical activity.
3. Field. Large open area designed for activity. It may or may not have goals, backstops, etc.; cannot be described as a Court space.
4. Pool: consists of a wading or swimming pool and the surrounding enclosed space.
5. Weight room: specifically designated room that is equipped with strength/endurance machines (e.g., weight machines (e.g., nautilus), free-weights, bench press) and/or aerobic machines such as stair-steppers and stationary bikes.
6. Gymnasium: large indoor space primarily for physical activity and game play. It may or may not have seating for spectators.
7 and 8. Multipurpose room/Auditorium: designated indoor spaces that can be used for multiple functions, including physical activity, plays, and eating.

IV. Area Improvements:
Improvements are permanent modifications to areas such as lines painted on courts (e.g., basketball, tennis, and four-square courts); cuts in grass or field areas (e.g., baseball diamonds); poles or holes in the cement/blacktop for poles or standards (e.g., basketball hoops; tether-ball and volleyball poles, tennis standards, football goal-posts).

Do not record for temporary improvements (e.g., temporary chalk lines for field games, portable nets for tennis and volleyball, portable soccer goals).

CODING CONVENTIONS:

An improvement identifies what the area is primarily designed for, regardless of how it is used at a particular time. For example, a tennis court is recorded as a tennis court—even if children are playing soccer on it.

- Two erect poles are often used for football and soccer goals. Two posts = one goal.
- A basketball court consist of a hoop plus permanent lines painted on the Surface Area
- Each half of a basketball court is counted as one. Each hoop is counted as one.
- When there is a basketball hoop without a painted court, or if there is only a shooting key or foul line painted, record only the hoop. The numbers for hoops and for half-courts are not always equal.
- The number of diamonds and backstops may not always be equal.
- A wallball court is a single erected wall. It could be the back of racquetball courts if a court is also specifically painted for wallball.
- A racquetball court must have walls on at least three sides.
- A volleyball court has two tall permanent poles separating areas about 30' by 30' (one court).
- A tennis court has two short poles and equal amount of play space on both sides of poles (one court).
- All climbing apparatus within 50 feet of each other and in the same Target Area are counted as one. If the items are widely separated (i.e., beyond 50 feet), count each group of climbing apparatus as a separate area.
- Record a baseball/softball diamond only if the diamond is a dirt area surrounded by grass, and places for the bases (home, first, second, third) are permanently marked. Do not record partial cut-outs (e.g., for home-base only) or temporary bases thrown on a "field" to make a diamond.

V. Improvement Overlap:
Record yes (1) to identify Target Area has multiple improvements that overlap within the same space but cannot be used simultaneously. For instance, record 1 if the court space has poles and/or painted lines that could be used to identify games for basketball, tennis, and volleyball (but not simultaneously).

VI. Surface Area:

sand: particles smaller than gravel, but coarser than silt (i.e., beach).

dirt: earth, soil; dusty when dry and not impacted.

gravel: loose, broken small fragments of rock.

mats: rubber or plastic coverings of floor or ground (e.g., for tumbling, etc).

cement

grass

carpet

tile

water

wood

other (specify, e.g., tarmac).

Sample Data Collection:

Procedures for Environmental Assessments

Before going to map Target Areas be sure to have data collection forms, 2 pencils with erasers, and a school map. Make certain to record/number the proper Target Area sequence on the data collection form.
Enter School ID number, Date, Observer ID number, and whether or not the form is a reliability assessment. Under Reliabilities circle "0" for primary observer and "1" for the reliability observer.

Complete the following variables for each Target Area. If an Area is locked or under construction, schedule an additional appointment.

Fixed Setting: Identify as either indoors or outdoors.

Location: Record whether Target Area is part of the school campus or adjacent to it.

Area Type: Select only one code. If none are appropriate, enter code 9 and describe the type.

Area Improvements: Count the number of improvements and record in the appropriate box(s)
For example, walk around the entire Target Area #1, count the number of basketball half courts, record this number in the space under the column for Target Area 1 and across the row for basketball courts (half courts). Count and record the quantity for each Improvement type in each different Target Area.

