ABSTRACT
Objective: To evaluate a community partnership between after-school programs (ASPs) and grocery stores to provide discounted pricing on snacks to meet the National Afterschool Association Healthy Eating Standards that call for serving a fruit or vegetable (FV) daily while eliminating sugar-based foods and beverages.

Methods: A single-group, pretest with multiple posttest design (spring, 2011–2013) in 4 large-scale ASPs serving 500 children/d was used, along with direct observation of snacks served, consumed, and cost.

Results: At baseline, FV, sugar-sweetened beverages, and desserts were served 0.1–0.5, 1.7–2.0, and 1.4 d/wk. By spring, 2013, FV increased to 5.0–0.0 d/wk, whereas sugar-sweetened beverages and desserts were eliminated. A total of 84% of children consumed the fruit; 59% consumed the vegetables. Cost associated with purchasing snacks resulted in a $2,000–$3,000 savings over a standard 180-day school year.

Conclusions and Implications: This partnership can serve as a model for successfully meeting nutrition policies established for ASP snacks.

Key Words: cost, nutrition, snack, children, school (J Nutr Educ Behav. 2013; [8]:1-6.)

INTRODUCTION
Nationally, after-school programs (ASPs) serve more than 8.4 million children, the majority of whom are elementary age. One of the major components of the ASP schedule is the provision of a snack. This snack represents an important part of a child's overall daily dietary intake by providing sustenance between school lunch and dinner at home. Evidence to date indicates that the nutritional quality of the foods and beverages served as snacks in ASPs falls short of existing nutrition standards for snacks in ASPs; the majority of the foods served contain high amounts of sugar (eg, cookies, candy) and sodium (eg, chips), and the beverages primarily are sugar-sweetened. Conversely, healthful foods and beverages, such as fruits, vegetables, and water, are almost entirely absent.

To address snack quality in ASPs, the National Afterschool Association developed the Healthy Eating Standards, which were subsequently adopted by the YMCA. The Healthy Eating Standards specify that all ASPs should serve fruits or vegetables every day, serve water as the primary beverage, and eliminate sugar-based foods and beverages. Previous studies have shown that adopting clear nutritional guidelines can significantly improve the types of foods and beverages served for snacks. However, the sustainability of changes to program practices remains in question, particularly because of potential issues surrounding cost associated with serving fruits and vegetables and whether children will consume “healthier” snacks. Cost is a major barrier to meeting existing nutritional guidelines for snacks in ASPs. In addition, studies indicate that a large portion of the fruits and vegetables served to children, primarily during school lunch, go uneaten. Thus, although short-term changes in meeting the standards have been achieved, it is unclear whether they are sustainable. Therefore, the purpose of this study was to evaluate an innovative partnership between 4 YMCA ASPs and a local grocery store chain on (1) meeting the Healthy Eating Standards, (2) the costs associated with meeting the Healthy Eating Standards, and (3) whether children consume the healthier snacks.

METHODS
Participants
The 4 participating ASPs were part of a midsize YMCA association with 5 branch associations, 4 of which
provide youth programming. The organization was taking part in a 2-year policy-level intervention focused on physical activity and nutrition grounded in the principles of community-based participatory research. The information presented in this brief focuses solely on the changes to snacks across the 2-year study. The ASPs served approximately 500 children/d (5–12 years of age; range, 60–180/site), took place immediately after school (about 3 PM), and lasted approximately 3 hours (until about 6 PM). All children arrived at the same time and were allowed to leave the ASP any time in the company of a parent or guardian. All ASPs had a similar schedule, each beginning with a snack followed by homework, enrichment, and physical activity. Each ASP purchased its snacks individually. None of the ASPs was receiving federal reimbursement for snacks or had policies in place specifying the nutritional content of the snacks served. The University of South Carolina Institutional Review Board approved all methods. Approval by the institutional review board included not having any child assent or parental consent, or consent with the grocers.

