

**DOES ADOPTION OF THE HEALTHY EATING STANDARDS IMPACT SNACK
QUALITY IN LOCAL AFTER-SCHOOL PROGRAMS?**

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Does Adoption of the Healthy Eating Standards Impact Snack Quality In Local After-School Programs?

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Abstract

Background: Childhood obesity is a pressing public health concern; the prevalence of childhood obesity is 15.5% in Virginia. About 15% of Virginia's K-12 population participates in after-school programs (ASPs), identified as appropriate venues in which to promote healthy eating. In 2011, the National Afterschool Association (NAA) adopted the evidence-based Healthy Eating and Physical Activity Quality Standards (HEPAQS) to address snack quality and physical activity in ASPs. Although research has indicated promise in implementation of such policies in after-school programs, a need for assessment of effectiveness still exists. Are the quality standards being implemented effective in increasing positive nutritional habits among children in ASPs? In 2014, Danville Parks and Recreation (P&R), a key partner in the Dan River Partnership for a Healthy Community (DRPHC), adopted the HEPAQS policies to improve the nutrition and physical activity of attending students.

Objective: The primary purpose of this study was to determine the effectiveness of the adopted HEPAQS Healthy Eating standards by comparing the quality of snacks served at the ASP sites before and after the HEPAQS policies were implemented. A secondary purpose of this study was to describe the quality of snacks among both policy-adoption and comparison sites. The tertiary purpose of this study was to compare the quality of program versus non-program snacks in the ASPs.

Methods: To meet the objective, a natural experiment followed a pre-post evaluation design to determine the impact of adoption of the Healthy Eating standards at three policy-adoption ASPs. Applying an interrupted time series design, a total of 531 children's snack observations were performed across all sites during a five-week pre-policy adoption data collection period and 412 total snack observations were performed during a six-week post-policy data collection period. Direct observation methods including a modified quarter-waste method for dietary observations and the HAAND tool were conducted by trained research staff to collect snack quantity, type, brand, and amount consumed. Observational data was entered into statistical software for hypothesis testing. Data were also analyzed using Nutrition Data System for Research (NDSR) software to determine the mean servings, fluid ounces, or grams of each nutrient specified in the adopted Healthy Eating standards.

Results: Adoption of the Healthy Eating standards among the three policy-adoption sites did not result in better snack quality based on adherence to the Healthy Eating standards. Policy-adoption sites were only meeting four of the nine adopted Healthy Eating standards post-policy, almost all of which were also being met pre-policy: serving foods without *trans*-fats, serving no sugar-sweetened beverages (SSBs), limiting fruit juice to one 8 oz. serving, and avoiding

artificially sweetened beverages. By post-policy data collection, policy-adoption sites were not meeting five of the nine adopted standards: weekly serving a fruit or vegetable, offering water at all times, serving no candy or sugar-based snacks, emphasizing whole grains, and serving no snack chips. Although no significant changes were expected among comparison sites, they saw a significant increase in 100% fruit juice consumption and a decrease in grams of *trans*-fat from pre- to post-policy data collection. Across all five sites, program snacks were generally healthier than non-program snacks, as program snacks contained less SSBs, sweets, and snack chips.

Conclusion: Adoption of the Healthy Eating standards among the three policy-adoption sites did not result in better snack quality. Pursuing additional HEPAQS regarding implementation, staff training, and social and program support may be necessary to impact snack quality. ASPs may improve non-program snack quality by addressing HEPAQS for vending machines and guidelines provided to parents regarding non-program snacks. The P&R partners of the Dan River Partnership for a Healthy Community should continue to seek support as they implement the Healthy Eating standards in their ASPs.

Keywords: Childhood obesity, afterschool programs, healthy eating standards, HEPAQS, policy implementation, snack quality, afterschool nutrition

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CHAPTER 1

LITERATURE REVIEW

Project Overview

The Healthy Eating and Physical Activity Quality Standards (HEPAQS) are evidence-based strategies for after-school programs (ASPs) to guide the quality of snacks and physical activity (PA) opportunities across all types of after school providers. Prior to the development of the HEPAQS,¹ there were no national standards for after-school programs. Promoted by the National Afterschool Association, these policies are being adopted voluntarily by after-school programs across the nation, such as the YMCA, Boys and Girls Clubs, and Parks and Recreation centers.

Although research has indicated promise in implementation of such policies in after-school programs,^{2,3} a need for assessment of effectiveness still exists. Are the quality standards being implemented effective in increasing positive nutritional habits among children in ASPs? Until now, most research measured menu items *served* rather than what the children actually *consumed*. If implementation of such policies is to advance, evaluation of their efficacy will continue to be important. In 2014, Danville Parks and Recreation (P&R), a key partner in the Dan River Partnership for a Healthy Community (DRPHC), adopted the HEPAQS policies to improve the nutrition and physical activity of attending students. This study intends to compare the quality of snacks consumed at the after-school program sites before and after the HEPAQS were implemented. In addition, this study intends to evaluate whether or not the after-school program sites are successful in implementation of the policies they selected to adopt.

Childhood Obesity Trends

One of our nation's most pressing health concerns is obesity among children. The prevalence of childhood obesity has increased steadily over the past decade and a half from 14.5% in the year 2000 to more than 17% of children in 2012, and currently more than one in three children are overweight in the United States.⁴ It is well known that children who are overweight or obese are more likely to be overweight or obese as adults.⁵⁻⁷ In addition, obesity heightens the risk of developing chronic metabolic diseases,⁸ including diabetes,⁹ arthritis,¹⁰ cancer,¹¹ and cardiovascular disease.¹² The prevalence of overweight is greater among those living below the poverty line than those living above it; in addition, overweight may be increasing more rapidly among youth below the poverty line.¹³ Miech *et al.* found that the prevalence of overweight among adolescents in poor families was 23.3% versus 14.4% among those in non-poor families across both non-Hispanic whites and non-Hispanic blacks.¹³

Children living in low-income families are more likely to consume less fruit, spend more time watching television, and have a higher incidence of overweight.¹⁴ Children in health disparate regions, often of ethnic minorities, enjoy less availability of healthful foods and well-stocked grocery stores in addition to decreased access to health care services.^{15,16} Corner stores and gas stations are more likely to occupy economically disadvantaged regions, such as the Dan River Region, and these venues tend to offer mostly salty, sweet, processed foods rather than fresh fruits or vegetables.¹⁷ Lucan *et al.* determined that corner stores in a low income minority region in Philadelphia contribute a significant amount of calories for young people, but the corner stores offer no fruits, vegetables, or whole grains not high in added sugar, sodium, and fat.¹⁷ Not uncommonly, purchasing just one item at a corner store could result in consumption of more than the recommended daily allowance for added sugar, sodium, and fat.¹⁷ This is the

typical composition of corner store food items in a low-income, minority region.¹⁷⁻¹⁹ Access to such foods contributes to the poor diet quality of children which is associated with higher levels of obesity.

Obesity develops as a consequence of positive energy balance, or a greater number of calories consumed compared to calories expended.²⁰⁻²² The drivers of positive energy balance in children are lack of physical activity and caloric overconsumption often characterized by poor diet quality.²⁰ It is estimated that children consume an extra 110-165 kilocalories per day which contributes to energy imbalance and overall weight gain in youth.²³ Not only are children eating excess calories, but the quality of those calories is also lacking in nutritional value.²⁴ Children in the US are not meeting the recommended number of servings in each food group of the USDA Dietary Guidelines for Americans,²⁴ and their diets are high in sugar, sweets, and sweetened grains, yet low in fruits and vegetables.²⁵

The Dietary Guidelines for Americans recommend at least five servings of fruits and vegetables daily, yet these foods are lacking in the majority of American children's diets.^{24,26-28} The Youth Risk Behavior Surveillance reports that nationwide in 2013, only 33.2% of students had eaten fruit or drank 100% fruit juice two or more times per day the week before the survey occurred, and only 28.4% of students reported eating vegetables at least two or more times per day during the week leading up to the survey.²⁷ Current nutrition research suggests that increasing fruit and vegetable intake can help protect against obesity and chronic health conditions.²⁹ There exists a correlation between energy density of the diet and obesity, such that children who consume more energy dense snacks including added sugars tend to have higher rates of obesity than those who consume less of these items.²⁹ Conversely, children who

consume more quantities of fruits and vegetables tend to be leaner.²⁹ Many dietary interventions seek to increase fruit and vegetable intake according to the recommendations of recent research.

Not only are children failing to consume recommended levels of fruits and vegetables, but they are also overconsuming certain nutrients and food groups. The rise of energy-dense snacks and added sugar contributes to the obesity epidemic.^{29,30} The consumption of sugar-sweetened beverages among youth and adolescents has been on the rise and is associated with increased weight gain in children.³⁰⁻³² Regular soft drinks were the largest contributor to added sugars in children's diets in 1994-1996.³³ Between 56 and 85% of all school children consume at least one soft drink daily according to studies between 2000 and 2006.³⁴ Soft drinks are caloric yet do not promote satiety.³⁵ Reduction in consumption of sugar-sweetened beverages is associated with improvement of BMI in children.^{36,37}

Desserts are the number one contributor to snacking calories among US children, followed by salty snacks and sugar-sweetened beverages.³⁸ The diets of most children in the nation are overloaded with sugar-sweetened beverages, sweets, sweetened-grains,³³ and *trans*-fats.³⁹ While *trans*-fats naturally occur in meat and poultry, *trans*-fats from this source would normally only account for 0.5% of an average American's diet.⁴⁰ However, *trans*-fat consumption is between 2% and 3% due to the increase of processed and hydrogenated foods.⁴⁰ *Trans*-fats have been linked to increased coronary heart disease, and current dietary recommendations include eliminating added trans fats in the diet.⁴⁰ *Trans*-fat consumption is also associated with negative changes in lipoproteins, inflammation, and diabetes mellitus.⁴¹

We have seen a significant increase in calorie consumption over the past few decades, as well as a shift from eating meals at home to eating snacks away from home.⁴² Obese children

and adults consume significantly more food away from home as well as grain products, sugar-sweetened beverages, and potato chips.⁴³ Fast food restaurants tend to have higher levels of *trans*-fats and saturated fats as well as foods with high glycemic index and caloric density.⁴⁴ While restaurants and fast food joints are significant providers of food away from home, schools also provide many meals for children. Policies and programs have ensued in order to ensure that food consumed in schools is adequate nutritionally, as schools provide a significant proportion of children's daily nutrients.

Nutrition in Schools

To address childhood obesity through the lens of diet improvement, many schools nationwide have employed food and nutrition programs to improve children's diets in order to help prevent obesity. The National School Lunch Program (NSLP) and the School Breakfast Program help children from low income families achieve the recommended nutrition guidelines.⁴⁵ The programs are federally assisted programs which provide low-cost or free, nutritionally balanced meals which must meet standards set forth by the Dietary Guidelines for Americans.⁴⁶ The National School Lunch Program provided lunches to over 31 million children each school day in 2012.⁴⁶ Cash subsidies and USDA foods are awarded to the sites who participate in the program and abide by Federal requirements for foods served. An additional aspect of the program is that ASPs can also be reimbursed for snacks which comply with the regulations. In order to receive the reimbursement, programs must provide two of the following four snack options: one serving of fluid milk, one serving of meat or meat alternate, one serving of vegetables or fruit or full strength vegetable or fruit juice, and one serving of whole grain or enriched bread or cereal.⁴⁷ The ability of schools to implement policies beyond those of the

NSLP is limited; however, the afterschool environment is an area of potential improvement of diet quality which is not already bound by the institution of a federal program.

The major outcomes of studies reporting on the impact of nutrition policies in schools are menu composition in total calories, total fat and saturated fat, amount of sodium, weekly consumption of fruit and vegetable options (servings, pieces per day, grams per day), and a few reported on price of snacks on the menu.⁴⁸ Some of the studies in Jaime's and Lock's 2007 systematic review show some preliminary success of policy implementation, but this review called for further research to evaluate what type of policy was most effective and cost-effective.⁴⁸

While programs such as the National School Lunch Program have already been implemented to address healthy eating during the academic school day, snacks are often offered at after-school programs. In addition to reimbursement through the NSLP afterschool snack program, ASPs can receive reimbursement through the Child and Adult Care Food Program (CACFP) and the Summer Food Service Program (SFSP) as long as they comply with certain nutrition standards described by each program as well as the Education Code nutrition standards.⁴⁹ The CACFP has a federally funded At Risk Afterschool Meals component of its program which funds ASPs in low-income areas to serve a meal or snack to children.⁵⁰ To be eligible, the location of the ASP must be in the attendance area of a public school in which at least fifty percent of students are eligible for free or reduced price meals. Programs must comply with the meal pattern described in the CACFP handbook based on the Dietary Guidelines for Americans in order to receive reimbursement.⁵⁰ Generally the free snack reimbursement rate is \$0.82-\$0.84 per snack.⁴⁹ The SFSP of the Community Child Nutrition Snack Project is another reimbursement program through which school-age children 18 years old and younger can receive

snack at an ASP.⁴⁹ The NSLP, CACFP, and SFSP are the major programs which offer snack reimbursement in ASPs. Researchers and policymakers have expanded their efforts to address snacks in the after-school programs or extended day programs.

Nutrition in Afterschool Programs (ASP)

The afterschool period is often a gap of time in which many parents are still working yet children are released from school.⁵¹ Studies say that more than 15 million school-age children, or 26%, are on their own after school;⁵¹ the presence of after-school programs is a powerful way to help alleviate hunger, and do so in a healthful manner. Approximately 15% of children or 8.4 million children participate in afterschool programs,⁵² and parents indicate that there are 18.5 million more children who would be sent to an after-school program if a quality one existed in their nearby communities.⁵³ During the average three hours per day children spend at an after-school program, children are typically served a drink and/or snack, and they participate in various activities including doing homework, PA or games. These programs are often in session every day of the school year, and the majority of participating children are 6 to 12 years of age, or in elementary school.⁵² A characteristic of many ASPs is that they often serve a higher proportion of low-income, minority populations. This composition helps to ensure policy-makers are reaching a greater percentage of the at-risk population. In addition, school-based PA comprises less than half of children's daily activity, indicating a need to search elsewhere for settings in which children spend a great deal of time.⁵⁴ Therefore, public health policy-makers and researchers have in recent years adopted this new venue—after-school programs—as a means to promote nutrition and PA policies. Organization and execution of ASPs vary greatly and may be run by the school or school district, a faith-based organization, or private daycare provider. Additionally, many large umbrella organizations such as Boys and Girls Clubs, the

YMCA, and park and recreational centers offer ASPs in their communities. Given the substantial number of participating youth, ASPs have the potential to have expansive reach.

Since after-school programs have a far-reaching impact across the nation, they have recently become a venue for the implementation and analysis of childhood obesity interventions adapted for this setting. There are several advantages to addressing the nutritional and PA environment of after-school programs. ASPs can serve as an intermediary between parents who enforce healthier eating and their children.⁵⁵ Snacks contribute an average of 24% of children's daily caloric intake.⁵⁶ Typical snacks served in after-school programs are often highly processed, salty or sweet snacks such as chips, crackers, desserts, and cookies which are mostly empty calories.^{46,57,58} Snacks served in ASPs tend to be high in carbohydrates including sugar and high-fructose corn syrup yet low in fruits and vegetables.⁵⁷ Coleman *et al.* reports in their study of seven elementary schools and Boys and Girls Clubs in Kansas that the most common snack observed was bread or candy, while the least common was a fruit or vegetable.⁵⁷ Beets *et al.* assessed the nutritional quality and consumption of snacks served in an observational descriptive study of 20 randomly selected South Carolina afterschool programs in total serving over 1700 elementary students.³ Using direct observation, they found on average, desserts and flavored salty snacks were served most frequently at 2.7 ± 1.5 and 2.1 ± 1.7 days/week respectively. This finding is consistent with the other literature on ASP snacks in which sweet and salty snacks are the most-commonly served and consumed items in afterschool programs.⁵⁸ Fruits and vegetables were only served 0.6 ± 1.0 and 0.1 ± 0.3 days/week respectively in the South Carolina Beets study, while sugar-sweetened beverages were served 1.8 ± 1.8 days/week.³ Again, these findings parallel those of previous research that fruits and vegetables are least commonly served.⁵⁷ The researchers additionally reported that out of 20 ASPs observed, 18

served sugar-sweetened foods, 16 served artificially flavored snacks, and 14 served sugar-sweetened beverages.³ Only 2 of the 20 sites served water daily, and none of the ASPs served a fruit or vegetable daily although these policies were specified in the Healthy Eating Standards document. The researchers concluded that the nutritional quality of snacks at the ASPs failed to meet the Healthy Eating Standards of the HEPAQS which are the nationally recognized standards.

Snacks in afterschool programs are an important part of children's diets, filling the gap between lunch at school and dinner at home. Additionally, the snacks provided can give healthy examples of nutritious snacks, and ASP leaders can serve as effective role models to promote healthy choices.⁵⁹ The afterschool environment can be a place where sugar-sweetened beverages are not offered and screen time is limited—these restrictions may not necessarily happen, particularly if children are home alone.

Snack Policy Interventions in ASPs

Several studies measuring fruit and vegetable consumption as an outcome have touted that organizational policy change can effectively help children meet nutritional recommendations.^{58,60} In 2006, Cassady *et al.* examined the effectiveness of policy implementation in the after-school program setting among low-income and ethnically diverse elementary-school students, many of whom qualify for free or reduced-price meals.⁶⁰ The primary outcome of this case study was change in fruit and vegetable consumption after the snack menu was changed in the Students Today Achieving Results for Tomorrow (START) after-school program in the greater Sacramento region where the program serves approximately 8,000 children from low-income families. START receives reimbursement from the CACFP of

the USDA and adheres to the nutrition requirements to receive this reimbursement. Starting in 2001, the program adopted the Children's 5 A Day—Power Play! curriculum, and in 2002 changed their snack menus and vendor to increase fruit and vegetables served. The policy implementation seemed to be efficacious, as the new menu increased servings of fruit by 83%. The old menu provided only 0.6 servings of fruit daily, but the new menu provided 1.1 servings; the increase consisted of both juice and fresh fruit.

In a second policy intervention, the quality of foods and beverages provided at seven YMCA ASPs was investigated before and after the YMCA's participation in a YMCA Learning Collaborative (YLC) which invoked policy change regarding five YLC-specific healthy eating standards.⁵⁸ YMCA staff reported menus each day using a standardized data collection spreadsheet for the duration of one and one-half school years. The mean number of weekly servings of fruits and vegetables increased by about 3 servings per week post-intervention, and servings of water increased by about 2 per week. Servings of foods with trans fats decreased by nearly 2 servings per week post-intervention, and foods with added sugars decreased by 1.5 servings per week. The positive changes exhibited in these two non-HEPA policy-intervention studies were significant, and these results encourage further promotion of healthy eating standards in ASPs.^{58,60} However, these two studies only presented data on the menu items *served*, and there still existed a gap concerning actual consumption of fruits and vegetables after an ASP policy change.^{58,60}

Development of the Healthy Eating and Physical Activity Quality Standards

Until recently, no standard nutrition or physical activity policies existed for the after-school environment, and the previously reviewed literature demonstrates an opportunity to

improve snack quality in ASPs. Beets *et al.* conducted a systematic review published in 2011 that recognized the need for a national set of guidelines for policymakers and ASP providers to implement, given the variability of the existing policies.⁴⁶ Beets *et al.* argues on the premise that adopting clear nutritional guidelines across the board will have a greater impact because of the development of support systems and unity within ASPs who abide by the same policies.^{2,46}

To address the lack of policies and guidelines, in 2011, the Healthy Out-of-School Time (HOST) coalition convened to create what would be called the Healthy Eating and Physical Activity Quality Standards.¹ The coalition consisted of twenty-four major out-of-school time service and policy leaders and researchers (e.g. Wiecha) who met to develop a set of research-based standards for use in a variety of out-of-school time settings.¹ The overarching goal of the HEPAQS is to promote healthy behavior among children attending ASPs, and long-range goals aim to reduce prevalence of obesity.