Improvement Overlap: Code 1= Yes if any of the improvements overlap each other or are dual-use improvements in the same Target Area (i.e., Target Area has both basketball court markings and tennis court poles and markings, but the two games cannot be played simultaneously). If different games can be played at the same time they are not considered overlapping, therefore code 0 = No.

Area surface: (surface codes are listed near the bottom of the data collection form):
Primary = Most dominant ground surface within each Target Area (i.e., 51% or greater).
Secondary = Second most prominent surface area (if there is one). (E.g., dirt track surrounds a grassy field). Record "0" if there is no secondary surface.

Area Size: Use a standard measuring wheel. Enter the square footage/meters for each Target Area.

Mapping Training and Reliability
Training for mapping should include:
1. Explanation of variables and the coding conventions (rules).
2. Demonstration of how to complete Mapping Variables on the data collection forms (use pictures of actual school Target Areas).
3. Presentation of pictures of different variables on the data collection form. Observers will record responses to the pictures on Mapping Variable data collection forms. Inter-observer agreements will be tallied and percentage agreement recorded. Observers will train until 90% agreement is achieved.
4. Discuss discrepancies, refinement of definitions, and protocol recommendations. Note discrepancies (inter-observer disagreements), tally, and discuss until 100% agreement is reached.
5. Trained mappers should go to schools/parks in teams of two (a Primary and a Reliability assessor). Each observer should individually assess and record for Fixed Setting, Location, Area Type, Area Improvements, Area Overlap, and Surface Area for each Target Area. They should then resolve any differences before leaving the location.

Mapping Variables Data Collection Sheet

Park ID:	**Date**	**Observer ID:**			**Reliability? 1. Yes;**		**0 No;**		
		1	2	3	4	5	6	7	8
Fixed Setting:									
1= indoor, 2= outdoor									
Location:									
1=school campus 2= adjacent to campus									
Area Type:									
1=Court Space 2=Play Space 3=Field 4=Pool 5=Weight Room 6=Gymnasium 7=Multipurpose 8=Auditorium 9=Other _____									
Area Improvements: (code total #)		1	2	3	4	5	6	7	8
a. Basketball Hoops									
b. Basketball Half Courts									
c. Wall-ball Courts									
d. Racquet ball Courts									
e. Volleyball Courts									
f. Tennis Courts									
g. Four-square									
h. Tetherball poles									
I Track									
j. Climbing Apparatus									
k Baseball/Softball Diamond									
l. Baseball/Softball Backstop									
m. Exercise Stations									
n. Long-jump Pits									
o. Football Goal (each goal post)									
p. Soccer Goal (each goal post)									
q. Other (specify)									
Improvement Overlap: Yes =1 No =0									
Surface Area: A. Primary									
B. Secondary									
1 = black top 3 = cement 5 = carpet 7 = wood 9 = gravel 11 = water 2 = dirt 4 = grass 6 = mats 8 = tile									
Area Size: (square footage)									
Comments:									

SOPLAY

System for Observing Play and Leisure Activity in Youth

Description and Procedures Manual

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SOPLAY
(System for Observing Play and Leisure Activity in Youth)

RATIONALE

Investigations of physical activity have been hampered by the lack of an objective tool for quantifying physical activity in "open" environments, such as recreational and leisure settings. Measuring activity in these environments is complicated because both the number of participants and their activity levels change frequently.

SUMMARY

The System for Observing Play and Leisure Activity in Youth (SOPLAY) is based on momentary time sampling techniques in which systematic and periodic scans of individuals and contextual factors within pre-determined target areas are made. During a scan the activity of each individual is mechanically or electronically coded as Sedentary (lying down, sitting, or standing), Walking, or Very Active. Separate scans are made for females and males, and simultaneous entries are also made for time of day, temperature, area accessibility, area usability, presence of supervision, presence and classification of organized activity, and equipment availability. Summary counts describe the number of males and females in any given setting and their activity levels. The instrument permits physical activity level comparisons to be made among different environments or within the same environment over different time periods. Energy expenditure rates (Kcal/kg/min) can also be calculated based on previously validated constants for each level of activity.