Intervention

The goal of the policy-level intervention was to identify strategies that would allow for the purchase of snacks that meet the Healthy Eating Standards defined by the National After-school Alliance and endorsed by the YMCA. To achieve the Healthy Eating Standards, in fall, 2011, leaders within the organization (business managers, site directors, child care directors, and program leaders) convened 4 meetings to identify potential strategies to achieve the nutrition goals outlined in the Healthy Eating Standards, while also being cognizant of the costs associated with purchasing fruits and vegetables to serve on a daily basis. The Healthy Eating Standards were used to guide all snack purchasing decisions implemented at the beginning of January, 2012. Although the standards call for serving a fruit or vegetable 5 d/wk, the ASPs determined that by the end of spring, 2012, they would set a goal of serving a minimum of 3 fruits or vegetables/wk, with the intent of reaching 5 servings/wk by the end of the second year (spring, 2013).

The primary concern for the ASPs when establishing nutrition policies for their snacks was the cost associated with serving fruits and vegetables on a daily basis. Across the 2-year intervention, the 4 ASPs allocated $0.34/child/snack/d to purchase snacks. To address this concern, the ASPs and university staff approached a local grocery store chain about a partnership to provide nutritious snacks to ASPs. The grocer provided a discounted pricing structure (cost plus) to allow the ASPs to purchase items recommended by the Healthy Eating Standards while maintaining current allocated snack expenses. The partnership was based on a systems framework conceptual model for translating policy into practice in ASPs. A key feature of the systems framework is the identification of outside organizations with expertise and resources that can be leveraged to build the capacity of ASPs to meet policy goals. The principles underlying this partnership were to establish a network of local food sellers that (1) can be easily accessed by ASPs dispersed geographically across 2 counties (convenient to access based on proximity for ASPs to grocery stores), where ASPs can purchase snacks that (2) conform to the established Healthy Eating Standards and (3) result in either maintaining or reducing current snack expenditures.

As part of the community partnership, the ASPs in conjunction with university personnel developed a snack order form that included only items that met the Healthy Eating Standards and monthly menus that included a fruit or vegetable every day. The order form served as a way to ensure that only items that conformed to the standards were available for purchase, whereas the monthly menu provided the ASPs with intentional planning of the daily snack offering. During the intervention, ASP site leaders ordered snacks every 1–2 weeks and placed their orders on Wednesday before a Monday pickup at the closest grocery store.

The ASP leaders recorded the types of foods and beverages served as snack and verified them via unannounced site visits and receipts by research staff. Across each measurement occasion (spring, 2011 to spring, 2013), program leaders recorded the daily snack offerings for each week (Monday through Friday) and saved any snack waste (eg, wrappers, peels) in a plastic sealable bag. On Fridays, a trained research staff would retrieve snack information and waste. Unannounced weekly site visits to each ASP during snack time were made to ensure the accuracy of the reported snack offerings. A total of 107 unannounced visits were conducted across the 4 ASPs. Snack information provided by the ASP leaders and from the direct observation during unannounced site visits were confirmed from purchasing receipts provided by the ASPs to the research staff. No evidence of inaccurate reporting was detected. Snack information was collected for 9 weeks each during spring/fall, 2011, and for 7 weeks each during spring/fall, 2012, and spring, 2013. Food and beverage items served as snacks were classified according to existing categories for snacks and included beverages and are defined in Table 1.

The costs of snacks purchased from the grocery store partner were determined via receipts provided by the ASPs. In addition, costs of the same snacks from a bulk warehouse club and a large food service vendor were collected. This was done to compare pricing from the grocery store partner in relation to purchasing the same snacks, had the ASPs continued to buy snacks from the bulk warehouse (location of snack purchases before partnership) or had they contracted with a food service vendor (consistent with other ASPs).

The researchers collected consumption of snacks using a modified direct observation protocol. During snack, children sat in groups of ≥ 3 children. At each unannounced site visit, trained research staff randomly selected a group of children. Within this group, no more than 5 children were randomly selected and observed for the entire duration of the snack time (approximately 15 minutes). During this time, a single observer recorded what the children were served.
for snack and indicated whether each child consumed the snack. Consumption was defined as observing a child eating ≥ 50% of an offered snack item. For instance, if children were provided a whole piece of fruit, a child would be classified as consuming the fruit if researchers observed that the child had eaten at least half of the fruit. When children did not eat any of the snack or only took several bites, consumption was recorded as 0 (not consumed). Inter-rater consumption reliability was estimated for 107 children served 217 snacks, with \( \kappa = 0.89 \) and percent agreement, 97%.