The HEPAQS were developed to address all spheres of influence emanating from the social ecological model.¹ An ecological framework in the area of health policy takes into perspective the interaction of different levels of factors and relationships and how they affect health and nutrition.⁶¹ Levels of influence include individual or personal factors, social environment or community networks, physical environments or settings, and macro-level environments or sectors.⁶¹ Examples of individual-level factors include genetic composition and day-to-day choices. Social influences might include interactions with friends and family, clubs, groups, and organizations. The characteristics of the physical environment can strongly influence healthy eating such as availability of certain restaurants, farmers markets, and supermarkets. Lastly, the broadest level of influence could include economic policies and laws regarding food industry infrastructure, for example. Research in health and nutrition is calling

for an ever-more integrated approach, as health is heavily influenced not only by individual behavior and choices, but also by environmental conditions and wide-scale policies.

The final HEPAQS include eleven standards which emanate from various levels of the social ecological framework such as individual behavior, peer and family influences, social settings, and community and social policies.¹ The HEPAQS target both PA and nutrition at each of these levels. A full version of the HEPAQS can be found in Appendix A. This project is primarily focused on the nutrition standards, and *Table 1* gives examples of standards at the different levels. While the HEPAQS do intend to reduce the risk of obesity in children over time, the standards are not meant to reduce the prevalence of obesity quickly; they are only one of many efforts to promote healthy behavior among children.¹ The major nutrition standards of the HEPAQS, informed by current evidence-based dietary recommendations, are to serve a fruit or vegetable daily, eliminate sugar-sweetened beverages, not serve snacks with *trans*-fat, offer water as the primary beverage, avoid artificial ingredients, and not serve candy or other sugar-based foods. The content and quality standard to address best practices for snack quality is: “Programs serve foods and beverages in amounts and types that promote lifelong health and help prevent chronic disease. These include minimally processed foods made with whole grains and heart-healthy fats or oils and without added sugar or trans fats; fruits and vegetables; and beverages made without added sugars.”⁶²

The HEPAQS address not only specific recommendations for types of foods to be served, but also staff training and behavior, financial support, physical facility factors, and parental involvement.⁶² However, policy implementation is much more challenging than policy adoption. Policy change or adoption of a new policy itself is not adequate to elicit action to benefit the children, and often a support system, training collaborative, or some sort of partnership is

necessary to achieve desired results and effective changes at the level of youth behavior and snack consumption.^{2,3,46,57-59,63-67} Staff training is a major concern in policy implementation and is addressed in the HEPAQS. The HEPAQS detail that staff are to be regularly trained, participating in training for healthy menu development at least once per year. In addition, all training is to be comprehensive and evidence-based, and delivered by qualified trainers. Examples of social support practices include refraining from using food as a reward or punishment, modeling healthy eating through staff behavioral examples, and engagement of parents in the program's healthy eating agenda. Financial program support is encouraged through relationships with the Child and Adult Care Food Program, the National School Lunch Program, and the Summer Feeding Program. Lastly, environmental support practices seek to ensure that the physical environment including vending machines and advertising reflects the HEPAQS goals. In observing environmental support best practices, a program should not display posters or advertisements promoting unhealthy foods or beverages, eliminate access to unhealthful vending machines, as well as restrict screen time to avoid exposure to food marketing.⁶²

Table 1: Examples of HEPA Standards or Best Practices at Different Social Ecological Levels

Level of Social Ecological Model	Example Healthy Eating Standard or Best Practice
Content and Quality/ Consumption Level	• On a daily basis, the program serves a fruit or vegetable (fresh, frozen, canned, or dried without added sugar). • On a daily basis, the program offers water at the table during snack, and has water accessible at all times. • On a daily basis, the program serves no candy or other foods that are primarily sugar based.
Staff Level	• Appropriate staff (those charged with responsibility) receive training in healthy menu development at least once each year. • Staff members do not bring in/consume personal food or beverages in front of children other than items that would appear on the program's menu.
Social Support Level	• Food is not used as a reward or punishment. • Holidays and birthdays are celebrated with healthy items.
Program Support Level	• The program budgets appropriately for food costs based on a food and beverage program that addresses the standards above.
Environmental Support Level	• No posters or advertisements on the walls promote unhealthy foods or include logos or trademarks from companies that produce foods that do not support the healthy eating standards. • Students do not have access to vending machines that sell foods and beverages that do not support the healthy eating standards.

RE-AIM Framework

The higher levels of the social ecological model addressed in the healthy eating standards are intended to improve not only effectiveness but also implementation and maintenance of the adopted policies since aspects including staff training and program support are taken into consideration. The RE-AIM model, which intends to improve the process of translating research or policy into practice, highlights the importance of Reach, Effectiveness, Adoption, Implementation, and Maintenance.⁶⁸ The reach component is the degree to which the study participants represent the larger group from which they were drawn. A study with an effective reach would attain a large percentage of eligible participants who accurately represent the target group.⁶⁹ A program with an excellent reach would also attract those with greatest need for the intervention in their target population. Effectiveness refers to the degree to which the initiative

achieves the intended outcome while also minimizing any negative side-effects of the initiative. A policy intervention is effective if the new policies actually change behavior and lead to desirable outcomes. This leads us to the next component of the framework called “Adoption.” This concept pertains to how well the initiative could be employed in a “real-world” setting, costs and environment considered. How well could low-resource staff replicate an intervention? If a program could only thrive when directed by highly-trained staff with expensive instruments in a particular location, adoption of this intervention could be a serious problem for the non-research work force. Implementation refers to how well the program could be implemented regardless of cost, time, staff, and location. Implementation also focuses on staff fidelity to the program intervention guidelines. How well did the staff deliver the intervention or initiative as it was intended? Lastly, Maintenance refers to how well the program is sustained over time without extraneous input from researchers or lofty resources. The current study intends to assess the effectiveness of the Healthy Eating policy adoption among ASP sites, and it is part of a larger, on-going study which will assess implementation and maintenance of the policy adoption.

Adoption, Effectiveness and Implementation of the HEPAQS in ASPs

The National Afterschool Association adopted the HEPAQS in 2011, followed by the YMCA of the USA, Boys and Girls Clubs, and Alliance for a Healthier Generation.⁷⁰ Since the adoption of the HEPAQS standards, several studies have sought to determine the impact of adoption of the HEPAQS in ASPs.^{2,64-66} The scope of this current study includes evaluating the impact of the Healthy Eating standards portion of the HEPAQS. First, only one study focused on effectiveness of HEPAQS adoption at the child consumption level of snacks.² A second focus in the literature is the staff level, including staff training, menu development, and policy

implementation.^{28,64,65} Thirdly, the literature also describes barriers to implementation of the policies such as cost burden and lack of appropriate facilities.^{2,3,53,61,63,71}

The end goal of the HEPAQS is to impact individual youth behavior in order to promote lifelong health and prevent chronic disease such as obesity. Measurement of policy effectiveness can focus on consumption at the kid level such as fruit and vegetable consumption and avoidance of sugar-sweetened beverages. Beets *et al.* tested the effectiveness of the HEPAQS in a single group pre- and post-test trial implemented in four after-school programs through a partnership with a community grocery store in order to lessen ASP financial burden.² The overall goal of this trial was to evaluate whether these ASPs which participated in this partnership met the Healthy Eating standards. To determine the average servings of different types of snacks each week, they used a direct observation protocol to collect data on five random children per after-school program site who were observed during the entire snack time. The results of the study indicated that the ASP went from serving no vegetables and 0.1 ± 0.5 servings of fruit per week to 5 ± 0 servings of fruit and 0.6 ± 0.7 servings of vegetables per week. In addition, sugar-sweetened beverages and desserts were completely eliminated after the Healthy Eating Standards were employed.² The significant increase in fruit consumption per week by the ASP children shows that children will eat healthier snacks when they are provided, indicating promising results for further HEPAQS program interventions.² Successful changes resulted when the support system was enhanced—namely, the partnership with the local grocery store.

The differences in outcomes of policy intervention are dependent upon the establishment of support systems. The literature also includes a handful of articles which discuss staff level aspects of the HEPAQS, including staff training, menu development, and nutrition education components of policy adoption in ASPs.^{28,64,65} These aspects are one or more levels above the

snack consumption level in the ASPs, yet they facilitate consumption at this individual child level. In 2011, the YMCA of the USA, the nation's leading non-profit provider of child care, announced its devotion to creating a healthier environment for our children by adopting the HEPA standards in both their early learning and after-school programs.⁶⁴ The introduction of HEPA standards into the YMCA will impact more than 700,000 children and teens across the nation who participate in the YMCA's 10,000 programs.^{64,58} With such a broad reach, the YMCA is a valuable setting in which to evaluate the quality of foods and beverages offered. Weaver *et al.* was the first to study the effect of staff training on ASP staff behaviors in four YMCA ASPs serving approximately five-hundred children.⁶⁵ The researchers evaluated the change in staff behaviors regarding PA and healthy eating promotion in the ASP from pre-intervention to post-intervention. The intervention consisted of a professional development training, on-site booster sessions, and ongoing feedback and technical support via phone or email. Staff were trained on role modeling, promoting healthy eating, and safe food handling. Each ASP received three booster sessions on-site with real-time feedback and modeling of HEPA strategies. Lastly, the intervention provided weekly contact via phone, email, or in-person conversation for ASP site leaders to receive ongoing feedback and support. Healthy eating staff behaviors assessed included staff verbally promoting healthy eating, staff verbally educating children about healthy eating, staff eating inappropriate foods, staff drinking other than water, unsafe food handling, children preparing food, and children distributing food to other children.⁶⁵ The System for Observing Staff Promotion of Activity and Nutrition (SOSPAN) systematic observation instrument was used as the measure for staff behaviors related to the HEPAQS.²⁸ From pre- to post-intervention, staff verbally promoting healthy eating increased from 0% of the scans to 10.5%.⁶⁵ Staff consumption of inappropriate foods was observed only

4.5% of the scans compared to 42.1% pre-intervention. Staff consumption of beverages other than water decreased, and verbal education about healthy eating increased. The successful efforts to train and provide ongoing support to staff who were implementing the HEPA policies can serve as a model for future interventions to emulate. Staff training is an important support system to enhance the effectiveness and implementation of the HEPAQS. As this study was the first of its kind, more studies are necessary to continue to evaluate the impact of staff training on staff behavior.⁶⁵

Barriers to Implementation of Nutrition-Based HEPAQS

The literature describes various barriers researchers and policy implementers have encountered while putting the policies into action, including snack cost, staff training/labor, lack of appropriate facilities, and food procurement.^{2,3,53,61,63,71} The Beets study in 20 South Carolina ASPs also reported on cost per snack, finding that desserts and salty snacks cost \$0.27 to \$0.32 per snack while fruits and vegetables cost \$0.38 to \$0.40 per snack.³ Using methods to extrapolate these costs, it is estimated that serving a fruit or vegetable daily versus serving a dessert or salty snack would cost \$7,244 compared to \$4,877, a difference of \$2,367.³ Similarly, in a descriptive study reviewing the costs of snacks in 32 YMCA ASPs from 2006 to 2008, Mozaffarian *et al.* found that healthful snacks are more expensive than less healthful snacks on average; however, there were several affordable yet healthful options.⁵³ They determined that healthful snacks were on average 50% more expensive than their counterparts. Nonetheless, they found that carrots and celery as well as whole grains did not alter overall snack price, and they identified twenty-two snacks which met the nutrition recommendations as well as the reimbursement rate.⁵³ Their list of snacks could potentially be used by other ASPs seeking menu development to adhere to nutrition policies. Nanney *et al.* conducted a descriptive study to

explore implementation of the Institute of Medicine's Child and Adult Food Care Program (CAFCEP) recommendations for after-school snacks; they identified a list of snacks which meet the IOM's nutrition criteria, yet 50% of the items on the list had to be excluded due to cost.⁶³ Nanney *et al.* noted that single-serve fruit and vegetable containers were costly (\$0.40 each), and that often a wholegrain alternative was more expensive than the white refined version.⁶³

It is suggested that efforts should be focused on assisting program leaders in planning and purchasing snacks to meet the HEPAQS.³ On study attempts to remedy these financial concerns.² Beets *et al.* recommend that ASPs prioritize healthy eating and connect via partnerships as collective purchasing power may increase the ability of ASPs to purchase healthy snack options.² In testing the effectiveness of the HEPAQS implemented in four after-school programs, Beets *et al.* facilitated a partnership with community grocery stores in order to lessen ASP financial burden.² Intending to set an example for ASPs nationwide, Beets *et al.* calculates the cost of snack per child per day in order to display the success of the grocery store partnership even after implementation of the healthy eating standards. Although the baseline cost was \$0.26 per snack per child per day, the snack cost increased to only \$0.34 per snack per child per day after the HEPAQS were well underway. This amount was still below the ASP's budgeted amount of \$0.34 per snack per day. Beets *et al.* showed the value of a partnership with the local grocery store to serve the needs of the ASP, as this was the first study to demonstrate that these standards can be effectively implemented without increasing the financial burden for the ASP.

Other barriers to implementation of the healthy eating standards were lack of access to appropriate food facilities and food labor issues.^{61,63,71} For example, among YMCAs adopting the new standards, lack of refrigeration for fresh produce is problematic.⁶⁴ Concerns among YMCA leaders include that children will not take all of the fresh fruits and vegetables provided,

and that lack of refrigeration storage space will cause those items to be discarded and money to be wasted.⁷¹ Access to kitchen facilities such as a refrigerator and running water is essential in safe preparation of many fresh foods.⁷¹ In addition to facilities, staff must be educated to safely handle food and carry out menu policy changes, increasing labor costs and skill demands on staff.^{61,63} This is particularly problematic coupled with high levels of staff turnover seen in many ASP settings.⁷¹ Wiecha *et al.* conducted a qualitative research study to investigate perceptions of healthy eating among ASP leaders.⁷¹ Adequate training is a support system which is necessary for successful policy implementation; interviews conducted by Wiecha *et al.* concluded that training was a major theme among ASP leaders.⁷¹ Staff must be trained to not only prepare and serve healthy foods but also how to purchase them as well. Participants in the interviews requested ongoing training and education for improving snack administration.⁷¹

Conclusions

The previous studies in the field have indicated that there is a considerable need for improvement of snack quality in ASPs which commonly serve salty snacks, desserts, and foods high in carbohydrates and sugars.^{46,57,58} Studies which have employed nutrition policies in ASPs have indicated positive outcomes including increased fruit and vegetable consumption and decreased sugar-sweetened beverage consumption when implementation was coupled with a support system such as a grocery store partnership or training collaborative.^{2,58} Training collaboratives have been shown to improve staff adherence to the HEPAQS in one intervention, yet additional studies are needed to confirm their findings.⁶⁵ An early study has reported success in alleviating the snack cost barrier through a partnership with a local grocery store.² Numerous additional barriers have been identified which impede the process of HEPAQS implementation and further research is necessary to address these challenges.

Overall, only two studies have assessed the effectiveness of the HEPAQS through a pre/post-policy adoption design.^{2,65} The first focused on the effectiveness of a community partnership to assist the ASPs in meeting the HEPA standards and the primary outcome was a significant increase in the number of fruit and vegetable servings and a decrease in servings of SSBs and desserts.² The second was a pre- and post-assessment staff-training intervention designed to support ASP staff implement the adopted HEPA standards in four YMCA programs, and the primary outcomes of this study were an increase in positive staff behaviors identified in the HEPA standards.⁶⁵ Both of these studies were limited in that they did not examine any control or comparison sites, and that they studied a relatively small number of ASPs (four per study). As the HEPA standards continue to be adopted across the nation, additional studies regarding effectiveness and implementation of the standards in various populations or geographic areas is necessary.

Measurement of Snack Behavior in ASP Settings

Assessment of the snack consumed, the snack environment, and the quality of snack are all important to the understanding of the potential impact of the HEPAQS. The measurement of impact can focus on observation of snack consumption in youth at the ASP or on staff implementation of the policy. Direct observation and a modified version of the quarter-waste method were employed by Beets *et al.* when they were characterizing the typical ASP snack environment³ and also in their pre- and post-assessment of HEPAQS adoption.² Weaver *et al.* employed the System for Observing Staff Promotion of Activity and Nutrition (SOSPAN) in evaluating their comprehensive staff training.⁶⁵ These measurement methods intend to capture data regarding the effectiveness of the HEPAQS either at the child consumption level or at the staff behavior level.

There are several different techniques employed to measure the nutritional quality of snacks served and consumed at after-school programs. Included in these methods are the weighing method, photograph method, menu assessment, dietary recalls, and direct observation.^{59,72,73} Menu assessment has been used to evaluate the nutritional quality of snacks, but this method has been shown to be inferior to direct observation.⁷² A dietary observation system was developed by Ball *et al.* and was found to be reliable; direct observation is now considered the gold-standard measure for use in child care settings.⁷² Observers were all trained by a Masters level registered dietitian. Trainees repeatedly practiced portion-size estimates in the laboratory and in the real-world setting. Laboratory training consisted of using standardized measuring cups and spoons for accurate portion estimation. In addition, trainees observed food and beverage consumption for two days in a child-care center. Data collection required that all children were counted and child 1, 3, and 5 were selected for observation—a random, systematic form of selection.⁷² Observers noted distinguishing characteristics of each child observed as a memory aid for easy identification. Children were not aware of any labeling so as not to interfere with their normal routine or induce a Hawthorne effect. Observers were instructed to collect direct observation data discreetly so as not to influence data outcomes. Quantity and type of foods and beverages were recorded on the Diet Observation Form, and to avoid ambiguity, observers were instructed to verify menu items served with the cook or site leader. The direct observation system evaluated in this study proved to be reliable, as the average inter-rater reliability coefficient was 0.992 among all five observers. Direct observation has not only proven to be a reliable method of assessment of food and beverage intake in child care, but it also is now considered the gold standard in this setting for dietary assessment.⁷²

The weighing method, although most accurate, is expensive, time-consuming, and labor intensive.⁵⁹ An accurate scale is needed, and food often has to be weighed before and after consumption. In the photograph method, it is difficult to keep track of students' plates to compare before and after photos. Surveys such as food-frequency questionnaires or dietary recalls suffer from response bias.⁵⁹ Children often have trouble remembering previous food consumption.⁷⁴ Direct observation methods are often less costly, require less labor and space, and yet they can be accurate when compared to the weighing method.⁷⁴ However, there are several different types of direct observation protocols, of which the quarter-waste method has been determined to be the most accurate.⁵⁹ The quarter-waste protocol is a visual estimation method in which an observer determines whether none, 25%, 50%, 75%, or 100% of a food or beverage item was consumed. In the study validating the quarter-waste method, observers were trained using protocols and photographed examples unless they had prior experience.⁵⁹ The quarter-waste method was tested on tray waste from 197 trays from school lunch. This method had a reliability of 0.90, compared to the half-waste and photograph methods which had reliabilities of 0.83 and 0.48 respectively. The photograph method was not reliable for food and beverage items in cartons or packages through which the observers could not see the waste. In addition, the photograph method was also more time consuming and costly than the quarter-waste method. The quarter-waste method proved to be the most cost-effective, reliable, and accurate visual method for dietary observation.⁵⁹ However, all methods of visual observation should acknowledge the presence of possible biases in behavior due to the obtrusive presence of researchers or change in schedule or environment. In any observation protocol, researchers should seek to remain as concealed as possible so as to minimize bias due to the Hawthorne effect. The quarter-waste method has been used in various studies to determine plate-waste.⁷⁵⁻⁷⁷

In a study to determine the amount of milk wasted in eleven Oregon school cafeterias, the quarter-waste method reliably predicted the amount wasted within one gram of the actual weight obtained by weighing the milk waste.⁷⁷

Specific to the HEPAQS focus on staff implementation, Ajja and Beets developed an assessment called the Healthy Afterschool Activity and Nutrition Documentation (HAAND) instrument.⁷⁸ The HAAND tool is designed to be completed in one visit by trained observers using direct observation and a quick interview with the site leader. The HAAND tool reliably captures the quality of the PA and nutrition in after-school programs.⁷⁸ A full version of the HAAND tool can be found in Appendix B. It captures not only the content and quality of the snack but also data about staff modeling behaviors and involvement. Items on the nutrition portion of the HAAND tool include what was served for snack, presence of outside food, staff modeling behaviors, access to vending machines, staff training, nutrition curricula, and presence of ongoing evaluation.⁷⁸ Each item is given a numerical score, then the total points across all items indicate the total score for the ASP. The median kappa value for inter-rater reliability of the HAAND tool was 0.92, and the values ranged from 0.70 to 1.0; the field observers' median percent agreement was 95%. Items on the HAAND tool address what was served for snack, whether children brought outside food or drinks, whether staff ate or drank foods other than the official snack in front of the children, and if children are allowed to bring electronic media devices.⁷⁸ The HAAND tool can be used to indicate the degree to which the ASP fosters an obesogenic environment.⁷⁸

Reliable and valid tools exist to observe and measure snack quality and adherence to the HEPAQS. Of the direct observation methods, the quarter-waste method is simple and cost-effective, yet accurate for determining plate waste. The HAAND tool captures additional aspects

of the HEPAQS including staff involvement and modeling behaviors. It has been used to reliably capture the physical activity and nutrition environment in ASPs. This current study employed modified versions of the quarter-waste method and the HAAND tool in order to collect information on snack quality using direct observation.