PURPOSE

SOPLAY was designed to obtain observational data on the number of students and their physical activity levels during play and leisure opportunities in a specified activity area.

During the M-SPAN study, SOPLAY observations were be made before school (BS), during each lunch period (L), and after school (AS).

VALIDITY & RELIABILITY

Validity

Although no field-based validity study of the SOPLAY measure has been conducted, validity of the activity codes used by SOPLAY have been established through heart rate monitoring (McKenzie et al., 1991; Rowe, Schuldheism, & van der Mars, 1997). These provide support for the initial construct validity of SOPLAY. Providing measures of persistent behaviors (i.e., physical activity) are taken frequently and at random, momentary time sampling techniques have shown to yield valid behavioral samples (Ref). Because only brief episodes are recorded, response and recording occur simultaneously with observations occurring at an approximate rate of one child per second.

Reliability

Reliability data for SOPLAY were collected during 14 days of field assessment. A pair of assessors would simultaneously and independently make counts of boys and girls in each

activity category in selected target areas. Activity counts from a total of 186 target areas were used in the reliability analysis. Interobserver agreements for the five contextual variables were 95%, 97%, 93%, 96%, and 88%, for area accessibility, usability, presence of supervision, presence of organized activity, and provision of equipment, respectively. To examine the reliability of activity counts made by different assessors, a series of intraclass correlations were computed. Correlations were high for sedentary girls (R=.98) and walking girls (.95), although lower for counts of very active girls (.76). For boys, correlations were high for sedentary (.98), walking (.98), and very active (.97) behavior. It was concluded that all interobserver agreements and intraclass correlations met acceptable criteria (IOA=80%, R=.75) for reliable assessment.

OBSERVATION AREAS

1. Direct observations will be made in designated Target Areas that represent all standard locations likely to provide opportunities for students to be physically active. These Areas will be predetermined and identified for observations prior to baseline assessments. A map will be provided to identify areas and a standard observation order established for each school. Additional target areas may be added by observers on site and then documented.

2. During occasions of high student density, Target Areas will be subdivided into smaller Scan Spaces so that accurate measures can be obtained. Observers will use standard court or field markings to determine appropriate Scan Spaces within each Target Area. Data from these smaller spaces will be summed to provide an overall measure for each Target Area.

   NOTE: A decision to subdivide a Target Area depends upon the (1) number of students in the area and (2) the type of student activity. Fast moving activities with students clustered together and moving in diverse directions (e.g., during soccer and basketball), require smaller scan spaces.

OBSERVATION PREPARATION

1. Prior to leaving for the school, prepare observation materials including: synchronized wristwatch, counter, clipboard, sufficient SOPLAY recording forms, and pencils.
2. Arrive at the school site at least 60 minutes prior to the official start of school. Review the sequence for observing Target Areas. Visit each Target Area in order and plan how to sub-divided it into Scan Spaces if necessary. Prepare mentally by scanning each area a few times.

SOPLAY CODES and RECORDING

Reliability Circle 'NO" unless you are the second observer and your data will serve as a reliability measure.

Temp. Enter Fahrenheit temperature at the start of the observation period.

Period Circle a number to designate whether observations were made before school (BS), at lunch time (L), or after school (AS).

Start time Enter the start time (2400 hours) of the sweep for that designated area.

Area Refers to the number of a previously designated School Target Area (see school map). If necessary, add an additional area, describe it, and give it a new number.

Condition Circle N or Y to describe specific conditions for each designated observation area. If a Target Area is inaccessible (A=N), do not code the other four conditions.

A = Area is accessible (e.g., not locked or rented to others)

U = Area is usable for physical activity (e.g., is not excessively wet or windy).

S = Area is supervised by designated school or adjunct (e.g., YMCA) personnel (e.g., teachers, playground supervisors, volunteers). The supervisor must be in or adjacent to that specific area (i.e., available to direct students and respond to emergencies), but does not have to be instructing, officiating, or organizing activities.

O = Organized physical activity (i.e., scheduled, with leadership by school or agency personnel apparent) is occurring in the area (e.g., intramurals, interscholastic practices, fitness stations).