### Data Analysis

The Healthy Eating Standards were evaluated by comparing changes in the types of snacks served from baseline (spring, 2011) to final assessment (spring, 2013). The reliable change index was calculated for each snack category using the number of times a snack category was served each week by the following formula: Reliable change = \( x_2 - x_1 / S_{diff} \), where \( x_2 \) and \( x_1 \) represent the baseline and post-initiative servings per week, respectively, and \( S_{diff} \) represents the standard error of difference between 2 test scores. The \( S_{diff} \) is equal to \( \sqrt{2(S_E)^2} \). The \( S_E \) (standard error of measurement) was calculated by \( S_E = s_1 \sqrt{1 - r_{xx}} \), where \( s_1 \) is the standard deviation of the spring, 2011 servings per week and \( r_{xx} \) is the reliability coefficient of the measure. For the analysis, 0.9 reliability coefficient was used. A reliable change index ≥ 1.96 indicates that significant changes occurred in the number of servings per week for each snack category. For snack categories in which 0 servings were observed at either measurement period (spring, 2011 or 2013), no analyses were performed because of the complete absence of the snack type (i.e., 0) from either the spring, 2011 or spring, 2013 measurement.

### Table 1: Average Servings for Snacks (Days per Week) at Baseline (Spring/Fall, 2011) and Post-initiative (Spring, 2012; Fall, 2012; and Spring, 2013)

<table>
<thead>
<tr>
<th>Snack Food/Beverage Category</th>
<th>Mean (SD)</th>
<th>Mean (SD)</th>
<th>Mean (SD)</th>
<th>Mean (SD)</th>
<th>Mean (SD)</th>
<th>Mean (SD)</th>
<th>Mean (SD)</th>
<th>Mean (SD)</th>
<th>Reliable Change Indexa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy (eg, yogurt, cheese)</td>
<td>0.1 (0.2)</td>
<td>0.2 (0.4)</td>
<td>1.0 (0.5)</td>
<td>0.4 (0.8)</td>
<td>0.9 (0.9)</td>
<td>8.94</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Fruits (eg, fresh, frozen, dried)</td>
<td>0.1 (0.5)</td>
<td>0.7 (1.5)</td>
<td>3.5 (1.5)</td>
<td>4.3 (0.8)</td>
<td>5.0 (0.0)</td>
<td>21.91</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetables² (eg, baby carrots, celery)</td>
<td>0.0 (0.0)</td>
<td>0.0 (0.0)</td>
<td>1.2 (1.0)</td>
<td>0.8 (1.0)</td>
<td>0.6 (0.7)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fruit or vegetable served</td>
<td>0.1 (0.5)</td>
<td>0.7 (1.5)</td>
<td>3.8 (0.9)</td>
<td>4.6 (0.8)</td>
<td>5.0 (0.0)</td>
<td>21.91</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Whole grains (ie, ≥ 3 g for fiber per serving)</td>
<td>0.0 (0.0)</td>
<td>0.0 (0.0)</td>
<td>0.2 (0.1)</td>
<td>0.0 (0.0)</td>
<td>0.0 (0.0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Desserts (eg, cookies, pies, snack cakes, cereal bars, granola bars)</td>
<td>2.0 (1.4)</td>
<td>2.3 (1.8)</td>
<td>0.0 (0.0)</td>
<td>0.0 (0.0)</td>
<td>0.0 (0.0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salty snacks² (eg, pretzels, crackers, tortilla chips, snack mixes)</td>
<td>3.1 (1.6)</td>
<td>2.8 (1.6)</td>
<td>0.8 (1.0)</td>
<td>1.8 (0.6)</td>
<td>2.6 (1.5)</td>
<td>-0.69</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweeteners (eg, candy, flavored ice pops, jam)</td>
<td>0.2 (0.5)</td>
<td>0.2 (0.5)</td>
<td>0.0 (0.2)</td>
<td>0.0 (0.0)</td>
<td>0.0 (0.0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-fruit fruit (eg, fruit snacks, leather)</td>
<td>0.7 (1.1)</td>
<td>0.3 (0.8)</td>
<td>0.0 (0.0)</td>
<td>0.0 (0.0)</td>
<td>0.0 (0.0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sugar-sweetened beverages (eg, non-100% juices, powdered drink mixes, punch)</td>
<td>1.7 (2.0)</td>
<td>2.1 (2.0)</td>
<td>0.0 (0.0)</td>
<td>0.0 (0.0)</td>
<td>0.0 (0.0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-packaged fruit (eg, sugar-added apple sauce, fruit in syrup)</td>
<td>0.6 (1.0)</td>
<td>0.1 (0.4)</td>
<td>0.0 (0.0)</td>
<td>0.0 (0.0)</td>
<td>0.0 (0.0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