Gaps in the Literature

The dilemma of childhood obesity must continue to be addressed, as over one in three children in the nation are overweight and 17% of children are obese.⁴ Positive energy balance driven by poor diet quality and lack of physical activity can be addressed through the venue of afterschool programs, which are growing in number and attendance across the nation, serving over 8.4 million US children.⁵² The previous studies in the field have indicated that there is a considerable need for improvement of snack quality in ASPs which commonly serve salty snacks, desserts, and foods high in carbohydrates and sugars.^{3,46,57,58} The HEPAQS adopted by the NAA in 2011 serve as a set of common policies among ASPs which address multiple levels of influence emanating from the social ecological model.¹ Two descriptive studies presented on typical ASP environment or cost burden of snacks but did not assess changes from pre to post-policy.^{3,53} Only two studies reported pre- and post-assessment policy adoption data;^{2,65} the first assessed snack consumption before and after policy adoption² and the second assessed staff behavior pre- and post-policy.⁶⁵ Neither of these two studies had a control group, and the number of adopting ASPs was only four in each study. Additionally, to my knowledge only one study to date has reported on “outside” foods, or non-program foods children bring from home, the store, or vending machines and how these foods compare to foods served at the afterschool program, yet this study was not assessing the HEPAQS.⁷⁹ Given the limited number of HEPA policy adoption studies, further research assessing policy effectiveness is needed in varying

populations or locations across the nation. Furthermore, additional studies are needed in order to compare the quality of program-served snacks compared to non-program snacks.

The HEPAQS have been established; now the questions remains whether these standards can be achieved, whether they can impact the behavior of youth who participate in the afterschool programs, and whether those healthy changes can be maintained. There is an appeal for evidence which determines the impact of HEPA policy implementation on the quality of snacks served and consumed in ASPs. Such evidence will enhance implementation and understanding of the HEPA policy adoption as well as provide rationale for policy adoption by future programs.

Aims, Hypotheses, and Research Questions

Primary aim: Determine the effectiveness of the adopted HEPAQS Healthy Eating Standards by comparing the quality of snacks served at the after-school program sites before and after the HEPAQS policies were implemented. It was hypothesized that the sites would meet their adopted policy goals for beverage consumption by serving no sugar-sweetened beverages and offering water at all times. Specifically, it was hypothesized that they would meet the policy standards for pre-packaged snacks by including whole grain items without *trans*-fats. The hypothesis included that the ASP sites will meet their adopted goal of serving a fruit or vegetable weekly and offering no candy or fried salty snacks on a daily basis. The hypothesis that sites would meet all adopted standards was based on the fact that sites were able to choose which of the Healthy Eating standards to adopt and start implementing them in a step-wise fashion; since sites adopted the goal of serving *weekly* fruits or vegetables instead of *daily*, it was hypothesized that sites would meet this lesser goal.

Research Questions:

Do snacks offered at the ASP sites satisfy the adopted Healthy Eating Standards?

Specifically, did the ASPs meet goals stated in the adopted HEPAQS for each of the following:

- a) Serving fruits and vegetables weekly
- b) Eliminating snacks with trans fat
- c) Offering water at all times
- d) Serving no candy or other foods that are primarily sugar based
- e) Emphasizing healthy beverages including low or nonfat milk, plain or naturally flavored non-carbonated water, and 100% fruit juice limited to an 8 ounce serving
- f) Serving no beverages made with caloric sweeteners including sodas, juices, juice drinks/ades, sports drinks, or iced teas
- g) Serving nutrient-dense snack options made with whole grains and without trans fats
- h) Offering no fried salty snacks such as potato or corn chips offered regardless of type of oil used in cooking, and
- i) Avoiding foods and beverages with artificial sweeteners, flavors, or colors?

Secondary aim: Describe the overall quality of snacks served at policy-adoption sites and comparison sites from pre- to post-policy adoption. It was hypothesized that there would be no change in the quality of snacks from pre- to post-policy among comparison sites since these sites were not adopting any policy changes during the period of time in which data was collected. It was beyond the scope of this study to test for statistical differences between policy-adoption sites and comparison sites. Rather, the goal was to describe the comparison sites in light of the snack quality data collected.

***Tertiary aim:* Explore the nutrient quality of snacks served in the afterschool programs compared to non-program snacks children brought from home, stores, or vending machines across both policy-adoption and comparison sites.** It was hypothesized that program-served snacks would be generally healthier than non-program foods children brought from home, stores, or vending machines. Specifically, it was hypothesized that non-program snacks would consist of more sugar-sweetened beverages and desserts compared to program-served snacks.

CHAPTER 2

METHODS

Study Area

The Dan River Region (DRR) in south central Virginia and north central North Carolina suffers from a disproportionate burden of obesity and chronic disease along with economic and educational disadvantage.^{15,80} Included in the DRR, which spans more than 1800 square miles and three large rural counties, are Pittsylvania County and Danville City of Virginia as well as Caswell County of North Carolina.⁸¹ The Dan River region experiences health disparities due to lower socioeconomic status, lower educational attainment, and a higher minority population of its residents.

Danville experiences unemployment rates higher than the average rate for the state of Virginia (*Table 2*). In addition, only 13.9% of residents in the Dan River region have obtained a bachelor's degree or higher; this is well below the state average of 34.7%.²⁶ Similarly, only 17.2% of the population of the City of Danville and 9.0% of Caswell County, North Carolina has acquired a Bachelor's degree.²⁶ Individuals with lower levels of education tend to have higher rates of mortality due to preventable causes than those with higher educational attainment.⁸² Education, in fact, is actually a stronger predictor of mortality than other factors including occupation and income.⁸² Similarly, the proportion of persons living below the poverty level in Pittsylvania County, 15.2%, is higher than the state average of 11.7%,²⁶ while 25% of the population of the City of Danville lives below the poverty line.²⁶ The median 2013 household income in the City of Danville was only \$30,786, \$35,315 in Caswell County, and in Pittsylvania County was \$42,143 compared to the national average of \$53,046.²⁶ There exists an unequal burden of obesity among ethnic minorities. African American and Hispanic children are most-

likely to be enrolled in after-school programs.⁶¹ Ethnic and racial minorities make up a larger percent of the population in this region than state and national percentages.²⁶

Table 2: Demographic Characteristics of Dan River Region in which Afterschool Program Sites Reside

Site	% Black or African American Alone (2013)	% White Alone (2013)	Median Household Income (2009-2013)	% Persons in Poverty	% of Persons aged 25 years+ in 2009-2013 with a Bachelor's degree or higher
Caswell	33.4	64.2	\$35,315	25.5	9.0
Danville City	49.3	47.7	\$30,786	25	17.2
Pittsylvania	76.3	21.8	\$42,143	15.2	13.7
Virginia	19.7	70.8	\$63,907	11.7	35.2

Not only does the DRR possess a higher burden of chronic health conditions, but it is also medically underserved.⁸³ Hill, You, and Zoellner demonstrate through a random digit dial validated telephone survey that residents in the DRR had higher BMIs and greater prevalence of obesity (36%) compared to state averages (29%).⁸⁰ Additionally, results of their study indicated that only 9% of the DRR population reported adequate fruit and vegetable intake with regards to meeting recommendations, while 27% of Virginians and 23% of Americans as a whole reported meeting fruit and vegetable consumption recommendations.⁸⁰ The National Survey of Children's Health in 2011 found that 29.8% of Virginia's 10 to 17 year olds were overweight or obese.⁸⁴ In Caswell County of the DRR, over 30% of children ages 5 to 11 were obese in 2012.⁸⁵ Pittsylvania County and Danville City are ranked 79th and 126th respectively of 133 Virginia counties in the Robert Wood Johnson Foundation County Health Rankings.⁸⁶ It is known that the severity of obesity and obesity-related outcomes is greater among rural residents compared to urban residents.¹⁵ Rural residents often face challenges accessing facilities such as gyms, recreation centers, grocery stores, and physicians.¹⁵ Areas in the Dan River Region have been

identified by the US Department of Health and Human Services as medically underserved areas (MUAs).⁸⁷ MUAs are designated as areas which have limited access to primary care services and they include groups of census tracts with a low population-to-provider ratio based on the Index for Medical Underservice.⁸⁷

These statistics highlight the need for continued health interventions in the DRR. Efforts to improve healthy eating and PA practices in this region are challenging, yet significantly vital. One organization established with the purpose of promoting an environment which supports healthy eating and PA in the DRR is helping to mitigate these disproportionate burdens in the DRR: the Dan River Partnership for a Healthy Community.⁸¹ The after-school program sites included in this study were identified and contacted through the Dan River Partnership for a Healthy Community (DRPHC) which includes community partners, local organizations, and leaders involved in several ASPs.

The DRPHC is a local Virginian community-researcher partnership with the goal of promoting an environment which supports healthy eating and PA in the Dan River Region (DRR) of south central Virginia and north central North Carolina.⁸¹ The mission of the DRPHC is to reduce obesity in the DRR. Danville Parks and Recreation and Danville Boys and Girls Club are members of the DRPHC and they work closely with researchers from Virginia Tech to improve the health of the DRR. Danville Parks and Recreation autonomously decided to adopt portions of the HEPAQS for use in their ASPs, as described in *Table 4*. This provided us with an opportunity to conduct a natural experiment in which we examine the effect of policy adoption in the selected ASPs in the DRR.

Study Design

This study was a natural experiment, taking advantage of the adoption of HEPAQS by Danville Parks and Recreation. Using a pre- and post-assessment design, the purpose was to determine the effectiveness of the recently adopted HEPAQS in three adoption sites and two comparison sites. As part of an interrupted time-series framework which will continue for a second phase of data collection regarding policy implementation, data were collected at different points along a time continuum with the “interruption” being the adoption of the HEPAQS at policy adoption sites during the summer of 2014. The interrupted time series design is appropriate in program evaluation settings to determine whether the treatment group, in this case the policy-adoption group, differs from its baseline trend more so than the comparison group does with its baseline data.⁸⁸ The pre-and post-policy data collection periods were separated by a summer vacation during which the ASPs were not meeting. We were able to assess effectiveness by comparing snack quality at baseline to quality after policy adoption among three adopting sites and two comparison sites. Snack quality was observed by means of a direct observation tool employing a modified quarter-waste method.⁵⁹ This method allows the observer to estimate whether none, 25%, 50%, 75%, 100% or multiple servings were consumed for a particular food or beverage item. The type of snack, brand, and quantity provided was also recorded. In addition, for each visit at each site, notes were made regarding the official snack served by the after school program staff as opposed to snacks brought from home or the vending machine. Aspects of the HAAND tool were also employed to help monitor staff behavior, electronic media usage, and snacks children brought from home.⁷⁸

Training and Fieldwork for Nutrition-Related Data Collection

Each observer participated in a training session for data collection which familiarized the observers with data collection tools and procedures. During this session, research assistants were familiarized with the tools and paperwork used in recording observations. This included parts of the HAAND tool as well as instruction with visual estimation of snack consumption using the modified quarter-waste method. First-time data collectors were able to practice in the field with other more seasoned researchers before beginning to collect data to be counted in the analysis.

A team of two researchers performed snack observations at each site; one observer recorded snack information for five random boys while the other recorded the same for five random girls. The purpose of this was to ensure gender equality in our samples, yet we did not look for differences among boys and girls in the resulting data as other research in the field did not stratify by gender.^{2,3,65} The observers were instructed not to interfere with normal snack operations while collecting data. If children of different age groups ate snacks at different times, researchers would spread out their observations among children of different ages yet still within the target range of 5-13 years of age. Snacks were provided at different times among the five after school programs, as the order of activities differed between sites.

Sites were visited for baseline data collection for five weeks during April and May of 2014. Each site was visited a total of ten to fourteen times during the after school time slot of 3:00-6:00 p.m. Follow-up data after adoption of the HEPAQS policies was collected for six weeks during September and October of 2014. During follow-up data collection, each of the five sites were visited a total of ten times. All study activities were approved by the Virginia Tech IRB.

Study Sites

Two community partners, Danville Parks and Recreation and Danville Boys and Girls Club worked with us to allow data collection at their ASP sites.

Table 3: Descriptive Characteristics of ASP Policy-Adoption Sites (1-3) and Comparison Sites (4-5)

ASP Site	Typical No. of Kids per day	Typical No. of staff per day	Regular Snack Time?	Access to Vending Machines?	Access to outside food store?	Water fountain?	Activity Areas	Snack Funding Sources
1	10	2-3	✓	✓	No	✓	Indoor gym, outdoor playground	Purchased
2	10-20	2-3	✓	No	No	✓	Indoor gym, outdoor playground	Purchased
3	10-12	1-2	No	No	✓	✓	Indoor gym, outdoor playground	Purchased
4	30-50	3-4	✓	✓	No	✓	Indoor gym	Donated and Purchased
5	50-70	4-5	✓	✓	No	✓	Indoor gym, outdoor playground	Donated and Purchased

Policy Adoption Sites

The policy adoption sites were three different Parks and Recreation (P&R) ASPs in the Dan River Region, labeled Sites 1, 2, and 3 for the purpose of this study. The P&R ASP at Site 1 was a small but very structured and organized program. The Site 1 program ran from 2:30 to 6:00 p.m. and children arrived around 2:45 in two batches. Kids congregated in the activity room for snack and homework which lasts about 30 minutes. After snack and homework, children

participated in activity and free play. This site has an indoor gymnasium, activity room or multipurpose room, and an outside play area including fields and playground equipment.

Children arrive around 2:35 p.m. at Site 2 and could stay until 6:00 p.m. Upon arrival, children had homework time and snack for one hour. After this hour, free play or free activity time was available. This site had several activity areas including a gym, outdoor blacktop, swings, playgrounds, and a grassy field.

Site 3 was a drop in/walk in recreational facility that operated from 3:00 to 8:00 p.m. Children signed in when they arrived, and the age ranges were 5-11 and 12-16 years old. Site 3 had the most open-ended structure of all the sites. Occasionally, there was some programming with speakers and activities, but most of the program was unstructured, supervised free play. Site 3 did not always offer an official program snack nor official snack time, and children could go off-site to purchase snacks at a nearby corner store.

Comparison Sites

For a stronger evaluation of the adoption by Parks and Recreation, we asked two local Boys and Girls Clubs in the Dan River Region (labeled Site 4 and Site 5) to serve as comparison sites. These sites serve similar kids of similar demographics and had not specifically adopted the HEPAQS policies or significantly changed their operating procedures during the duration of our study. Site 4 operated from 3:00 to 6:00 p.m., serving children between 6 and 18 years old, but the majority of children at Site 4 were less than 12 years old. Children arrived via transportation just after 3:00 p.m. in two batches. Upon arriving from the bus, children lined up to sign in, then they proceeded to select a snack offered on site. Children had access to a multi-purpose room area, a gymnasium, video game room, computer room, and homework room. The homework

and computer rooms operated in shifts, such that only a small group of kids (about 15) had access to those rooms at one time.

Site 5 was the largest site, but very organized. The site was open from 2:30 to 6:00 p.m. and all students were signed in and organized by age group into various areas. There were three homework room areas, one of which contained a computer lab. Snack time was organized by age group, and the youngest children (ages 5-7) ate first around 4:00 p.m., followed by the older kids. Children lined up for snack and it was passed out one-by-one by site volunteers. Most of the children were usually encouraged to finish their homework before their corresponding snack time and then they move on to free play.

Sequence and Adoption of the HEPAQS by Parks and Recreation

As previously mentioned, the ASP program director and other P&R leadership decided to adopt the HEPAQS. Thus, the Healthy Eating policies were reviewed by the ASP director, selected, and ‘adopted’ through a revision of the staff handbook, ASP menus, snack offerings, and schedule at each site. *Table 4* compares the original Healthy Eating Standards to those adopted by P&R. Baseline data collection took place over five weeks during April and May, 2014. The policies were formally adopted over the summer months, handbooks rewritten, and staff updated on policy changes when returning to programs in the fall. Post-policy adoption took place over six weeks from September to October 2014. Sites had been open and running for approximately one month when post-policy data collection occurred.

Table 4: Adopted Healthy Eating Standards Compared to Original HEPAQS Healthy Eating Standards

HEPAQS Healthy Eating Standards	Adopted Standards
1. Daily serve a fruit or vegetable.	✓ weekly basis
2. Offers water at the table during snack, and has water accessible at all times.	✓
3. Only serve foods made without trans fats.	✓
4. Serve beverages without caloric sweeteners.	✓
5. Serve no candy or other foods that are primarily sugar based.	✓
6. Portion size control and variety of items offered each day.	✓
7. Accommodates dietary restrictions related to allergy, food intolerance, religion and culture	None
8. Emphasizes nutrient dense options including whole grains, lean protein foods, and no trans fats.	✓
9. Emphasizes healthy beverages [low or nonfat milk; plain or naturally flavored non-carbonated water; and 100% fruit juice (limit to 8 oz serving)]. -No limits on low/nonfat plain milk or water.	✓ Only offers unlimited water
10. Serves no foods that are deep fried, par fried or flash fried unless healthy oil was used. -Does not offer fried salty snacks such as potato or corn chips	✓ Does not specify regarding deep fried, par fried, or flash fried foods.
11. Avoid foods and beverages made with artificial ingredients (sweeteners, flavors, or colors).	✓
12. Is based on a minimum 2 week cycle, and ideally a 4 week cycle to maximize variety.	None

Analysis

Descriptive information regarding each ASP was collected during the initial visit to each site. Information collected included access to vending machines, water fountains, and non-program food, ASP activity routine, and media device policies. For the purpose of this study, non-program food was defined as any food not offered or served by the ASP; it was either brought from home, purchased off-site, or purchased from a vending machine on or off-site. Ongoing descriptive data, which included what was served for snack, the presence of non-program food, and if staff consumed non-program foods in front of the children, were collected

at each visit using the HAAND tool. These descriptive data were not scored or entered into an analysis program; rather, they were used as descriptive information.