E = Equipment provided by the school or other agency is present (e.g., balls, jump ropes). Do not code 'YES' if the only equipment is permanent (e.g., basketball hoops) or is owned by students themselves.

S W V S = Sedentary; W = Walking; V = Very Active

Act. Enter the activity code (or name) for the most prominent physical activity that girls and boys are participating in within designated area.

Physical activity codes for secondary schools:

0. no specific activity (sit, stand, walk)
1. aerobics (dance, step aerobics)
2. baseball/softball
3. basketball
4. dance (ballet, country, line)
5. football
6. gymnastics
7. martial arts (judo, karate)
8. racquet sports (tennis, badminton)
9. soccer
10. swimming
11. volleyball
12. weight training/lifting
13. playground games (e.g., tetherball, 4-square)
14. none of the activities above (e.g., track)

Comments. Describe any events or features that may help explain any of the above data.

Alternative physical activity codes for young children:

0. no specific activity (sit, stand, walk)
1. fitness/aerobics (dance/step aerobics)
2. baseball/softball
3. basketball/volleyball
4. dance/gymnastics
5. soccer/football
6. climbing/sliding
7. jumping games
8. manipulative games/racquet activities
9. sedentary games/activities
10. none of the other ten categories
11. tag/chasing games

RECORDING PROCEDURES

1. On the observation form, enter the **School ID**, the **Date**, **Observer ID**, if it was a **Reliability** assessment, the **Temperature**, and the **Period** of assessment. Enter the **Start Time** for each **Area** scan (or scan space).

2. Record the contextual variables for each area (see SOPLAY codes).

3. Scan each entire target area for **Girls**, using the mechanical counter to record the number of **Sedentary**, **Walking**, and **Very Active** observations. Classify the predominant type of **Activity** occurring using the codes at the bottom of the SOPLAY Observation Form. Transfer these data to the SOPLAY Observation Form and reset the counter. Repeat for Boys. Record empty Target Areas by entering 0 (zero) into the SAV columns.

4. Always scan from LEFT to RIGHT. Observe each student in the area once. If an observed student reappears in the scan area, do not record a second time. Do not back-track to count new children entering the scan area.

BEFORE SCHOOL OBSERVATIONS

The objective is to obtain an accurate measure of the number of students engaged in physical activity before school starts. The last scan should begin 15 minutes before the school starts. Begin at School Start minus 40 minutes (with 6 Target Areas), minus 30 minutes (with 4 Target Areas), or minus 25 minutes (with 3 Target Areas).

LUNCHTIME OBSERVATIONS

The objective is to obtain an accurate measure of the number of students engaged in physical activity at lunchtime (outside of required physical education). There are two complete rotations of scans during lunchtime. The first rotation begins at Lunch Start plus 15 minutes. Always begin at Area 1 at start time. If a physical education class is occurring in a target area, record the area "accessible=No." The second rotation of scans begins at Lunch Start plus 25 minutes.

AFTER SCHOOL OBSERVATIONS

The objective is to obtain an accurate measure of the number of students engaged in physical activity beginning at School End plus 15, 45, and 75 minutes. Start at Area 1 at specified start time; then walk directly to subsequent Areas in designated rotation.

Sample Schedule (9:00 School Start; 4 target areas; 3 lunch periods)

8:00-8:20am	check Target areas, prepare data forms
8:25 am	initiate SCAN in Target Area 1 (following established sequence)
8:30 am	initiate SCAN in Target Area 2 (continue established sequence)
8:55 am	first school (warning) bell rings
9:00 am	school start
11:30	Lunch one (initiate SCAN 1 in Target Area 1 at 11:45)
	(initiate SCAN 2 in Target Area 1 at 11:55)
12:00	Lunch two (initiate SCAN in Target Area 1 at 12:15)
	(initiate SCAN 2 in Target Area 1 at 12:25)
12:30	Lunch three (initiate SCAN in Target Area 1 at 12:45)
	(initiate SCAN 2 in Target Area 1 at 12:55)
15:00	School Ends
15:15	initiate SCAN in Target Area 1, continue
15:45	initiate SCAN in Target Area 1, continue
16:15	initiate SCAN in Target Area 1, continue

SCORING

1. Depending on the unit of analysis (gender, area, period, school, etc.), raw counts in each activity level are aggregated (sums or means) according to the variables of interest.