³ Reliable change index comparing differences in servings per week from spring, 2011 vs spring, 2013. Values above 1.96 are statistically significant; ² No analyses were performed because of the complete absence of the snack type (i.e., 0) from either the spring, 2011 or spring, 2013 measurement period; ³ Vegetables served concurrently with dips, such as peanut butter, low-fat yogurt Ranch, and hummus; ⁴ Salty snacks served during the initiative and approved for discount purchasing were unflavored pretzels, corn tortilla chips, and air-popped popcorn. Salty snacks served before the initiative consisted of flavored salty snacks such as Doritos, Chex Mix, and Goldfish crackers.
2013, separately, for snacks purchased and are expressed as the average cost of a single snack for each child per day (ie, cost/snack/child/d). Analyses were conducted using Stata (version 12.0, StataCorp, College Station, TX, 2011).

RESULTS

Table 1 lists the snacks served across the 4 ASPs during the 2-year study. At baseline (spring/fall, 2011), the 4 ASPs were serving 0.1 servings/wk of fruit and 0.0 servings/wk of vegetables and 2.0, 3.1, and 1.7 servings/wk of desserts, salty snacks, and sugar-sweetened beverages, respectively. By spring, 2013, fruit servings per week increased to 5.0 and vegetables to 0.6, whereas desserts and sugar-sweetened beverages were eliminated.

Table 2 presents a sample 4-week menu for spring, 2013. At baseline, the 4 ASPs spent approximately $0.26/snack/child/d. By spring, 2013, this increased to $0.32/snack/child/d, yet it was below the budgeted amount of $0.34/snack/child/d. The Figure presents cost comparisons among the discounted grocery store partnership, the bulk warehouse club, and the food service vendor, pre-intervention, and budgeted amount for an estimated 180-day operation period (average school year

### Table 2. Sample 4-Week Snack Menu, Spring, 2013

<table>
<thead>
<tr>
<th>Day</th>
<th>Snack</th>
<th>Snack</th>
<th>Snack</th>
<th>Snack</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>Banana(^h) Pretzels</td>
<td>Banana(^w)</td>
<td>Banana(^h) String cheese(^h)</td>
<td>Banana(^w)</td>
</tr>
<tr>
<td>Tuesday</td>
<td>Banana(^h) String cheese(^h)</td>
<td>Orange(^w) Pretzels</td>
<td>Orange(^w) Pretzels</td>
<td>Banana(^h) Pretzels</td>
</tr>
<tr>
<td>Wednesday</td>
<td>Orange(^w) Pretzels</td>
<td>Apple(^h) String cheese(^h)</td>
<td>Apple(^h) Pretzels</td>
<td>Orange(^w) Pretzels</td>
</tr>
<tr>
<td>Thursday</td>
<td>Apple(^w) Pretzels</td>
<td>Apple(^h) String cheese(^h)</td>
<td>Apple(^h) Pretzels</td>
<td>Apple(^w)</td>
</tr>
<tr>
<td>Friday</td>
<td>Apple(^h) Pretzels</td>
<td>Banana(^h) Salsa</td>
<td>Apple(^h) Pretzels</td>
<td>Apple(^h) Tortilla chips</td>
</tr>
</tbody>
</table>

\(h\) indicates half; \(w\), whole.

![Figure](image-url)
length) and serving approximately 500 children/d. The estimated cost difference between the discounted grocery store partnership and the bulk warehouse chain resulted in a savings of $3,699, whereas the savings vs purchasing snacks at the food service vendor was $2,430.

Table 3 lists the percentage of children consuming healthy snack offerings in spring, 2013. A total of 261 children were observed during snack, for a total of 463 different individual snacks observed. Over 80% of the children were observed consuming ≥ 50% of the served fruit, whereas only 60% of the children were observed consuming the served vegetable. Approximately 79% and 90% of children consumed the served dairy (predominantly string cheese) and salty snacks, respectively.