NDSR

Snack observation data including brand, quantity, and amount consumed were entered into Nutrition Data System for Research (NDSR) software developed (2011) by the Nutrition Coordinating Center (NCC), University of Minnesota in Minneapolis, MN. All records underwent a quality assurance data check by another research assistant. The NDSR software is designed for 24-hour dietary recalls, food records, menus, and recipes, and it contains over 18,000 foods including about 8,000 brand name products. The software can be used for calculation of the nutrient composition of diets, meals, or snacks.

Each snack observation entry in NDSR consisted of the food and beverages consumed by one child on one date they attended the ASP. Within ASP sites, snack observation entries were also separated by program and non-program foods. The compilation of individual entries for each site was analyzed via the Average Total Nutrient Report and the Averaged Food Group Servings Report in NDSR. NDSR produced different reports for each ASP site for both program and non-program snacks consumed.

Upon the occasion that the brand consumed was not listed in NDSR, the closest possible substitution was made by comparing nutrients of the consumed food/beverage with those available in NDSR. For example, the “Flamingo” brand juice box is not one of the brands included in NDSR, so we substituted the corresponding flavor of Libby’s Juicy Juice for these items. If an observer did not include quantity provided or amount eaten during data collection, the item could not be entered or coded into NDSR due to lack of necessary information.

Additionally, if a child was served a snack item but did not consume any of it, there was no way to record this data in NDSR as this software does not allow for entries in which none of the food was consumed.

NDSR divides food groups into subgroups encoded by different ID codes. NDSR will automatically calculate servings of these five food groups via the Food Group Report: fruits, vegetables, grains, dairy, and sweets. *Trans*-fat and energy (kilocalories) were obtained from NDSR's Averaged Total Nutrient Report. In order to perform the appropriate calculations for other categories, the subgroups and ID codes listed in Appendix C were used to define the necessary variables.

Calculations

For program food calculations, average daily servings, grams, or ounces of food or beverage items were calculated by taking the daily average for each observation day at the site, adding together the total number of daily averages, and dividing by the number of visits at each site. Therefore, the reported means were an average of the daily averages for each site, and the standard deviations (SD) were calculated using the standard deviations of the list of daily averages for each site. Data were categorized and analyzed not only by pre- versus post-policy adoption, but also by site and by program versus non-program snacks. T-tests between pre- and post-policy data for program-served snacks were calculated using the list of daily averages for each food group or item per site, comparing the list of pre-policy daily averages to post-policy daily averages.

For non-program snacks, the average of all the non-program snack observations was calculated rather than taking the daily average of each item at each site since the number of non-

program snack observations was relatively small compared to the number of program food observations. Similarly, the whole list of non-program snack observations was used to calculate standard deviations for non-program snacks. T-tests between program and non-program snacks were performed between the list of daily averages for program snacks and the whole list of non-program snack observations for each snack item/food group at each site.

In order to determine if the data was affected by any outliers, medians were also calculated for program-served snack data both pre- and post-policy for eleven variables: water, SSBs, artificially sweetened drinks, fruit, 100% fruit juice, vegetables, grains, whole grains, grains with some whole grains, dairy, sweets, and snack chips. Median values were very similar to mean values; therefore, mean values were used for hypothesis testing.

To test the hypothesis that the ASPs will meet their adopted policy goals, descriptive statistics were used to calculate the mean post-policy adoption servings and compare to the recommended servings listed in the adopted HEPAQS for each of the following food groups or food items: energy (kilocalories), fluid ounces of water, fluid ounces of sugar-sweetened beverages, fluid ounces of artificially sweetened beverages, servings of fruits, servings of 100% fruit juice, servings of vegetables, servings of grain, servings of whole grain items, servings of grain items with some whole grains, servings of dairy, servings of sweets, servings of fried salty snacks (snack chips), and grams of trans fats. To determine if there was any change between pre- and post-policy adoption, an unpaired t-test with an alpha value of 0.05 was used to compare the mean servings or grams of food items or groups listed above between pre- and post-policy data among both comparison and policy-adoption sites. An unpaired t-test was necessary since the number of data points from snack observation differs from pre-to post-policy adoption. The t-tests were conducted between the pre-policy daily averages and the post-policy daily averages

for each food/beverage item at each site. To test the hypothesis that program food will be generally healthier than outside-foods children brought from home, stores, or vending machines, an unpaired t-test was conducted with an alpha value of 0.05 to compare the mean servings of fruits, vegetables, sugar-sweetened beverages, and sweets in the program versus non-program foods consumed. The t-tests were conducted between the post-policy daily averages of program-served snack items and the overall averages of non-program snack items.

CHAPTER 3

RESULTS

Snack Observations

During pre-policy data collection, which took place for five weeks during April and May 2014, research teams visited each site between ten and fourteen times and performed a total of 531 children's snack observations across all sites. During post-policy data collection, which took place for six weeks during September and October 2014, research teams visited each site ten times and performed a total of 412 children's snack observations (*Table 5*).

Table 5: Snack Observation Data Points Across 5 ASP Sites

Baseline Pre-Policy Site Visits					Post-Policy Adoption Site Visits			
Site	No. Baseline Site Visits	No Boys' Snacks Observed	No. Girls' Snacks Observed	Total No. Children's Snacks Observed	No. Post-Adoption Site Visits	No Boys' Snacks Observed	No. Girls' Snacks Observed	Total No. Children's Snacks Observed
1	11	47	53	100	10	39	47	86
2	12	59	58	117	10	47	48	95
3	10	41	39	80	10	21	19	40
4	10	45	49	94	10	49	47	96
5	14	70	70	140	10	47	48	95

Primary aim: To determine the effectiveness of the adopted HEPAQS Healthy Eating Standards by comparing the quality of snacks served at the after-school program sites before and after the HEPAQS policies were implemented.

Table 6 includes the baseline and post-policy snack consumption per day at policy-adoption sites (Sites 1, 2, and 3). Unpaired t-tests were used to test the difference between pre- and post-policy means, generating the resulting *p* values. Significant *p* values are bolded. The mean energy (kilocalories), fluid ounces of water, fruit servings (total), and fluid ounces of 100% fruit juice changed significantly from pre- to post-policy data collection among the policy-adoption sites. Site 2 exhibited a significant increase of 2.09 fluid ounces from a baseline consumption of 1.78 ± 2.12 fluid ounces ($p=0.037$) of 100% fruit juice post-policy, which in turn increased total fruit servings at this site by the same amount. At Site 3, there was a significant decrease ($p=0.012$) of 3.98 fluid ounces of water from a baseline value of 4.19 ± 3.99 and a significant increase in energy of 85.1 kilocalories ($p=0.004$) compared to baseline consumption of 206.4 ± 38.3 kilocalories. Site 1 did not exhibit any significant changes from baseline to post-policy. Both baseline and post-policy mean daily servings are included in *Table 6*, but only post-policy data were used to determine compliance with the adopted standards. The post-policy compliance data are described in the following sections correlating with this study's specified research questions.

Table 6: Average Baseline and Post-Policy Program Snack Consumption Per Child Per Day at Policy-Adoption Sites (Sites 1 through 3)

Site 1					Site 2				Site 3			
Food Group/Items	Baseline, Mean (SD)	Post-Policy Mean (SD)	Mean Change	Post-Policy vs Baseline <i>P</i>	Baseline Mean (SD)	Post-Policy Mean (SD)	Mean Change	Post-Policy vs Baseline <i>P</i>	Baseline Mean (SD)	Post-Policy Mean (SD)	Mean Change	Post-Policy vs Baseline <i>P</i>
Energy (kilocalories)	247.2 (163.1)	234.8 (138.4)	-12.4	0.852	176.9 (109.7)	209.4 (72.2)	32.5	0.415	121.3 (37.8)	206.4 (38.3)	85.1	0.004
Beverages												
Water (fl. oz.)	0.35 (0.74)	0.64 (1.60)	0.29	0.626	0.15 (0.52)	0.09 (0.18)	-0.06	0.716	4.19 (3.99)	0.21 (0.60)	-3.98	0.012
SSB (fl. oz.)	0 (0)	0 (0)	0	--	0.66 (1.24)	0 (0)	-0.66	0.092	1.08 oz. (2.00)	0 (0)	-1.08	0.121
Artificially Sweetened Drinks (fl. oz.)	0 (0)	0 (0)	0	--	0 (0)	0 (0)	0	--	0 (0)	0 (0)	0	--
100% Fruit Juice (fl. oz.)	5.27 (0.86)	4.05 (2.97)	-1.22	0.241	1.78 (2.12)	3.87 (2.19)	2.09	0.037	0 (0)	0 (0)	0	--
Major Food Groups												
Fruit Servings (Total)	1.32 (0.21)	1.02 (0.75)	-0.30	0.246	0.45 (0.53)	0.97 (0.55)	0.52	0.037	0.14 (0.44)	0 (0)	-0.14	0.343
Fruit Servings (No Juice)	0 (0)	0 (0.01)	0	--	0 (0)	0 (0)	0	--	0.14 (0.44)	0 (0)	-0.14	0.343
Vegetable Servings	0 (0)	0 (0)	0	--	0.03 (0.09)	0.01 (0.03)	-0.02	0.548	0 (0)	0 (0)	0	--
Grains Servings (Total)	0.87 (0.48)	0.58 (0.52)	-0.29	0.204	0.91 (0.42)	0.54 (0.49)	-0.37	0.072	0.52 (0.50)	0.54 (0.79)	0.02	0.960
Whole Grains Servings	0.12 (0.23)	0.06 (0.14)	-0.06	0.492	0.16 (0.20)	0.11 (0.19)	-0.05	0.520	0.52 (0.50)	0.50 (0.81)	-0.02	0.941
Some Whole Grains Servings	0.26 (0.26)	0.12 (0.16)	-0.14	0.148	0.15 (0.15)	0.13 (0.22)	-0.02	0.134	0 (0)	0 (0)	0	--
Dairy Servings	0.17 (0.57)	0.15 (0.21)	-0.02	0.925	0.06 (0.19)	0.11 (0.32)	0.05	0.612	0 (0)	0 (0)	0	--
Low-Nutrient Density Foods												
Sweets Servings	0.08 (0.11)	0.13 (0.27)	0.05	0.592	0.11 (0.11)	0.11 (0.12)	0	0.877	0 (0)	0 (0)	0	--
Snack Chips Servings	0.31 (0.32)	0.23 (0.23)	-0.08	0.482	0.36 (0.38)	0.14 (0.21)	-0.22	0.106	0 (0)	0 (0)	0	--
Trans Fats (g)	0.27 (0.60)	0.08 (0.12)	-0.19	0.334	0.05 (0.05)	0.10 (0.21)	0.05	0.473	0.02 (0.03)	0.09 (0.17)	0.07	0.439

Significant *p*-values are **bolded**. -- indicates t-test or *p*-value could not be computed since all values both pre- and post-policy adoption were 0 for those particular food or beverage items. Means and standard deviations were calculated using the average and standard deviation of the daily averages for each site.

Notes: Fruit servings came almost entirely from 100% fruit juice. One serving of fruit is equal to ½ cup fresh, frozen, canned, or cooked fruit, 1 medium piece of fruit, 4 fluid ounces of 100% fruit juice, ½ fresh grapefruit, or ¼ cup dried fruit. One serving of vegetables is equal to ½ cup raw, cooked or canned vegetables or 1 cup of raw leafy vegetables. One serving of grains is equal to ½ cup cooked grain/cereal, 16g of flour or cornmeal, ½ cup cooked rice, 1 slice of bread, ½ hamburger bun, ½ small bagel, 1 small roll, ½ English muffin, or 1 ounce of other grain product. One serving of dairy is equal to 1 cup of fluid milk, ½ cup evaporated milk, 1 cup yogurt, 1 ½ ounces natural cheese, 2 ounces processed cheese, 2 cups cottage cheese, ½ cup ricotta cheese, 3 cups dry curd, or 2 ounces cheese spread or food.

Degree to which sites met adopted standard for serving fruits and vegetables weekly

During post-policy data collection, children at Sites 1 and 2 were daily consuming a full serving of 100% fruit juice; children were consuming 1.02 ± 0.75 servings per day at Site 1 and 0.97 ± 0.55 servings per day at Site 2. However, consumption of this beverage does not satisfy the healthy eating standards' definition of a fruit serving. Children at Site 3 consumed 0 ± 0 servings of fruit daily. Therefore, none of the policy-adoption sites met the goal of serving a fruit or a vegetable weekly at their ASP.

Degree to which sites met adopted standard for offering water at all times

None of the policy-adoption sites were meeting the standards regarding offering water at all times according to post-policy data collection. Children at sites 1, 2, and 3 only consumed on average 0.64 ± 1.60 , 0.09 ± 0.18 , and 0.21 ± 0.60 fluid ounces respectively of water offered by the ASPs during the post-policy data collection period.

Degree to which sites met adopted standard for eliminating snacks with trans-fat

Children at Sites 1, 2 and 3 consumed an average of 0.08 ± 0.12 , 0.10 ± 0.21 , and 0.09 ± 0.17 grams respectively of *trans*-fat in program-served snacks during post-policy data collection. Foods which contain 0 to less than 0.5 grams of *trans*-fat per serving can be considered to have 0 grams of *trans*-fat on the food label.⁸⁹ Sites 1 through 3 were meeting the healthy eating standards regarding *trans*-fat.

Degree to which sites met the adopted standard for serving no beverages made with caloric sweeteners including sodas, juices, juice drinks/ades, sports drinks, or iced teas

The mean consumption of sugar-sweetened beverages was 0 ± 0 fluid ounces at all three sites post-policy. All three policy-adoption sites were meeting the healthy eating standard regarding sugar-sweetened beverages at post-policy data collection period.

Degree to which sites met the adopted standard for serving no candy or other foods that are primarily sugar based

Children at Sites 1 and 2 were observed consuming program-offered sweets both during baseline and post-policy data collection. The daily average of sweets servings consumed post-policy at Sites 1 and 2 were 0.13 ± 0.27 and 0.11 ± 0.12 respectively. This equated to about half a serving of sweets per week, or about 2 per month. This data lined up with the fact that observers did not witness the programs at Sites 1 and 2 serving sweets every day, but a few times a month. Overall, policy-adoption sites were not meeting this standard by post-policy data collection.

Degree to which sites met the adopted standard for serving nutrient-dense snack options made with whole grains

Children at Site 3 were consuming 0.50 ± 0.81 or half a serving of whole grains post-policy; all of this site's grains were whole grains, and there were no items observed that counted as having only some whole grains. Children at Sites 1 and 2 were only consuming 0.06 ± 0.14 and 0.11 ± 0.19 servings of whole grains respectively, and an additional 0.12 ± 0.16 and 0.13 ± 0.22 servings of grains with at least some whole grains included in the product. Policy-adoption sites were not meeting the standard regarding emphasizing whole grains.

Degree to which sites met the adopted standard for emphasizing healthy beverages including low or nonfat milk, plain or naturally flavored non-carbonated water, and 100% fruit juice limited to one 8 ounce serving

Dairy was not a commonly served item among the observed ASPs in this study. Fluid milk was never observed, and the amount of servings which came from other dairy products were low. Children at Site 1 consumed only 0.17 ± 0.57 servings of dairy per day pre-policy and 0.15 ± 0.21 servings post-policy. In fact, the policy-adoption sites adopted a modified version of the original standard such that their goal was to only offer unlimited water, not unlimited nonfat or low-fat milk (*Table 4*). The sites met the goal of limiting 100% fruit juice to no more than one 8 ounce serving per child. In NDSR, one serving of 100% fruit juice is actually only 4 fluid ounces. Therefore, sites were meeting this standard both pre- and post-policy, with post-policy values of 5.27 ± 0.86 fluid ounces per day at Site 1, 1.78 ± 2.12 ounces per day at Site 2, and 0 ± 0 fluid ounces per day at Site 3.

Degree to which sites met the adopted standard for offering no fried salty snacks such as potato or corn chips offered regardless of type of oil used in cooking

Only one of three policy-adoption sites were meeting this standard post-policy. The consumption of program-offered snack chips at Site 1 was 0.23 ± 0.23 servings per day post-policy, and at Site 2 was 0.14 ± 0.21 servings per day; Sites 1 and 2 did not meet this healthy eating standard regarding fried salty snacks. Site 3 was not offering snack chips as evidenced by a mean of 0 ± 0 and thus was meeting the adopted standard.

Degree to which sites met the adopted standards for avoiding foods and beverages with artificial sweeteners, flavors, or colors?

All three policy-adoption sites were meeting the standard of not serving any beverages made with artificial sweeteners. The NDSR software used was not able to indicate if artificial flavors or colors existed in any of the food and beverage items, nor was it able to identify foods with artificial sweeteners, just beverages.

Table 7 indicates whether sites were meeting or not meeting the nine adopted Healthy Eating standards for both the baseline and post-policy data collection periods. Overall, policy-adoption sites were meeting three of nine standards pre-policy, and four of nine standards by post-policy. The only change that occurred was that the small amounts of sugar-sweetened beverages consumed at Sites 2 and 3 were reduced to zero by post-policy; however, sites were not far from meeting this standard even during pre-policy data collection. Therefore, adherence to the standards did not truly change from pre- to post-policy, which is reinforced by the limited number of significant changes from pre- to post-policy shown in *Table 6*.

Table 7: Did the Policy-Adoption ASP Sites Meet Their Adopted HEPAQS Goals at Baseline and Post-Policy?

Healthy Eating Standard	Did Sites Meet Standard At Baseline?			Did Sites Meet Standard Post-Policy?		
	Site 1	Site 2	Site 3	Site 1	Site 2	Site 3
1. Weekly serve a fruit or vegetable (fresh, frozen, canned or dried without added sugar).	X	X	X	X	X	X
2. Offers water at the table during snack, and has water accessible at all times.	X	X	X	X	X	X
3. Only serve foods made without trans fats.	✓	✓	✓	✓	✓	✓
4. Serve beverages without caloric sweeteners (SSBs).	✓	X	X	✓	✓	✓
5. Serve no candy or other foods that are primarily sugar based.	X	X	✓	X	X	✓
7. Emphasizes nutrient dense options including whole grains, lean protein foods, and no trans fats.	X	X	✓	X	X	✓
8. Emphasizes healthy beverages [low or nonfat milk; plain or naturally flavored non-carbonated water; and 100% fruit juice (limit to 8 oz serving)]. -No limits on water.	✓	✓	✓	✓	✓	✓
9. Serves no foods that are deep fried, par fried or flash fried unless healthy oil was used. -Does not offer fried salty snacks such as potato or corn chips	X	X	✓	X	X	✓
10. Avoid foods and beverages made with artificial ingredients (sweeteners, flavors, or colors).	✓	✓	✓	✓	✓	✓

Notes: The HEPAQS consider 8 fluid ounces to be one serving of juice while NDSR and the Dietary Guidelines consider one serving to be 4 fluid ounces. Most of the standards that sites were meeting post-policy were also being met pre-policy.

Secondary aim: Describe the overall quality of snacks served at policy-adoption sites and comparison sites from pre- to post-policy adoption.

Among comparison sites, the fruit servings (total) and 100% fruit juice servings changed significantly between baseline and follow-up data collection at Sites 4 and 5 (*Table 9*). The *p*-values shown in green in *Table 8* indicate that the number of total fruit servings increased significantly ($p=0.025$) by about half a fruit serving (0.54 servings) at Site 4, and similarly fruit servings also increased significantly ($p=0.046$) by 0.40 servings at Site 5. Since nearly all of the total fruit servings came from 100% fruit juice, the significant increases in 100% fruit juice consumption at Sites 4 and 5 mimicked the values for total fruit servings.