Example: To calculate the most active areas for boys and girls at a school during a given day

Steps:

a. Reduce lunchtime data. Calculate mean activity counts from the double-scan data to provide a single count for each activity level of boys and girls for each lunch period. For multiple lunches, sum these counts across periods to compute a single lunch count for boys and girls for each level of student activity.

b. Sum across school day. Aggregating by area, calculate a mean for each activity level (boys and girls separately) across all periods observed (i.e., before school, lunchtime, after school) to arrive at single counts for boys and girls at each level of activity in each area.

c. Calculate energy expenditure rates. To estimate kilocalories/kg expended, the number of children counted in the sedentary, walking, and very active categories are multiplied by the constants .051kcal/kg/min, .096kcal/kg/min, and .144kcal/kg/min, respectively. Kilocalories/kg from each category can be summed to provide a measure of the total kilocalories/kg expended by children in a given area. These values can be interpreted as the number of kilocalories per kg of body weight per minute expended in each area during the school day. These energy expenditure rates are dependent on the number of children observed. Arrange means in descending order.

KEY WORDS

Target Area - A predetermined observation area in which students may potentially engage in physical activity. A number of Target Areas will be established for each school.

Scan Space - A subdivision of a Target Area in which the assessor makes an observation scan. Target Areas are subdivided into Scan Spaces when the number of students is large and they are engaged actively.

Scan - A single observation movement from left to right across a Target Area or Scan space. During a sweep, each individual student in the area is counted and coded as being Sedentary (S), Walking (W), or Very Active (V).

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School ID : ___ ___
Date:__ __/__ __/__ __
D8 D9 D10 D11

SOPLAY

(System for Observing Play and Leisure Activity in Youth)

Obs. ID #: ___ ___ Reliability: 0. No 1. Yes Temp: ___ ___F Period: **1.** BS **2.** L1s1 L1s2 **3.** L2s1 L2s2 **4.** L3s1 L3s2 **5.** AS1 **6.** AS2 **7.** AS3

START TIME	AREA	CONDITION					GIRLS				BOYS			
		A	U	S	O	E	S	W	V	Act.	S	W	V	Act.
__ __: __ __	**1**	0. N 1. Y	0. N 1. Y	0. N 1. Y	0. N 1. Y	0. N 1. Y	____	____	____	____	____	____	____	____
__ __: __ __	**2**	0. N 1. Y	0. N 1. Y	0. N 1. Y	0. N 1. Y	0. N 1. Y	____	____	____	____	____	____	____	____
__ __: __ __	**3**	0. N 1. Y	0. N 1. Y	0. N 1. Y	0. N 1. Y	0. N 1. Y	____	____	____	____	____	____	____	____
__ __: __ __	**4**	0. N 1. Y	0. N 1. Y	0. N 1. Y	0. N 1. Y	0. N 1. Y	____	____	____	____	____	____	____	____
__ __: __ __	**5**	0. N 1. Y	0. N 1. Y	0. N 1. Y	0. N 1. Y	0. N 1. Y	____	____	____	____	____	____	____	____
__ __: __ __	**6**	0. N 1. Y	0. N 1. Y	0. N 1. Y	0. N 1. Y	0. N 1. Y	____	____	____	____	____	____	____	____
__ __: __ __	**7**	0. N 1. Y	0. N 1. Y	0. N 1. Y	0. N 1. Y	0. N 1. Y	____	____	____	____	____	____	____	____
__ __: __ __	**8**	0. N 1. Y	0. N 1. Y	0. N 1. Y	0. N 1. Y	0. N 1. Y	____	____	____	____	____	____	____	____

Activity Codes: 0=No identifiable activity 1=Aerobics 2=Baseball/Softball 3=Basketball 4=Dance 5=Football 6=Gymnastics 7=Martial Arts
8=Racquet sports 9=Soccer 10=Swimming 11=Volleyball 12=Weight Training 13=Other playground games 14=None of the above

SOPLAY Recording Form 1/10/06 SJM