DISCUSSION

To the authors’ knowledge, this is the first study to demonstrate that the adoption of Healthy Eating Standards can be met without increasing snack costs above the budgeted amount, and that children consume the healthier snack served. These findings have implications for ASPs across the nation that are attempting to comply with national standards for the quality of snacks served in ASPs, yet are faced with cost barriers and opponents who argue children will not consume healthier snacks when offered. Given the widespread availability of grocery stores, this innovative partnership has the ability to be scaled and replicated with ASPs nationwide.

Previous studies have reported increased servings for fruits and vegetables through working with ASP leaders to adopt snack standards. This is consistent with the current study, in which the Healthy Eating Standards guided the selection and planning of daily snacks, which led to improved snacks. An important distinction between prior studies and the current one is the evaluation of costs associated with changing snacks served to fruits or vegetables daily. Price is cited as a primary barrier to meeting existing ASP snack policies and standards. For the ASPs in this study, if they had continued to purchase snacks that met the Healthy Eating Standards at the bulk warehouse chain, they would have incurred an additional $1,450 in snack expenditures above their annual budgeted amount for snacks. This added cost is considerable because many ASPs operate on a limited budget and often distribute additional programmatic costs to parents in the form of an increased enrollment price. Thus, an increase in operating expenses is not likely to be adopted, simply to conform to recommendations for the types of snacks ASPs should serve.

Attempts to improve the nutritional quality of foods and beverages children eat have often resulted in substantial amounts of fruits and vegetables wasted, with anywhere from 40% to 90% winding up in trash cans. This creates the perception that serving children fruits and vegetables only results in creating healthier trash cans. This study demonstrated that over 80% of children consumed the fruits served as a snack. Conversely, < 60% of the children consumed the vegetable served, even when it was paired with a dip (peanut butter, low-fat yogurt Ranch, or hummus). Based on field notes during the direct observation of consumption, it was commonly reported that children used the vegetables as utensils to eat the dips, rather than eating the vegetable and the dip together. Thus, many of the vegetables were thrown away, whereas the dips were entirely consumed.

The strengths of this study are the use of direct observation to record consumption and the serving of snacks provided. The large number of weeks over which the snack information was collected also provided a comprehensive view of the types of snacks typically served. Importantly, detailed cost information to estimate snack expenditures was collected. Some of the limitations of the study were the absence of a control group, the limited number of ASPs participating, and the inability to calculate plate waste. The authors were unable to calculate plate waste with the snacks because of the inability to determine how many snacks were provided each day. Finally, although only 4 ASPs participated, the cost savings estimated from the partnership are independent of the sample size and would remain fixed in terms of pricing for individual snack items.

IMPLICATIONS FOR RESEARCH AND PRACTICE

Through this innovative community partnership between ASPs and a local grocery store chain, meeting the Healthy Eating Standards can be attained without increased costs in budgeted snack expenditures. Importantly, these findings also highlight that children will eat healthier snacks, primarily fruit. After-school program providers should seek to establish similar community partnerships with local food sellers, with the intent of reducing price barriers to purchasing food items that conform to existing nutritional guidelines for the types of snacks served in this

<table>
<thead>
<tr>
<th>Snack Type</th>
<th>Total Snacks Observed</th>
<th>Consumed (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy (eg, yogurt, cheese)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fruits (eg, apples, oranges, bananas)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salty snacks (eg, unflavored pretzels, crackers, tortilla chips)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetables (eg, baby carrots, celery)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*aChildren could consume ≥ 1 snacks during a single observation; bConsumed classified as eating or drinking ≥ 50% of amount served. Interrater consumption of snack observations: κ = 0.89, percent agreement, 97%; cVegetables served concurrently with dips, such as peanut butter, low-fat yogurt Ranch, and hummus.
setting. Although these findings are encouraging, additional work needs to focus on replicating these findings in a larger sample of ASPs with grocery stores across the nation. Furthermore, based on these findings, the authors recommend that ASPs expose children to vegetables using strategies such as complementary nutrition education, taste tests, more promotion of specific vegetables (fresh and local), and/or garden or food preparation to help with children’s consumption of them when served as a snack.

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REFERENCES