Table 8: Average Baseline and Post-Policy Program Snack Per Child Per Day at Comparison Sites (Sites 4 and 5)

Site 4					Site 5			
Food Group/ Items	Baseline Mean (SD)	Post-Policy Mean (SD)	Mean Change	Post-Policy vs Baseline <i>p</i>	Baseline Mean (SD)	Post-Policy Mean (SD)	Mean Change	Post-Policy vs Baseline <i>p</i>
Energy (kilocalories)	185.2 (72.7)	205.6 (73.1)	20.4	0.551	229.1 (112.9)	245.9 (86.4)	16.8	0.684
Beverages								
Water (fl. oz.)	0 (0)	0 (0)	0	--	0.41 (1.53)	0.01 (0.03)	-0.40	0.345
SSB (fl. oz.)	0.27 oz. (0.86)	0 (0)	-0.27	0.343	0 (0)	0 (0)	0	--
Artificially Sweetened Drinks (fl. oz.)	0.34 (1.08)	0 (0)	-0.34	0.343	0.38 (1.41)	0 (0)	-0.38	0.336
100% Fruit Juice (fl. oz.)	3.48 (2.54)	5.58 (0.72)	2.10	0.030	4.53 (2.65)	6.13 (0.62)	1.60	0.046
Major Food Groups								
Fruit Servings (Total)	0.87 (0.63)	1.41 (0.20)	0.54	0.025	1.13 (0.66)	1.53 (0.16)	0.40	0.046
Fruit Servings (No Juice)	0 (0)	0 (0)	0	--	0 (0)	0 (0)	0	--
Vegetable Servings	0 (0)	0 (0)	0	--	0.05 (0.19)	0.11 (0.34)	0.06	0.644
Grains Servings (Total)	0.81 (0.45)	0.81 (0.43)	0	0.984	1.01 (0.64)	1.04 (0.47)	0.03	0.891
Whole Grains Servings	0 (0)	0.01 (0.04)	0.01	0.343	0 (0)	0.06 (0.18)	0.06	0.343
Some Whole Grains Servings	0.38 (0.21)	0.43 (0.30)	0.05	0.644	0.61 (0.42)	0.44 (0.41)	-0.17	0.320
Dairy Servings	0 (0)	0 (0)	0	--	0 (0)	0.27 (0.87)	0.27	0.343
Low-Nutrient Density Foods								
Sweets Servings	0 (0)	0.01 (0.04)	0.01	0.343	0 (0.01)	0.03 (0.09)	0.03	0.381
Snack Chips Servings	0 (0)	0.05 (0.09)	0.05	0.095	0 (0)	0 (0)	0	--
Trans Fats (g)	1.09 (1.05)	0.38 (0.28)	-0.71	0.092	0.79 (1.11)	0.26 (0.20)	-0.53	0.103

Significant *p*-values are **bolded**; -- indicates t-test or *p*-value could not be computed since all values both pre- and post-policy adoption were 0 for those particular food or beverage items. Means and standard deviations were calculated using the average and standard deviation of the daily averages for each site.

Notes: Fruit servings came almost entirely from 100% fruit juice. One serving of fruit is equal to ½ cup fresh, frozen, canned, or cooked fruit, 1 medium piece of fruit, 4 fluid ounces of 100% fruit juice, ½ fresh grapefruit, or ¼ cup dried fruit. One serving of vegetables is equal to ½ cup raw, cooked or canned vegetables or 1 cup of raw leafy vegetables. One serving of grains is equal to ½ cup cooked grain/cereal, 16g of flour or cornmeal, ½ cup cooked rice, 1 slice of bread, ½ hamburger bun, ½ small bagel, 1 small roll, ½ English muffin, or 1 ounce of other grain product. One serving of dairy is equal to 1 cup of fluid milk, ½ cup evaporated milk, 1 cup yogurt, 1 ½ ounces natural cheese, 2 ounces processed cheese, 2 cups cottage cheese, ½ cup ricotta cheese, 3 cups dry curd, or 2 ounces cheese spread or food.

Typical snacks served at policy-adoption sites were a juice box and a pre-packaged snack such as chips, cheese crackers, baked crackers, snack bars, and fruit snacks. There were slight differences in significance when considering the individual values for the policy-adoption Sites 1 through 3 compared to the overall average for all three sites (Table 9). Overall the consumption of water decreased from 0.19 ±0.28 fluid ounces during the pre-policy period to 0.04 ±0.04 fluid

ounces post-policy ($p=0.040$) among policy-adoption sites, as indicated in *Table 10*; however, this change was only significant in one of three sites. Also among policy-adoption sites as a whole, the fluid ounces of sugar-sweetened beverages significantly decreased from 0.58 ± 0.54 fluid ounces pre-policy to 0 ± 0 fluid ounces post-policy ($p=0.022$), yet there was no significant difference in fluid ounces of SSBs at any one site alone. Overall, after the HEPA standards had been adopted, the children at the policy-adoption sites were consuming 2.64 ± 2.29 fluid ounces of 100% fruit juice per day, yet they were not meeting their adopted standard to provide one serving of fruits or vegetables that are fresh, frozen, canned, or dried without added sugar. Overall, no vegetables were consumed or served across the policy-adoption sites. Children were consuming an average of 0.55 ± 0.02 servings of total grains across the policy-adoption sites, 0.22 ± 0.24 servings of which were whole grains.

Typical snacks offered at comparison sites included a juice box and a pre-packaged snack such as animal crackers, snack bars, and cheese crackers. There was only one minor difference in the significant values when considering individual comparison sites compared to the average of both comparison sites. Overall, the grams of *trans*-fat consumed decreased significantly among comparison sites, from 0.94 ± 0.21 to 0.32 ± 0.08 grams post-policy ($p=0.021$; *Table 9*); however, no significant difference was seen in any one comparison site. The significant changes in total fruit and 100% fruit juice consumption were reflected in both the individual and overall comparison site averages. The averaged values among the comparison sites indicated an increase in fruit and 100% fruit juice consumption from 4.01 ± 0.74 fluid ounces pre-policy to 5.86 ± 0.39 fluid ounces post-policy ($p=0.004$; *Table 9*). The secondary goal of this study was to describe comparison sites overall; it was beyond the scope of this study to test for statistical differences between policy-adoption sites and comparison sites.

Table 9: Overall Average Baseline and Post-Policy Snack Per Child Per Day Within Policy-Adoption Sites and Within Comparison Sites

Food Group/ Item	Policy-Adoption Sites				Comparison Sites			
	Baseline Mean (SD)	Post-Policy Mean (SD)	Mean Change	Post-Policy vs Baseline <i>P</i> among Policy-Sites	Baseline Mean (SD)	Post-Policy Mean (SD)	Mean Change	Post-Policy vs Baseline <i>P</i> among Comparison Sites
Energy (kcal)	181.80 (63.09)	216.87 (15.60)	35.07	0.229	207.15 (31.04)	225.75 (28.50)	18.60	0.618
Beverages								
Water (fl. oz.)	0.19 (0.28)	0.04 (0.04)	-0.15	0.040	0.03 (0.04)	0 (0)	-0.03	0.336
SSB (fl. oz.)	0.58 (0.54)	0 (0)	-0.58	0.022	0.14 (0.19)	0 (0)	-0.14	0.328
Artificially Sweetened Drinks (fl. oz.)	0 (0)	0 (0)	0	--	0.36 (0.03)	0 (0)	-0.36	0.171
100% Fruit Juice (fl. oz.)	2.35 (2.68)	2.64 (2.29)	0.29	0.545	4.01 (0.74)	5.86 (0.39)	1.85	0.004
Major Food Groups								
Fruit Servings (Total)	0.64 (0.61)	0.66 (0.58)	0.03	0.712	1.00 (0.18)	1.47 (0.08)	0.47	0.003
Fruit Servings (No Juice)	0.05 (0.06)	0 (0.01)	-0.05	--	0 (0)	0 (0.01)	0	--
Vegetable Servings	0.01 (0.02)	0 (0.01)	-0.01	0.529	0.03 (0.04)	0.06 (0.08)	0.03	0.700
Grain Servings (Total)	0.77 (0.21)	0.55 (0.02)	-0.21	0.105	0.91 (0.14)	0.93 (0.16)	0.02	0.985
Whole Grain Servings	0.27 (0.22)	0.22 (0.24)	-0.04	0.621	0 (0)	0.04 (0.04)	0.04	0.241
Grain Servings with Some Whole Grains	0.14 (0.13)	0.07 (0.08)	-0.05	0.074	0.50 (0.16)	0.44 (0.01)	-0.06	0.457
Dairy Servings	0.08 (0.09)	0.09 (0.08)	0.01	0.804	0 (0)	0.14 (0.19)	0.14	0.330
Low-nutrient density foods								
Sweets Servings	0.06 (0.06)	0.08 (0.07)	0.02	0.565	0 (0)	0.02 (0.01)	0.02	0.220
Snack Chips Servings	0.22 (0.20)	0.12 (0.12)	-0.10	0.134	0 (0)	0.03 (0.04)	0.03	0.095
Trans Fats (g)	0.11 (0.14)	0.09 (0.01)	-0.02	0.735	0.94 (0.21)	0.32 (0.08)	-0.62	0.021

Significant *p*-values are **bolded**. -- indicates t-test or *p*-value could not be computed since all values both pre- and post-policy adoption were 0 for those particular food or beverage items. Means and standard deviations were calculated using the average and standard deviation of the daily averages for each site.

Notes: Fruit servings came almost entirely from 100% fruit juice. One serving of fruit is equal to ½ cup fresh, frozen, canned, or cooked fruit, 1 medium piece of fruit, 4 fluid ounces of 100% fruit juice, ½ fresh grapefruit, or ¼ cup dried fruit. One serving of vegetables is equal to ½ cup raw, cooked or canned vegetables or 1 cup of raw leafy vegetables. One serving of grains is equal to ½ cup cooked grain/cereal, 16g of flour or cornmeal, ½ cup cooked rice, 1 slice of bread, ½ hamburger bun, ½ small bagel, 1 small roll, ½ English muffin, or 1 ounce of other grain product. One serving of dairy is equal to 1 cup of fluid milk, ½ cup evaporated milk, 1 cup yogurt, 1 ½ ounces natural cheese, 2 ounces processed cheese, 2 cups cottage cheese, ½ cup ricotta cheese, 3 cups dry curd, or 2 ounces cheese spread or food.

Tertiary aim: Explore the nutrient quality of snacks served in the afterschool programs compared to “outside” snacks children brought from home, stores, or vending machines across both pre- vs. post-policy adoption.

Unpaired t-tests were used to test the difference between program and non-program snack means. Program versus non-program post-policy means and *p* values for Sites 1, 2, and 3 are shown in *Table 10*, while those values for Sites 4 and 5 are shown in *Table 11*. *Table 12* displays the overall averaged program versus non-program snack data for policy-adoption sites and comparison sites. Compared to post-policy program-consumed snacks, the non-program post-policy snacks at Site 1 contained significantly less fruit servings: 0.18 ± 0.44 servings via non-program snacks compared to 1.02 ± 0.75 servings from program snacks ($p=0.007$). Site 1 non-program snacks contained significantly less fluid ounces of 100% fruit juice, at 0.37 ± 1.11 fluid ounces compared to 4.05 ± 2.97 fluid ounces among program snacks ($p=0.004$). Site 1 non-program snacks also contained significantly less dairy servings: 0 ± 0 servings compared to 0.15 ± 0.21 servings among program-served snacks ($p=0.049$). Non-program snacks at Site 2 contained significantly less kilocalories (95.5 ± 60.2 compared to 209.4 ± 72.2 ; $p=0.003$), significantly less fruit servings (0.32 ± 0.43 compared to 0.97 ± 0.55 ; $p=0.016$), significantly less fluid ounces of 100% fruit juice (0 ± 0 compared to 3.87 ± 2.19 ; $p=0.000$), and significantly less sweets servings (0 ± 0 compared to 0.11 ± 0.12 ; $p=0.016$) than did program snacks. Site 3 non-program snacks contained significantly more sugar-sweetened beverages (2.48 ± 5.71 fluid ounces compared to 0 ± 0 ; $p=0.045$), and significantly more sweets servings (0.49 ± 1.16 compared to 0 ± 0 ; $p=0.050$).

Table 10: Program vs Non-Program Snacks Consumed Among Policy-Adoption Sites Post-Policy

Food Group/Item	Site 1			Site 2			Site 3		
	Program Post-Policy Mean (SD)	Non-Program Post-Policy Mean (SD)*	Program vs Non-Program <i>P</i>	Program Post-Policy Mean (SD)	Non-Program Post-Policy Mean (SD)*	Program vs Non-Program <i>P</i>	Program Post-Policy Mean (SD)	Non-Program Post-Policy Mean (SD)*	Program vs Non-Program <i>P</i>
Energy (Kcals)	234.8 (138.4)	200.2 (171.5)	0.563	209.4 (72.2)	95.5 (60.2)	0.003	206.4 (38.3)	291.0 (207.1)	0.067
Beverages									
Water (fl. oz.)	0.64 (1.60)	0 (0)	0.241	0.09 (0.18)	3.40 (6.31)	0.210	0.21 (0.60)	0 (0)	0.351
SSB (fl. oz.)	0 (0)	0.86 (2.60)	0.166	0 (0)	0 (0)	--	0 (0)	2.48 (5.71)	0.045
Artificially Sweetened Drinks (fl. oz.)	0 (0)	0 (0)	--	0 (0)	0 (0)	--	0 (0)	0 (0)	--
100% Fruit Juice (fl. oz.)	4.05 (2.97)	0.37 (1.11)	0.004	3.87 (2.19)	0 (0)	0.000	0 (0)	0 (0)	--
Major Food Groups									
Fruit Servings	1.02 (0.75)	0.18 (0.44)	0.007	0.97 (0.55)	0.32 (0.43)	0.016	0 (0)	0.08 (0.23)	0.078
Vegetable Servings	0 (0)	0 (0)	--	0.01 (0.03)	0 (0)	0.343	0 (0)	0.03 (0.08)	0.090
Grain Servings (Total)	0.58 (0.52)	0.70 (0.77)	0.626	0.54 (0.49)	0.28 (0.49)	0.315	0.54 (0.79)	1.16 (1.40)	0.136
Whole Grain Servings	0.06 (0.14)	0.11 (0.26)	0.544	0.11 (0.19)	0.14 (0.38)	0.828	0.50 (0.81)	0.07 (0.25)	0.185
Servings with Some Whole Grain	0.12 (0.16)	0.09 (0.28)	0.751	0.13 (0.22)	0 (0)	0.063	0 (0)	0 (0)	--
Dairy	0.15 (0.21)	0 (0)	0.049	0.11 (0.32)	0 (0)	0.277	0 (0)	0.06 (0.22)	0.162
Low Nutrient-Density Foods									
Sweets Servings	0.13 (0.27)	0.29 (0.49)	0.290	0.11 (0.12)	0 (0)	0.016	0 (0)	0.49 (1.16)	0.050
Snack Chips Servings	0.23 (0.23)	0.07 (0.21)	0.092	0.14 (0.21)	0.14 (0.38)	0.986	0 (0)	0.33 (0.79)	0.054
Trans Fat (g)	0.08 (0.12)	0.17 (0.40)	0.416	0.10 (0.21)	0.04 (0.08)	0.397	0.09 (0.17)	0.17 (0.19)	0.344

Significant *p*-values are **bolded**. -- indicates t-test or *p*-value could not be computed since all values both pre- and post-policy adoption were 0 for those particular food or beverage items.

* indicates values in the column have been calculated using an overall average method rather than daily averages.

Notes: Fruit servings came almost entirely from 100% fruit juice. One serving of fruit is equal to ½ cup fresh, frozen, canned, or cooked fruit, 1 medium piece of fruit, 4 fluid ounces of 100% fruit juice, ½ fresh grapefruit, or ¼ cup dried fruit. One serving of vegetables is equal to ½ cup raw, cooked or canned vegetables or 1 cup of raw leafy vegetables. One serving of grains is equal to ½ cup cooked grain/cereal, 16g of flour or cornmeal, ½ cup cooked rice, 1 slice of bread, ½ hamburger bun, ½ small bagel, 1 small roll, ½ English muffin, or 1 ounce of other grain product. One serving of dairy is equal to 1 cup of fluid milk, ½ cup evaporated milk, 1 cup yogurt, 1 ½ ounces natural cheese, 2 ounces processed cheese, 2 cups cottage cheese, ½ cup ricotta cheese, 3 cups dry curd, or 2 ounces cheese spread or food.

As shown in *Table 11*, non-program consumed snacks at Site 4 contained significantly less fruit servings: 0 ± 0 servings per day compared to 1.41 ± 0.20 servings per day from program-served snacks ($p=0.000$). The non-program snacks similarly contained significantly less 100% fruit juice servings: 0 ± 0 servings compared to 1.40 ± 0.18 servings from program snacks ($p=0.000$). Servings with some whole grain were lower among non-program snacks at 0.06 ± 0.31 servings per day compared to 0.43 ± 0.30 servings per day from program snacks ($p=0.005$). However, non-program snacks at Site 4 contained significantly more whole grain servings: 0.99 ± 1.88 servings compared to 0.01 ± 0.04 servings among program snacks ($p=0.018$). At Site 5, non-program snacks contained significantly fewer calories: 62.57 ± 46.43 kilocalories compared to 245.9 ± 86.4 kilocalories from program snacks ($p=0.002$). Non-program snacks contained significantly less fruit: 0.13 ± 0.22 servings compared to 1.53 ± 0.16 servings among program snacks ($p=0.002$). Almost all of the fruit servings came from 100% fruit juice as indicated by the very small servings of fruit without juice. Total grains were lower among non-program snacks: 0 ± 0 servings compared to 1.04 ± 0.47 servings among program snacks ($p=0.000$). Grain products with some whole grain servings were significantly lower among non-program snacks: 0 ± 0 servings per day compared to 0.44 ± 0.41 servings per day among program snacks ($p=0.009$). Lastly, grams of *trans*-fat were also lower among non-program snacks: 0 ± 0 grams compared to 0.26 ± 0.20 grams among program snacks ($p=0.003$).

Table 11: Program vs Non-Program Snacks Consumed Among Comparison Sites Post-Policy

Site 4				Site 5		
Food Group/Item	Program Post-Policy Mean (SD)	Non-Program Post-Policy Mean (SD)*	Program vs Non-Program <i>P</i>	Program Post-Policy Mean (SD)	Non-Program Post-Policy Mean (SD)*	Program vs Non-Program <i>P</i>
Energy (Kcals)	205.6 (73.1)	281.86 (210.45)	0.122	245.9 (86.4)	62.57 (46.43)	0.002
Beverages						
Water (fl. oz.)	0 (0)	0 (0)	--	0.01 (0.03)	0 (0)	0.343
SSB (fl. oz.)	0 (0)	0.76 (3.73)	0.328	0 (0)	0 (0)	--
Artificially Sweetened Drinks (fl. oz.)	0 (0)	0 (0)	--	0 (0)	0 (0)	--
100% Fruit Juice (fl. oz.)	5.58 (0.72)	0 (0)	0.000	6.13 (0.62)	0 (0)	0.000
Major Food Groups						
Fruit Servings (Total)	1.41 (0.20)	0 (0)	0.000	1.53 (0.16)	0.13 (0.22)	0.002
Vegetable Servings	0 (0)	0 (0)	--	0.11 (0.34)	0 (0)	0.343
Grain Servings (Total)	0.81 (0.43)	1.48 (1.73)	0.087	1.04 (0.47)	0 (0)	0.000
Whole Grain Servings	0.01 (0.04)	0.99 (1.88)	0.018	0.06 (0.18)	0 (0)	0.343
Servings with Some Whole Grain	0.43 (0.30)	0.06 (0.31)	0.005	0.44 (0.41)	0 (0)	0.009
Dairy	0 (0)	0 (0)	--	0.27 (0.87)	0 (0)	0.343
Low Nutrient-Density Foods						
Sweets Servings	0.01 (0.04)	0.27 (0.52)	0.026	0.03 (0.09)	0.24 (0.41)	0.474
Snack Chips Servings	0.05 (0.09)	1.24 (1.83)	0.004	0 (0)	0 (0)	--
Trans Fat (g)	0.38 (0.28)	0.20 (0.65)	0.268	0.26 (0.20)	0 (0)	0.003

Significant *p*-values are **bolded**.

-- indicates t-test or *p*-value could not be computed since all values both pre- and post-policy adoption were 0 for those particular food or beverage items.

* indicates values in the column have been calculated using an overall average method rather than daily averages.

Notes: Fruit servings came almost entirely from 100% fruit juice. One serving of fruit is equal to ½ cup fresh, frozen, canned, or cooked fruit, 1 medium piece of fruit, 4 fluid ounces of 100% fruit juice, ½ fresh grapefruit, or ¼ cup dried fruit. One serving of vegetables is equal to ½ cup raw, cooked or canned vegetables or 1 cup of raw leafy vegetables. One serving of grains is equal to ½ cup cooked grain/cereal, 16g of flour or cornmeal, ½ cup cooked rice, 1 slice of bread, ½ hamburger bun, ½ small bagel, 1 small roll, ½ English muffin, or 1 ounce of other grain product. One serving of dairy is equal to 1 cup of fluid milk, ½ cup evaporated milk, 1 cup yogurt, 1 ½ ounces natural cheese, 2 ounces processed cheese, 2 cups cottage cheese, ½ cup ricotta cheese, 3 cups dry curd, or 2 ounces cheese spread or food.

Considering the average overall program versus non-program snack consumption for policy-adoption and comparison sites, both fruit servings and 100% fruit juice servings were significantly less among non-program snacks compared to program snacks (*Table 12*). Among policy-adoption sites, fluid ounces of SSBs and servings of sweets were significantly larger in non-program snacks than program snacks (*Table 12*). Among comparison sites, the overall values indicate that sweets and snack chip servings were larger among non-program snacks (*Table 12*). While non-program snacks at comparison sites contained more whole grains servings on average, they also contained significantly less servings of grains with some whole grains.

Table 12: Overall Program vs Non-Program Snacks Consumed Among Policy-Adoption Sites and. Comparison Sites

Food Group/Item	Policy-Adoption Sites			Comparison Sites		
	Program Post-Policy Mean (SD)	Non-Program Post-Policy Mean (SD)*	Program vs Non-Program <i>P</i> within Policy-Sites	Program Post-Policy Mean (SD)	Non-Program Post-Policy Mean (SD)*	Program vs Non-Program <i>P</i> within Comparison Sites
Energy (Kcals)	216.87 (15.60)	195.57 (97.83)	0.737	225.75 (28.50)	172.22 (155.06)	0.460
Beverages						
Water (fl. oz.)	0.04 (0.04)	1.13 (1.96)	0.674	0 (0)	0 (0)	0.330
SSB (fl. oz.)	0 (0)	1.11 (1.26)	0.017	0 (0)	0.38 (0.54)	0.327
Artificially Sweetened Drinks (fl. oz.)	0 (0)	0 (0)	--	0 (0)	0 (0)	--
100% Fruit Juice (fl. oz.)	2.64 (2.29)	0.12 (0.21)	0.000	5.86 (0.39)	0 (0)	0.000
Major Food Groups						
Fruit Servings	0.66 (0.58)	0.19 (0.12)	0.005	1.47 (0.08)	0.07 (0.09)	0.000
Vegetable Servings	0 (0.01)	0.01 (0.02)	0.207	0.06 (0.08)	0 (0)	0.330
Grain Servings (Total)	0.55 (0.02)	0.71 (0.44)	0.113	0.93 (0.16)	0.74 (1.05)	0.264
Whole Grain Servings	0.22 (0.24)	0.11 (0.04)	0.275	0.04 (0.04)	0.50 (0.70)	0.022
Servings with Some Whole Grain	0.07 (0.08)	0.03 (0.05)	0.387	0.44 (0.01)	0.03 (0.04)	0.000
Dairy	0.09 (0.08)	0.02 (0.03)	0.184	0.14 (0.19)	0 (0)	0.330
Low Nutrient-Density Foods						
Sweets Servings	0.08 (0.07)	0.26 (0.25)	0.048	0.02 (0.01)	0.26 (0.02)	0.020
Snack Chips Servings	0.12 (0.12)	0.18 (0.13)	0.432	0.03 (0.04)	0.62 (0.88)	0.004
Trans Fat (g)	0.09 (0.01)	0.13 (0.08)	0.258	0.32 (0.08)	0.10 (0.14)	0.286

* indicates values in the column have been calculated using an overall average method rather than daily averages.

Notes: Fruit servings came almost entirely from 100% fruit juice. One serving of fruit is equal to ½ cup fresh, frozen, canned, or cooked fruit, 1 medium piece of fruit, 4 fluid ounces of 100% fruit juice, ½ fresh grapefruit, or ¼ cup dried fruit. One serving of vegetables is equal to ½ cup raw, cooked or canned vegetables or 1 cup of raw leafy vegetables. One serving of grains is equal to ½ cup cooked grain/cereal, 16g of flour or cornmeal, ½ cup cooked rice, 1 slice of bread, ½ hamburger bun, ½ small bagel, 1 small roll, ½ English muffin, or 1 ounce of other grain product. One serving of dairy is equal to 1 cup of fluid milk, ½ cup evaporated milk, 1 cup yogurt, 1 ½ ounces natural cheese, 2 ounces processed cheese, 2 cups cottage cheese, ½ cup ricotta cheese, 3 cups dry curd, or 2 ounces cheese spread or food.

CHAPTER 4

DISCUSSION

The primary aim of this study was to determine the effectiveness of the adopted Healthy Eating standards by comparing the quality of snacks served at the ASP sites before and after the HEPA policies were implemented. The quality of snacks were determined by the degree to which the sites implemented each of the nine adopted Healthy Eating standards. *Table 13* shows whether or not Sites 1, 2, and 3 met each of the nine adopted standards. Post-policy, the policy-adoption sites were meeting four standards: serving food without *trans*-fats, serving beverages without caloric sweeteners, emphasizing healthy beverages by limiting 100% fruit juice to an 8 oz. serving, and avoiding beverages made with artificial ingredients. However, the policy-adoption sites were not meeting the five other adopted standards regarding fruits and vegetables, offering water, serving no candy or other foods that are sugar-based, emphasizing whole grains, and serving no fried salty snacks including chips. Following is a discussion of the adopted standards, whether or not the policy-adoption sites met those standards, and the potential implications of the results.

Table 13: Did the Policy-Adoption ASP Sites Meet Their Adopted HEPAQS Goals Post-Policy?

Healthy Eating Standard	Did they hit the target?		
	Site 1	Site 2	Site 3
1. Weekly serve a fruit or vegetable (fresh, frozen, canned or dried without added sugar).	X 0 servings/d	X 0 servings/d	X 0 servings/d
2. Offers water at the table during snack, and has water accessible at all times.	X Offered 3 out of 10 days	X Offered 2 out of 10 days	X Offered 1 out of 8 days
3. Only serve foods made without trans fats.	✓ 0.08 g/d	✓ 0.10 g/d	✓ 0.09 g/d
4. Serve beverages without caloric sweeteners (SSBs).	✓ 0 (0) fl. oz./d	✓ 0 (0) fl. oz./d	✓ 0 (0) fl. oz./d
5. Serve no candy or other foods that are primarily sugar based.	X 0.13 (0.27) servings/d	X 0.11 (0.12) servings/d	✓ 0 (0) servings/d
7. Emphasizes nutrient dense options including whole grains, lean protein foods, and no trans fats.	X 10.3% of grains were whole	X 20.4% of grains were whole	✓ 92.6% of grains were whole
8. Emphasizes healthy beverages [low or nonfat milk; plain or naturally flavored non-carbonated water; and 100% fruit juice (limit to 8 oz serving)]. -No limits on water.	✓ 4.05 (2.97) fl. oz./d 100% fruit juice	✓ 3.87 (2.19) fl. oz./d 100% fruit juice	✓ 0 (0) fl. oz./d 100% fruit juice
9. Serves no foods that are deep fried, par fried or flash fried unless healthy oil was used. -Does not offer fried salty snacks such as potato or corn chips	X 0.23 (0.23) servings/d	X 0.14 (0.21) servings/d	✓ 0 (0) servings/d
10. Avoid foods and beverages made with artificial ingredients (sweeteners, flavors, or colors).	✓ 0 (0) fl. oz./d	✓ 0 (0) fl. oz./d	✓ 0 (0) fl. oz./d
<i>Note: The HEPAQS consider 8 fluid ounces to be one serving of juice while NDSR and the Dietary Guidelines consider one serving to be 4 fluid ounces.</i>			

The first of the standards that policy-adoption sites met during post-policy data collection was to serve only snacks without *trans*-fats; my hypothesis that sites would meet this goal was supported. However, there was no significant change from pre-to post-policy; sites were meeting goals regarding *trans*-fat both pre- and post-policy. The Dietary Guidelines for Americans recommend that *trans*-fats be limited as much as possible.⁹⁰ While foods which

contain 0 to less than 0.5 grams of *trans*-fat per serving can be considered to have 0 grams of *trans*-fat on the food label, this value only reflects the amount per serving.⁸⁹ Although Sites 1, 2, and 3 were meeting the healthy eating standards regarding *trans*-fat, consumption of multiple servings of foods which contain less than 0.5 grams of *trans*-fat per serving can certainly add up to multiple grams per day. *Trans*-fats are a nutrient of concern in the diet because they are known to increase the risk of heart disease and raise blood levels of LDL cholesterol.⁹⁰ While Beets *et al.* did not report on grams of *trans*-fat in his policy-adoption study,² measurement of this ingredient in ASP snacks is important given the health concerns for this ingredient and because one of the Healthy Eating standards is to eliminate *trans*-fats from all snacks.

The second Healthy Eating standard which the three policy-adoption sites met post-policy was to serve no beverages made with caloric sweeteners including sodas, juices, juice drinks/ades, sports drinks, or iced teas. Pre-policy adoption, children at Sites 2 and 3 consumed small amounts of sugar-sweetened beverages. On average at baseline, children at Site 2 consumed only 0.66 ± 1.24 fluid ounces of SSB per day and 1.08 ± 2.00 fluid ounces per day at Site 3, neither of which were significantly different from the values of zero fluid ounces at each site post-policy. Similarly, Beets *et al.* found that before the healthy snack initiative, SSBs were served 1.7 ± 2.0 to 2.1 ± 2.0 servings per week, which equates to about 2.5 to 3.5 fluid ounces per child per day, and after the healthy initiative they were completely eliminated.² During pre-policy adoption, Site 2 served SSBs three out of twelve observation days and Site 3 served SSBs three out of 10 total observation days. Program-served SSBs were not observed on any observation day at all three policy-adoption sites, indicating my hypothesis that sites would meet their goal regarding SSBs was supported. Since children were not consuming large amounts of SSBs on those certain days pre-policy, numerically the data shows no difference in consumption

of SSBs between pre- and post-policy adoption for individual sites. However, when the values for all three policy-adoption sites were averaged as seen in *Table 9*, a significant difference in SSB consumption appeared ($p=0.022$). Essentially, adoption of the healthy eating standards had no significant impact on program-served SSBs because the programs were already at a very low level of consumption of SSBs. However, the little change that did occur was in a beneficial direction.

The third standard met by the policy-adoption sites was to emphasize healthy beverages, particularly by limiting 100% fruit juice to one eight ounce portion per child. Policy-adoption sites were meeting this standard both before and after the policies were adopted, indicating that the policies did not result in significant change. In the observational study conducted by Beets *et al.*, researchers found that 100% fruit juice was served an average of 0.7 ± 1.4 servings per week, which is well below the recommended less than 8 fluid ounces per day and also below our findings of 2.64 ± 2.29 ounces per day of 100% juice post-policy in policy-adoption sites.³ However, in the pre- and post-policy adoption study by Beets *et al.*, 100% fruit juice was not reported on.

The fourth standard that the policy-adoption sites met was to serve no beverages with artificial sweeteners. All three policy-adoption sites met this standard both pre- and post-policy adoption, supporting my hypothesis that no beverages with artificial sweeteners would be served post-policy. As was the case for grams of *trans*-fat, fluid ounces of SSB, and 100% fruit juice, adherence to the standard post-policy for artificial sweeteners cannot be attributed to adoption of the policies since standards were being met pre-policy. The average consumption of beverages with artificial sweeteners was zero fluid ounces at all three sites. NDSR had subgroups for beverages with artificial sweeteners, but there were no subgroups or variables to identify

artificial ingredients in foods, including artificial food coloring or flavorings. Therefore, artificial ingredients in foods were not calculated, just artificial sweeteners in beverages. Although artificial sweeteners are included in the Healthy Eating standards, Beets *et al.* did not present data regarding this category in either of his studies regarding afterschool food.^{2,3}

The other five of the standards were not met by the policy-adoption sites by post-policy data collection, the first of which was increasing fruit and vegetable consumption. The consumption of fruits and vegetables is a primary outcome often measured in order to indicate snack healthfulness at ASP sites.^{2,3,60,64} Although children at Sites 1 and 2 were consuming a full serving of 100% fruit juice post-policy, they were still not meeting the healthy eating standards since the standards specify that the fruit serving is to be fresh, frozen, canned or dried without added sugar. The policies do not allow for 100% fruit juice to count as a fruit serving, although other policies and standards such as the NSLP do allow this item to count as a fruit serving.⁴⁵ Snack at Site 3 did not include any servings of fruits or vegetables. Therefore, none of the policy-adoption sites were meeting their weekly goal of serving a fruit or vegetable that is fresh, frozen, canned, or dried without added sugar; my hypothesis that sites would meet their goal to serve a fruit or vegetable weekly was not supported. The findings of this study parallel those of other studies which indicate that fruits and vegetables are among the least-commonly served and consumed items in ASPs.^{3,57} Beets *et al.* found that at baseline before the healthy snack initiative, children were served fruit 0.1 to 0.7 days per week and vegetables 0 days per week.² In this current study, the average fruit servings without fruit juice in the policy-adoption sites was 0.05 servings during baseline data collection and 0 servings post-policy. Vegetable servings, at 0.01 ± 0.02 servings at baseline and 0 ± 0 servings post-policy, mirrored the findings of Beets *et al.* However, fruit and vegetable consumption increased post-initiative to 5 ± 0 days

(or servings) per week in the Beets *et al.* study, while my current study did not observe any increase in fruit or vegetable consumption. Along with the adoption of the HEPA standards in four ASPs, Beets *et al.* had also evaluated the effectiveness of a community partnership between the ASPs and a grocery store.² While we cannot assume that the success of the Beets *et al.* intervention in increasing fruit and vegetable consumption was solely due to the partnership with the grocery store, it appears that this partnership had a positive impact on the ASPs abilities to meet the adopted standards. My current study did not employ nor investigate any support mechanisms such as a grocery store partnership, and ASP sites were meeting only four out of the nine adopted Healthy Eating standards post-policy. Results from the Beets *et al.* study suggest that had my study sites implemented some sort of partnership or support system, the outcome may have been more favorable.

The original healthy eating standard regarding fruits and vegetables was to serve at least one of the two on a daily basis. This recommendation is more pro-active in helping children to reach their recommended total number of servings of fruits and vegetables per day. As adoption of the HEPAQS is voluntary by ASPs, the programs also had the freedom to choose which of the standards they wished to adopt. In the case of our three policy-adoption P&R sites, they identified that adopting the policy to include a fruit or vegetable weekly was more feasible given their situation, resources, and circumstances. In the future, a participating ASP can always update the standards they wish to adopt.

The second Healthy Eating standard not met by the policy-adoption sites was that water is to be offered at all times at the ASPs, indicating that my hypothesis for this standard was not supported. The operational definition of offering water at all times according to the healthy eating standards is to offer water at the table during snack and also to have water accessible at all

times. While access to a water fountain assures that water is accessible at all times, if water is not offered at the snack table, then a site is not meeting this policy. Water recorded by observers included water offered either in bottles or cups at the snack table. None of the three policy-adoption sites met the standard of offering water daily at the snack table. In the observational study by Beets *et al.*, water was served daily at only 2 of 20 ASPs.³ As long as safe, free water such as tap water exists at an ASP site, implementing this policy should not accrue any added costs to the ASP. Mozaffarian *et al.* suggest that replacing 100% juice with tap water will result in cost savings which can be applied to the purchase of healthful options such as fresh fruits and vegetables.⁵³ Water availability during ASP snack was also studied by Giles *et al.* in a group randomized controlled trial among 20 ASPs in Boston which were randomized to either participate in a learning collaborative intervention or be observed as a control.⁸¹ Participation in the intervention, The Out-of-School Nutrition and Physical Activity Initiative, was associated with an increase in average volume of water served of 3.6 fluid ounces per day.⁸¹ Giles *et al.* also reported a potential cost savings of \$0.21 per snack per child by replacing 100% juice with water.⁸¹ In my current study during post-policy data collection, two out of three policy-adoption sites were serving about one serving of 100% fruit juice per child on a daily basis. By serving water on a daily basis at the snack table, the sites will not only be meeting the standard regarding water, but they will have more funds to devote to meeting the fruit and vegetable standard.

The third adopted Healthy Eating standard not met by adopting sites was to serve no candy or other foods that are primarily sugar based. The sweets food group in NDSR consists of candy, honey, sugar, sweet sauces, etc. and it is made up of eight subgroups: 1) Sugar, 2) Syrup, Honey, Jam, Jelly, Preserves, 3) Sauces, Sweet-Regular, 4) Sauces, Sweet—Reduced Fat/Reduced Calories/Fat Free, 5) Chocolate Candy, 6) Non-chocolate Candy, 7) Frosting or

Glaze, and 8) Sweetened Flavored Milk Beverage Powder without Non-fat Dry Milk. Energy-dense diets, particularly those including fat and added sugars are associated with overweight status in children.²⁹ Higher energy-density diets are also associated with lower consumption of fruits and vegetables, as sweets often replace more nutritious items.²⁹ Sites 2 and 3 served sweets during the post-policy adoption period, indicating that they failed to meet the standard, and that my original hypothesis was not supported. The average daily servings of sweets can be extrapolated to reflect the number of sweets servings offered per month at Sites 1 and 2.

Assuming a five day program week and four weeks in the month, Site 1 children consumed 2.6 servings of sweets per month, and Site 2 children consumed 2.2 servings per month. Rather than serving fractions of a serving of sweets each day at these two sites, we observed the sites serving sweets a few times per month. For example, at Site 1, a cookie-pudding dessert, an ice-cream cup, and gummy worms were all served different days during the month long observation period. Desserts (cookies, pies, snack cakes, cereal bars, granola bars) were consumed a bit more frequently in the policy intervention by Beets *et al.* at 2.0 ± 1.4 servings per week at baseline; however, servings decreased such that they were eliminated. As discussed previously, Beets *et al.* employed a partnership with a grocery store to help ASPs meet the standards which was an aspect of support lacking in my study.

The fourth standard not met by the adopting sites was to serve nutrient-dense snack options made with whole grains. The Dietary Guidelines for Americans (2010) recommend to make at least half of total grains consumed whole grains.⁹⁰ Whole grains promote nutrient-density in the diet as they contain vitamins, minerals, and fiber rather than just starchy carbohydrates as do refined grains.⁹⁰ However, the healthy eating standards are worded such that ASPs are to “emphasize” whole grains, yet the standards do not quantify what percentage of total

grains should be whole grains. At Site 1, 13% of the total grains were whole grains pre-policy, while only 10% of total grains were whole post-policy. The percentage of total grains that were whole grains at Site 2 increased from 17.6% to 20.4% from baseline to post-policy; however, 20% is still far below the recommendation that at least 50% of total grains are whole grains. The percentage of total grains that were whole grains at Site 3 was 100% at baseline and 92.5% at follow-up data collection. While the Dietary Guidelines recommendation refers to making at least 50% of total daily grain consumption whole grains and children could be making up for lack of whole grains in their afterschool program snack by eating whole grains at other meals, providing whole grain snacks increases their ability to meet the Dietary Guidelines recommendations. The NDSR software allowed for the calculation of serving of grains with “some whole grains,” as it divided each type of grain into three subgroups. For example, NDSR will differentiate between crackers with whole grain, some whole grain, and refined grain. At Site 1, 29.9% of total grain servings contained at least some whole grain during baseline data collection which decreased to 20.7% post-policy adoption. Site 2 consumption of some whole grains was 16.5% and 24.1% of total grain servings at baseline and follow-up respectively. Site 3 served mostly whole grains; there were no observed servings of grain with just some whole grains at this site. Since the composition of snacks that fall into the “some whole grains” category is not certain, the number of grams of whole grains in these items cannot be determined.

The majority of grains servings fell into the refined category for Sites 1 and 2, while Site 3 consistently met the standard by serving almost exclusively whole grains. Overall, on average, 35.1% of the total grains consumed at policy adoption sites were whole grains, and 18% contained some whole grain. However, there was quite a difference between individual sites and

the overall data masks the variety among sites. My hypothesis that policy-adoption sites would meet the standard of emphasizing whole grains was not supported.

The fifth standard not met by adopting sites was to offer no fried salty snacks such as potato or corn chips regardless of the type of oil used in cooking. Only one of the three policy-adoption sites met this standard. Sites 1 and 2 did serve snack chips, indicating that my hypothesis for this standard was not supported. There was no significant change at any site in the level of snack chip consumption from pre- to post-policy adoption. Although Beets *et al.* did not exclusively report on snack chips, consumption of flavored salty snacks and unflavored salty snacks in his observational study were 2.1 ± 1.7 and 1.3 ± 1.7 servings per week respectively.³ In the policy-intervention study by Beets *et al.*, salty snacks decreased from 3.1 ± 1.6 to 2.6 ± 1.5 , yet this change was not significant, indicating similar findings as my current study.²

Calories in Snacks Consumed

The average program-served snack at policy-adoption sites was about 217 ± 15.60 kilocalories post-policy. While there was no difference between pre- and post-policy energy (kilocalories) consumption at Sites 1 and 2, Site 3 experienced an increase in 85 calories from baseline to post-policy data collection. Site 3 did not always provide a regular snack for children at the site, even though the calorie level of the snacks that were provided were similar to those provided at the other sites. Although Site 3 appears to be meeting the greatest number of healthy eating standards (*Table 13*), Site 3 also provided the least regular snack, and children at this ASP often sought out snacks from the local corner store instead. Some days, Site 3 provided no program-served snack.

Although within the days that Site 3 served snack they were the most compliant policy-adoption site, serving program snack consistently each day of the program may have had a better overall outcome since non-program snacks consumed at Site 3 tended to be higher on average in total calories, SSBs, sweets, chips, and grams of *trans*-fat.

Role of the Comparison Sites

The role of the comparison sites was to serve as sites which were similar in geographic location to our policy-adoption sites but were not adopting the HEPA standards. Choosing sites that were in the same areas as the policy-adoption sites helps to minimize the possibility that any changes we saw in snack quality were due to forces other than the adoption of the HEPA standards such as another extraneous intervention in that same geographical area. Since the comparison sites were not adopting any policies nor changing their policies during the data collection periods, we would not expect to see any changes in snack quality. However, we did see significant beneficial changes in servings of 100% fruit juice and grams of *trans*-fat at comparison sites (*Table 9*). We do not know the reason why these changes occurred; it could have been that the sites experienced a change in the amount or types of snacks being donated at these sites such that more fruit juice could be provided to the children and the snacks served contained less *trans*-fat. Additionally, another plausible explanation is that the Hawthorne effect could have influenced site leaders' desire to offer different items because they knew that they would be observed in our study. However, the changes among comparison sites may have just been a fluke and we cannot pinpoint the exact reason as to why these changes occurred.

Even after policy adoption, the adoption sites overall did not exhibit any meaningful, clinically relevant changes although the consumption of SSBs did decrease post-policy by 0.58

fluid ounces (*Table 8*; $p= 0.022$). Among the comparison sites, 100% fruit juice consumption increased by about half a serving (*Table 9*), yet total fruit juice consumption was below the recommended 8 fluid ounces or less per child. It appears that the policy-adoption sites did no better than comparison sites even though they adopted the policies.

Overall, data did not support the hypothesis that policy-adoption sites would meet their adopted healthy eating standards. The policy-adoption sites did not meet their goals of serving a fruit or vegetable weekly, offering water at all times, serving no candy or other sugar-based foods, emphasizing whole grains, and serving no fried salty snacks including snack chips. All policy-adoption sites did, however, meet the adopted standards to only serve foods made without *trans*-fat, serve beverages without caloric sweeteners, limit 100% fruit juice to one 8 oz. serving, and avoid beverages made with artificial sweeteners.

My tertiary aim was to explore the nutrient quality of program-served snacks compared to non-program snacks children brought from home, stores, or vending machines across both policy-adoption and comparison sites. Overall, non-program snacks among policy-adoption sites contained less fruit and 100% fruit juice, but more SSBs and sweets, which supports my original hypothesis that non-program snacks would generally be less healthy than program snacks. Additionally, among comparison sites, non-program snacks also contained less fruit and 100% fruit juice yet more sweets and snack chips, supporting my hypothesis. However, non-program snacks among comparison sites also contained more whole grain servings (*Table 12*). My hypothesis that program snacks are generally healthier than non-program snacks was supported by my data. The HEPA standards address non-program snacks in the following ways.

The social support level of the healthy eating standards includes that “parents receive guidelines about food that may be brought into the program by the parent or child to ensure that such foods support the healthy eating objectives of the program” and that “the program has a process in place for discussing inappropriate food choices with parents.”⁶² However, there was no evidence to suggest that our study sites were implementing and enforcing these standards. Additionally, the environmental support best practices specify that students are not to have access to vending machines that sell snacks which do not support the healthy eating standards. Vending machines were still present at Site 1 during post-policy data collection, and at Site 3, students had access to the local corner store (*Table 3*). With further implementation of the standards, the policy-adoption sites may begin to address non-program sources of snacks such as vending machines and encouraging healthy food choices with parents.

This study intended to determine the effectiveness of adoption of the Healthy Eating standards, which is the second component of the RE-AIM framework. Individual level socio-demographic data was not collected for children at the ASP sites; therefore, reach could not specifically be calculated in order to determine how well children at ASP sites represent children from the entire area. Implementation and maintenance components are to be investigated during phase two of policy-adoption among the ASP sites in which sites intend to train staff and further implement the policies.

CHAPTER 5

SUMMARY

This pre-post evaluation of policy adoption found that policy-adoption sites met four out of nine adopted Healthy Eating standards. However, the policy-adoption sites had already been meeting these four standards pre-policy. Thus, the adoption of the Healthy Eating standards had no impact on snack quality in the three policy-adoption sites observed in this study. This study also found that non-program snacks were generally less healthy than program-served snacks as they contained more SSBs, sweets, and snack chips overall. In concordance with the RE-AIM framework, future studies in this population should investigate the implementation and maintenance phases of policy adoption by assessing staff training, staff behavior, and support systems employed to help meet the adopted policies.

Study Limitations

Limitations of this research study include the relatively small number of adopting ASPs. Three adopting sites were observed in this study since three P&R sites of the DRR autonomously adopted the standards. A strength of this current study was that two comparison sites were also observed for the duration of the study. The number of adopting sites is comparable to that in the Beets *et al.* policy adoption study and the Weaver *et al.* staff training study which both observed four ASPs, yet no comparison sites.^{2,65} Additionally, as this current study was an evaluation of a natural experiment on policy adoption at the site level, there were no interventions or support being provided by the researchers which may have led to increased implementation and adherence to the standards had support been provided. However, a strength of this study was that direct observation methods were employed rather than just conducting interviews or menu

reviews. Support efforts and assessment of implementation and maintenance of the standards is to occur during the second phase of policy-adoption among the ASP sites, as sites decided to adopt the policies in phase one and implement them in phase two. Limitations of the NDSR nutritional software included that NDSR was not able to indicate foods with artificial ingredients, just beverages. Also, while NDSR does have many brands of snack items, some brands were not in the database and a close substitution was chosen instead. In directly observing child consumption via a modified quarter-waste method, sometimes it was difficult to estimate amount consumed for snacks in opaque containers such as juice boxes. Observers were instructed to discreetly pick up and shake the juice box containers that had been thrown away if they needed to confirm the quantity left in the box. Lastly, this study measured effectiveness of the standards at the child consumption level, but did not intend to assess staff training or program support levels of implementation which will occur in phase two. Since the follow-up data collection period occurred in the early stages of post-policy adoption, the ASPs may not have had sufficient time to prepare their staff and adequately incorporate the standards into their routines. Data from this current study can help inform researchers and ASP site leaders understand where they are starting out and what needs to be done to improve and meet all the standards. Data from phase two will give greater insight into staff training and preparation for implementation of the standards.

Policy Implementation and Maintenance at the Policy-Adoption Sites

Implementation of adopted policies is challenging.⁶⁷ Jaime notes that the impact of school-based nutrition policies may be limited by maintenance of the changes.⁴⁸ In other words, if an adopted policy is not effectively implemented nor sustained, the effectiveness is

compromised. Results of this current study reinforce the need for continued efforts to support implementation of policy in addition to adoption of written policies.

The staff training elements of the healthy eating standards include that staff training is evidence-based, non-supportive of any particular industry, and is delivered by qualified personnel who uphold all food safety regulations.⁶² Staff are to receive at least yearly training on healthy menu development, and new staff are to be quickly trained and oriented to healthy menu development. The HEPA standards specify programs that employ a nutrition education curriculum should verify that said curriculum is evidence-based, non-supportive of any particular industry or food sector, and is delivered by qualified personnel. The staff at our policy adoption sites may need to seek professional training by qualified personnel in order to understand food safety, healthy menu development, and nutrition education. Additionally, staff may need to develop and update their staff training protocol to account for these staff-training policies.

The social support best practices emphasize a positive social environment which fosters healthy eating. Examples of best practices in this level of support include to not use food as a reward or punishment, birthdays and holidays are celebrated with healthy items, fundraisers emphasize healthy foods or nonfood items, and that students participate in the food selection and cleanup process. Additionally, staff are to model healthy eating by sitting and eating the daily program snack with the students, discussing the health benefits of the snack with the children, and avoiding bringing in and consuming personal food or beverages in front of the children. Parents are also involved at the social support level by receiving educational materials, promoting healthy food at parent events, and receiving guidelines regarding what foods may be brought to the program. Our policy-adoption sites may need to train staff how to role model healthy food items as well as how to address parents regarding what foods are allowed in the

program. Additionally, educational materials for parents could be developed and tailored towards parents at specific sites.

Program support refers to the infrastructure of the program which can foster healthy eating through management and budgeting practices. Best practices at this level include budgeting adequately for foods that meet the healthy eating standards, accessing appropriate federal nutrition programs to assist with funding, and avoiding use of food items for crafts. The policy-adoption sites in this study may need to reassess their budget and how they can meet the Healthy Eating standards within this budget. The sites should also consider possible reimbursement by federal nutrition assistance programs in order to lessen cost burden.

Lastly, the environmental support category refers to creating a physical environment which supports healthy eating. Physical aspects that should be addressed include posters, advertisements, books, vending machines, screen time, and adequate kitchen facilities. Improving the program support and staff training levels of the policy initiative will help to improve implementation and long-term maintenance of the policy adoption. ASP sites in this study should review any posters, books, and vending machines to be sure that healthy eating messages are consistent throughout the program.

Future Directions of Research

The focus of this study was the effect of policy adoption on consumption among children at the ASPs. The additional HEPAQS related to staff training and role modeling, parental support, nutrition education, and social, environmental, and program support were not directly assessed. The partner organization, P&R, planned a two-phase approach to the HEPAQS in which the policies would be adopted in year one with additional staff training the focus of year

two. Future studies should follow the ASPs through implementation into the maintenance phase of adopting the policies.

Studies should assess implementation of the healthy eating standards at the staff training level as well as the social, program, and environmental support levels since successful maintenance is tied to implementation of all levels of the standards. Efforts such as the work done by Weaver *et al.* which assessed staff behaviors in ASPs need to continue in order to link certain staff behaviors with child-level outcomes of healthy snack consumption.⁶⁵ To assess implementation, interviews and focus groups should be conducted with key informants and ASP leaders or directors. Direct observation and documentation review employing the HAAND tool and System for Observing Staff Promotion of Activity and Nutrition (SOSPAN) should continue through the implementation and maintenance phases. Future research is also necessary in order to provide support for ASPs to overcome price barriers.^{2,3} Beets *et al.* suggest that ASPs can form partnerships with local grocery stores or markets to decrease the cost burden of snacks to the ASPs.² In 2006 to 2008, Mozaffarian *et al.* evaluated the cost of healthy versus unhealthy snack options and suggested substitutes where appropriate.⁵³ Similarly, the price and healthfulness of current snacks in our policy-adoption ASPs should be evaluated in order to determine where cost savings can be made and what items can be exchanged for healthier ones.

Development of both support systems to overcome barriers and strategies to strengthen implementation and maintenance will not only improve existing ASPs which have adopted the HEPAQS, but will also justify adoption of these policies by additional ASPs who currently are not implementing any standards for healthy eating.

Conclusions and Implications

In conclusion, this study found that adoption of the Healthy Eating standards among P&R ASP sites did not effectively improve snack quality, yet program-served snacks were generally healthier than non-program snacks. The standards that sites met post-policy were also being met pre-policy and they included: serve no *trans*-fats, serve no SSBs, limit 100% fruit juice to one 8 ounce serving, and avoid artificially sweetened beverages. However, by post-policy, ASPs were not meeting five standards: weekly serve a fruit or vegetable, offer water at all times, serve no candy or sugar-based snacks, emphasize whole grains, and serve no snack chips.

The P&R partners of the Dan River Partnership for a Healthy Community should continue to seek support as they implement the Healthy Eating standards in their ASPs. The DRPHC research partners should support training and implementation efforts, and ASP sites should collaborate efforts to train staff in the areas of food safety, snack purchasing, snack preparation, and positive role modeling. P&R should consider participation in some kind of purchasing partnership with a food vendor to lessen snack costs. Specifically, P&R ASP sites should consider replacing juice boxes with water and using the resulting cost savings to purchase fruits and vegetables which comply with the standards and thus meet their goal of offering a fruit or vegetable at least once per week. Carrots or celery could be offered often since research has found that these items tend not to increase the cost of snack significantly.⁵³ Offering water at all times should be attainable at low cost by providing a pitcher of water and cups at the table during snack. Attaining the standards of serving no candy, emphasizing whole grains, and serving no snack chips may require a more in-depth menu evaluation of all items served to determine if snack items meet the standards. Lastly, P&R should take steps to address non-program snack consumption in their ASPs as these snacks were generally not as healthy as program-served

snacks. Vending machines which offer unhealthy snacks in opposition to the Healthy Eating standards should be removed. Furthermore, parents should be informed as to which foods are allowed to be brought from home into the program. As efforts to enhance implementation of the Healthy Eating standards continue, research partners should continue to assess adherence to the standards and present their findings to the local community and the greater research world so that effective standards can be implemented in ASPs all across the nation and improve the health of millions of children participating in these programs.

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APPENDICES

Appendix A: The Healthy Eating and Physical Activity Quality Standards



HEALTHY EATING AND PHYSICAL ACTIVITY (HEPA) STANDARDS

Healthy Eating:

In April, 2011 The National AfterSchool Association adopted these standards for healthy eating in out-of-school time programs. Accordingly, new language addresses snack content and quality, staff training, curriculum, social support (including staff role modeling, parent engagement and children's social development), program support, and environmental support.

Content and Quality

Standard: Programs serve foods and beverages in amounts and types that promote lifelong health and help prevent chronic disease. These include minimally processed foods made with whole grains and heart-healthy fats or oils and without added sugar or trans fats; fruits and vegetables; and beverages made without added sugars.

Best Practices

1. On a daily basis, the program:
 - a. serves a fruit or vegetable (fresh, frozen, canned or dried without added sugar).
 - b. offers water at the table during snack, and has water accessible at all times.
 - c. only serves foods made without trans fat.
 - d. serves beverages that are not made with caloric sweeteners. Beverages made with caloric sweeteners include but are not limited to sodas, juices, juice drinks/ades, sports drinks or iced teas.
 - e. serves no candy or other foods that are primarily sugar based.
 - f. through portion size and variety of items offered each day, provides each student with enough calories to avoid both hunger and over eating.
 - g. offers choices and accommodates dietary restrictions related to allergy, food intolerance, religion and culture. Examples include offering high-calcium beverages for children that cannot drink regular cow's milk such as soymilk or lactose-free milk.
2. The menu:
 - a. emphasizes nutrient dense options including baked goods made with whole grains and without trans fats, and protein foods that include lean meats, nuts or beans.
 - b. emphasizes healthy beverages including low or nonfat milk; plain or naturally flavored non-carbonated water; and 100% fruit juice.
 - i. does not offer flavored milk made with added sugars or artificial ingredients
 - ii. fruit juice should be limited to one 8 oz serving per day
 - iii. no limits on low/nonfat plain milk or water.
 - c. offers sweet baked goods no more than twice a month, and these contain no trans fat.
 - d. serves no foods that are deep fried, par fried or flash fried unless a healthy oil (unsaturated or poly-unsaturated such as canola, peanut or olive oil) was used in the frying process.

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- i. does not offer fried, salty snacks such as potato or corn chips regardless of type of oil used in cooking.
 - e. avoids foods and beverages made with artificial ingredients (sweeteners, flavors, or colors).
 - f. is based on a minimum 2 week cycle, and ideally a 4 week cycle to maximize variety.
3. Alternatively, or in addition, the program's food choices are guided by an evidence-based source of nutrition guidelines for snack menus whose content is drawn from scientific literature. Programs should avoid guidelines produced by institutions with ties to specific products or for-profit industries. Examples of evidence based sources of nutrition guidelines include but are not limited to (URLs can be found at the end of the document):
- a. Institute of Medicine Nutrition Standards for Foods in Schools. *Standards for the Afterschool Setting*.
 - b. California Department of Education *Nutrition Standards for Snacks in After School Programs*.
 - c. Alliance for a Healthier Generation school meals and competitive foods/afterschool program standards.
 - d. USDA Child and Adult Care Food Program
 - e. School Wellness Policy and Procedure document
 - f. YMCA health promotion standards for afterschool programs

Staff Training

Standard: Staff regularly participate in learning about healthy eating grounded in effective training models using content that is evidence-based.

Best Practices

- 1. All training on healthy eating is comprehensive, evidence-based, does not support a particular industry or food sector agenda, and is delivered by qualified personnel.
- 2. Facility adheres to local standards/regulations for food safety.
- 3. Healthy Menu Development:
 - a. Appropriate Staff (those charged with this responsibility) receive training in healthy menu development at least once each year.
 - i. Such training may complement but not replace training for compliance or participation in federal food assistance programs.
 - ii. In programs where food is not purchased by the program itself, the staff are educated on healthy menus so that they may advocate with their food sources for quality menu items.
 - b. New staff are quickly oriented to healthy menu development (if regularly scheduled training is at least a month away).
 - c. At least 2 staff are trained at a time.
- 4. Health promotion awareness training and coaching:
 - a. All staff receive training on the role of healthy eating, physical activity, and social supports for healthy behaviors minimally once per year.
 - c. New staff are quickly oriented to this information.

Nutrition Education Curriculum

Standard: Programs that offer nutrition education classes will ensure that materials presented to children are evidence-based, do not support a particular industry or food sector agenda, and are delivered by qualified personnel.

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Best Practices

1. The program uses a curriculum that is grounded in nutrition and behavioral science such as CATCH Kids Club or YMCA's Food and Fun After School.
2. USDA Cooperative Extension nutritionists deliver curriculum.

Social Support

Standard: The program creates a social environment, including positive relationships, that encourages children to enjoy healthy foods. Research shows that children's food choices are influenced not only by food appearance, taste and familiarity, but also by social factors including peers, role models, group dynamics, and having healthy options.

Best Practices

1. Function of food in the program is to promote healthy eating and good nutrition.
 - a. Food is not used as a reward or punishment.
 - b. Holidays and birthdays are celebrated with healthy items.
 - c. Fundraisers emphasize healthful foods or rely on nonfood items.
2. Students participate in food selection, distribution, preparation, and clean-up.
3. Staff model and promote healthy eating.
 - a. Staff members sit and eat the daily program snack or meal with students.
 - b. Staff discuss the health benefits of snack components with children.
 - c. Staff members do not bring in/consume personal food or beverages in front of children other than items that would appear on the program's menu.
4. Parents are engaged with the program's emphasis on healthy eating.
 - a. Educational materials (that meet standards for curriculum above) are made available to parents/families through pamphlets, newsletters, email blasts or other means
 - b. Healthy food is served at parent events.
 - c. Parents receive guidelines about food that may be brought into the program by the parent or child to ensure that such foods support the healthy eating objectives of the program.
 - i. The program has a process in place for discussing inappropriate food choices with parents.
 - d. Healthy eating standards and practices are shared and discussed during parent advisory group meetings.
 - e. Programs develop parent advisory groups to support developing healthy habits at home.

Program Support

Standard: Infrastructure supports healthy eating through management and budgeting practices.

Best Practices

1. The program budgets appropriately for food costs based on a food and beverage program that addresses the standards above.
2. The program accesses federal nutrition programs that can assist with providing healthy snacks and meals to participants, including the Child and Adult Care Food Program, the National School Lunch Program, and the Summer Feeding Program.
3. If the food budget has a small margin, the program does not use their food budget for food-based crafts (i.e., uses their supply budget for pasta intended for use in craft projects).
4. Program managers and executives support healthy eating through coaching, mentoring, and

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- monitoring menu quality.
- 5. Foods served at staff meetings are healthy.
- 6. Staff at all levels model healthy eating on the job.

Environmental Support

Standard: The program's physical environment supports healthy eating. Availability of vending machines, advertising and availability of kitchen facilities can all influence food choices and food availability.

Best Practices

1. No posters or advertisements on the walls promote unhealthy foods or include logos or trademarks from companies that produce foods that do not support the healthy eating standards.
2. The program environment provides positive messages about healthy eating through posters, pictures and books.
3. Students do not have access to vending machines that sell foods and beverages that do not support the healthy eating standards.
4. The program restricts screen time (as described in Physical Activity section) to avoid exposure to food marketing.
5. The program has adequate kitchen and storage facilities—and has adequate access to them—to support the healthy eating standards, for example through shared use agreements with host sites.

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Physical Activity:

In April, 2011 The National AfterSchool Association adopted these standards for physical activity in out-of-school time programs. As adopted, NAA's standards for physical activity support the USDHHS 2008 guidelines for activity patterns shown to promote lifelong health and prevent chronic disease. Accordingly, new language addresses content and quality, staff training, social support (including staff role modeling, parent engagement and children's social development), program support, and environmental support.

Content and Quality

Standard: The program's physical activity offerings support the USDHHS 2008 guidelines recommending that all children and youth obtain at least 60 minutes of physical activity per day that includes a mixture of moderate and vigorous intensity activity as well as bone and muscle strengthening activities.

Best Practices

1. Dedicates at least 20% or at least 30 minutes of morning or afterschool program time to physical activity (60 minutes for a full day program).
2. Provides physical activities in which students are moderately to vigorously active for at least 50% of the physical activity time.
3. Play takes place outdoors whenever possible.
4. Ensures that daily physical activity time includes aerobic and age-appropriate muscle and bone strengthening and cardio-respiratory fitness activities.
5. Includes a variety of physical activity options aimed at engaging students in fun, recreational, and life-long learning opportunities.
6. Offers unstructured free play or structured activities that involve all program attendees.
7. Offers non-competitive activities.
8. Offers competitive physical activities in an intramural program (see NASPE guidelines).
9. Offers activities that are adaptable, accessible and inclusive of children with all abilities, including physical, sensory and intellectual disabilities.
10. Conducts physical activities that are integrated with enrichment, academic, or recreation content; goal-driven, planned, sequentially designed and delivered, safe, inclusive, developmentally appropriate, and success-oriented.
11. Provides short physical activity breaks between and/or within learning activities to invigorate children and eliminate long periods of sitting; incorporates physical activity into transition time.
12. Does not permit access to television or movies, and limits digital device time to less than one hour per day to allow for other activities. Digital device use is limited to homework or devices/programs that actively engage children in moderate to intense physical activity.

Staff Training

Standard: Staff participate in learning about physical activity using effective training models and using content that is evidence-based.

Best Practices

All staff leading physical activities at the afterschool program:

1. Receive annually a minimum of eight contact hours of professional development on effective practices and strategies for including physical activity that supports the USDHHS guidelines as an element of their programs.
2. Are First Aid/CPR certified and provide 16 hours of annual in-service training, including: new staff orientation, service training, training in health/activity, training in behavior management.
3. Are trained in adapting physical activity opportunities to include children and youth at all levels

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of athletic availability and those with physical, sensory or intellectual disability.

All staff:

1. Are trained not to withhold opportunities for physical activity (e.g., not being permitted to play with the rest of the class or being kept from play-time), except when a child's behavior is dangerous to himself or others. Staff members are trained to use appropriate alternate strategies as consequences for negative or undesirable behaviors.
2. Are trained and familiar with curricular resources on integrating physical activity throughout the program.

Social Support

Standard: The program creates a social environment, including positive relationships, that encourages children to enjoy and participate in physical activity. Research shows that children's physical activity choices are influenced not only by preference and familiarity, but also by social factors including peers, role models, group dynamics, and having multiple options.

Best Practices

1. Staff lead and participate in active play (e.g., games and activities).
2. Staff do not withhold or use physical activity as a punishment or reward.
3. Students participate in activity selection, organization and leadership.
4. Parents are engaged with the program's emphasis on healthy physical activity.
 - a. Educational materials are made available to parents/families through pamphlets, newsletters, email blasts or other means.
 - b. Parent events incorporate physical activity.
 - c. Physical activity standards and practices are shared and discussed during parent advisory group meetings.
 - d. Programs develop parent advisory groups to support physical activity at home.

Program Support

Standard: Infrastructure supports physical activity through management and budgeting practices.

Best Practices

1. The program budgets appropriately to provide high quality physical activity experiences.
2. Program managers and executives support physical activity improvements through coaching, mentoring, and monitoring progress.
3. Program participates in ongoing self-evaluation and program improvement strategies.
4. The program's liability and risk management policies enable staff to participate in physical activity with students.
5. The organization promotes and encourages a physically active lifestyle among staff.

Environmental Support

Standard: The program's physical environment supports the physical activity standards.

Best Practices

1. Equipment for games, sports and activities is age and developmentally appropriate.
2. Equipment is sufficient to engage all participants and meets all required safety Standards.

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3. Equipment supports USDHHS physical activity goals by facilitating cardiorespiratory and musculoskeletal fitness.
4. The program has adequate indoor facilities for physical activity.
5. The program has adequate outdoor facilities for physical activity, including fields and playgrounds that meet safety standards for surfacing, equipment, and workmanship.
6. The program has adequate access to indoor and outdoor facilities through formal or informal shared use agreements with host facilities.
7. The program environment provides positive messages about safe and developmentally appropriate physical activity through posters, pictures and books.

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Resources For Standards

Alliance for a Healthier Generation, Healthy Schools Program Framework. *Healthy Schools Program Framework: Criteria for Developing a Healthier School Environment*. Retrieved June 14, 2010, from http://www.healthiergeneration.org/uploadedFiles/For_Schools/Healthy_Schools_Program_Framework/Framework_July09_sp_highres.pdf.

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Appendix B: The HAAND Tool

Healthy Afterschool Activity and Nutrition Documentation – HAAND

Program Name:	_____	Date of Observation:		/		/	
Location:	_____						
Weather:	_____	# Children:		# Staff:			
		Program Start:		Program End:			

What was served for snack?			Describe
Did children bring outside <u>food</u> ?	YES	NO	If YES, describe...
Did children bring outside <u>drinks</u> ?	YES	NO	If YES, describe...
Did staff eat/drink foods other than snack in front of children?	YES	NO	If YES, describe...
Are children allowed to bring electronic media devices	YES	NO	If YES, describe...
Total time allocated for physical activity			# Minutes Scheduled for PA
Notes:			

Healthy Afterschool Program Index – HAPI (Physical Activity)

Domain	Item	Source	Level					Score
			0	1	2	3	4	
Policy	Written Policies	Document review	No written policies	Written policies, non-specific language	Written policies, explicit language (i.e., measurable)			
Child Involvement	Feedback	Document review or self-report	None	Informal collection	formal collection			
Screen time		Document review or self-report	> 1 hr/day	< 1 hr/day	None allowed			
Schedule of PA	Time Allocated	Document review or Observation	No scheduled time	Less than 25% of ASP	25-49% scheduled	50% or more of schedule		
	Types of Activities	Document review or Observation	None	Limited # activities	Diverse range of activities that appeal to child of all skill level			
	Equity	Document review or Observation	Activities favor single gender	Activities appeal to both genders				
Training for PA	Staff Training - Amount	Document review or self-report	No training for physical activity promotion	Less than 1hr devoted to PA/yr	1-4hr devoted to PA/yr	+4hrs/yr		
	Staff Training - Quality	Document review or self-report	No training for physical activity promotion	Training delivered by non-certified personnel	Training delivered by qualified professional (e.g., physical educator, health promotion specialist, graduate degree in health ed. field)			
	Parent Workshop	Document review or self-report	None	1/yr	+2/yr			
Curricula		Document review	None	Non evidence-based curriculum	Evidence-based curriculum			
Evaluation		Document review or Observation	None	Limited evaluation (e.g., single time per year) Non-valid methods (e.g., staff reports, child self-reports)	Ongoing evaluation (e.g., 2 or more times per year) Non-valid methods	Limited evaluation Valid methods (e.g., pedometers, accelerometers, trained observation)	Ongoing evaluation Valid methods	
Total Score								/25

Star Rating: 1 to 5 = ★, 6 to 9 = ★★, 10-14 = ★★★, 15-21 = ★★★★, and 22-25 = ★★★★★

Healthy Afterschool Program Index – HAPI-PA (Physical Activity)

Domain	Item	Source	Notes/Comments
Policy	Written Policies	Document review	
Child Involvement	Feedback	Document review or self-report	
Screen time		Document review or self-report	
Schedule of PA	Time Allocated	Document review or Observation	
	Types of Activities	Document review or Observation	
	Equity	Document review or Observation	
Training for PA	Staff Training - Amount	Document review or self-report	
	Staff Training - Quality	Document review or self-report	
	Parent Workshop	Document review or self-report	
Curricula		Document review	
Evaluation		Document review or Observation	

Healthy Afterschool Program Index – HAPI-N (Nutrition)

Domain	Item	Source	Level					Score
			0	1	2	3	4	
Policy	Written Policies	Document review	No written policies	Written policies, non-specific language	Written policies, explicit language (measurable)			
Child Involvement	Feedback	Document Review or Self-report	None	Informal collection	Formal collection			
Quality of Snacks	Fruit	Document Review or self-report	None served	1 time/wk	2 times/wk	3 times/wk	4 or more times/wk	
	Vegetable	Document Review or self-report	None served	1 time/wk	2 times/wk	3 times/wk	4 or more times/wk	
	Sugar Sweetened Beverages	Document Review or self-report	4 or more times/wk	3 times/wk	2 times/wk	1 time/wk	None served	
	Whole Grains	Document Review or self-report	None served	1 time/wk	2 times/wk	3 times/wk	4 or more times/wk	
Access to vending Machines		Document Review or Observation	Full access	No access				
Training	Staff Training - Amount	Document review or self-report	No training	Less than 1hr/yr	1-4hr/yr	+4hrs/yr		
	Staff Training - Quality	Document review or self-report	No training	Training delivered by non-certified personnel	Training delivered by qualified professional			
	Parent Workshops	Document review or self-report	None	1/yr	+2/yr			
Curricula		Document review	None	Non evidence-based curriculum	Evidence-based curriculum			
Evaluation		Document Review or Observation	None	Limited evaluation (e.g., single time per year) Non-valid methods (e.g., staff reports, child self-reports)	Ongoing evaluation (e.g., 2 or more times per year) Non-valid methods	Limited evaluation Valid methods (e.g. Using for example nutrition calculator to determine whether snack served meet national/local guidelines))	Ongoing evaluation Valid methods	
Total Score								/34

Star Rating: 1 to 6 = ★, 7 to 14 = ★★, 15-21 = ★★★, 22-27 = ★★★★, and 28-34 = ★★★★★

Healthy Afterschool Program Index – HAPI (Nutrition)

Domain	Item	Source	Notes/Comments
Policy	Written Policies	Document review	
Child Involvement	Feedback	Document Review/Self-report	
Quality of Snacks	F&V	Document Review or self-report	
	Sugar Sweetened Beverages	Document Review or self-report	
	Whole Grains	Document Review or self-report	
Access to vending Machines		Document Review or Observation	
Training	Staff Training - Amount	Document review or self-report	
	Staff Training - Amount	Document review or self-report	
	Parent Workshops	Document review or self-report	
Curricula		Document review	
Evaluation		Document Review or Observation	

Appendix C: NDSR Subgroups and ID Codes

<i>NDSR Subgroups and ID Codes</i>	
Food category	Subgroups Summed to Perform Calculation
Water	BVU0500 “Unsweetened water”
Sugar-Sweetened Beverages	BVS0400 “Sweetened soft drinks” BVS0300 “Sweetened fruit drinks” BVS0500 “Sweetened tea” BVS0100 “Sweetened coffee” BVS0200 “Sweetened coffee substitutes” BVS0600 “Sweetened water”
Artificially sweetened drinks	DML0400 “artificially sweetened flavored milk beverage powder with non-fat dry milk” MSC1100 “artificially sweetened flavored milk beverage powder without non-fat dry milk” DOT0400 “artificially sweetened pudding and other dairy dessert” DOT0600 “dairy-based artificially sweetened meal replacement/supplement” BVA0400 “artificially sweetened soft drinks” BVA0300 “artificially sweetened fruit drinks” BVA0500 “artificially sweetened tea” BVA0100 “artificially sweetened coffee” BVA0200 “artificially sweetened coffee substitutes” BVA0600 “artificially sweetened water” BVA0700 “nondairy-based artificially sweetened meal replacement/supplement”
100% fruit juice	FRU0100 “citrus juice” FRU0200 “fruit juice excluding citrus juice”
Fruit Servings (Total)	FRU0100 “citrus juice” FRU0200 “fruit juice excluding citrus juice” FRU0300 “citrus fruit” FRU0400 “fruit excluding citrus fruit” FRU0500 “avocado and similar” FRU0600 “fried fruits” FRU0700 “fruit-based savory snack”
Fruit Servings (No Juice)	FRU0300 “citrus fruit” FRU0400 “fruit excluding citrus fruit” FRU0500 “avocado and similar” FRU0600 “fried fruits” FRU0700 “fruit-based savory snack”

Vegetable Servings	VEG0100 “dark-green vegetables”
	VEG0200 “deep-yellow vegetables”
	VEG0300 “tomato”
	VEG0400 “white potatoes”
	VEG0800 “fried potatoes”
	VEG0450 “other starchy vegetables”
	VEG0700 “legumes (cooked dried beans)”
	VEG0600 “other vegetables”
	VEG0900 “fried vegetables”
Whole grains Servings	VEG0500 “vegetable juice”
	GRW0100 “Grains, flour and dry mixes—whole grain”
	GRW0200 “Loaf-type bread and plain rolls—whole grain”
	GRW0300 “Other breads (quick breads, corn muffins, tortillas)—whole grain”
	GRW0400 “crackers—whole grain”
	GRW0500 “pasta—whole grain”
	GRW0600 “ready-to-eat cereal (not presweetened)—whole grain”
	GRW0700 “ready-to-eat cereal (presweetened)—whole grain”
	GRW0800 “Cakes, cookies, pies, pastries, Danish, doughnuts and cobblers—whole grain”
	GRW100 “Snack bars—whole grain”
	GRW0900 “snack chips—whole grain”
	GRW1100 “popcorn”
	GRW1200 “flavored popcorn”
Some whole grains Servings	GRS0100 “Grains, flour and dry mixes—some whole grain”
	GRS0200 “Loaf-type bread and plain rolls—some whole grain”
	GRS0300 “Other breads (quick breads, corn muffins, tortillas)—some whole grain”
	GRS0400 “crackers—some whole grain”
	GRS0500 “pasta—some whole grain”
	GRS0600 “ready-to-eat cereal (not presweetened)—some whole grain”
	GRS0700 “ready-to-eat cereal (presweetened)—some whole grain”
	GRS0800 “Cakes, cookies, pies, pastries, Danish, doughnuts and cobblers—some whole grain”
	GRS100 “Snack bars—some whole grain”
	GRS0900 “snack chips—some whole grain”

Dairy Servings	DMF0100 “milk—whole”
	DMR0100 “milk—reduced fat”
	DML0100 “milk—low fat and fat free”
	DMN “milk—nondairy”
	DMF0200 “ready-to-drink flavored milk--whole”
	DMR0200 “ready-to-drink flavored milk—reduced fat”
	DML0200 “ready-to-drink flavored milk—low fat and fat free”
	DML0300 “sweetened flavored milk beverage powder with non-fat dry milk”
	DML0400 “artificially sweetened flavored milk beverage powder with non-fat dry milk”
	DCF0100 “cheese—full fat”
	DCR0100 “cheese—reduced fat”
	DCL0100 “cheese—low fat and fat free”
	DCN0100 “cheese—nondairy”
	DYF0100 “yogurt—sweetened whole milk”
	DYR0100 “yogurt—sweetened low fat”
	DYL0100 “yogurt—sweetened fat free”
	DYF0200 “yogurt—artificially sweetened whole milk”
	DYR0200 “yogurt—artificially sweetened low fat”
	DYL0200 “yogurt—artificially sweetened fat free”
	DYN0100 “yogurt—nondairy”
	DOT0100 “frozen dairy dessert”
	DOT0200 “frozen nondairy dessert”
	DOT0300 “pudding and other dairy dessert”
	DOT0400 “artificially sweetened pudding and other dairy dessert”
	DOT0500 “dairy-based sweetened meal replacement/supplement”
	DOT0600 “dairy-based artificially sweetened meal replacement/supplement”
	DOT0700 “infant formula”
	DOT0800 “infant formula—nondairy”
Sweets Servings	SWT0400 “sugar”
	SWT0500 “syrup, honey, jam, jelly, preserves”
	SWT0700 “sauces, sweet—regular”
	SWT0800 “sauces, sweet—reduced fat/reduced calorie/fat free”
	SWT0100 “chocolate candy”
	SWT0200 “non-chocolate candy”
	SWT0300 “frosting or glaze”
	SWT0600 “sweetened flavored milk beverage powder without non-fat dry milk”

Fried salty snacks (snack chips servings)	GRW0900 “snack chips—whole grain” GRS0900 “snack chips—some whole grain” GRR0900 “snack chips—refined grain”
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