The Effectiveness of Boss’ Healthy Buddies Nutritional Program in Elementary School Students

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Abstract

In America, childhood obesity has been increasing at an alarming rate and has been linked to immediate and long-term health problems. To reduce the high prevalence of obesity, it is crucial that children are taught nutrition education at an early age to promote healthy eating decisions. Boss’ Healthy Buddies is a cost-free nutrition program that is matched with South Carolina education standards and is designed for elementary school students from kindergarten through fourth grade. The aim of the current study was to improve nutrition education knowledge of elementary school students by implementing Boss’ Healthy Buddies and to compare its efficacy to an existing and costly CATCH nutrition program. Participants attending a public elementary school in Spartanburg, South Carolina received weekly twenty-minute Boss’ Healthy Buddies lessons for eight weeks. Results were compared to a nearby school with the existing CATCH program implemented and a school receiving no nutrition education. After eight weeks of Boss’ Healthy Buddies lessons, students improved their nutrition knowledge of beverages and foods. Results suggested that Boss’ Healthy Buddies was as effective or better than the CATCH program. Most importantly, nutrition knowledge was improved after nutrition education when compared to no nutrition education.
The Effectiveness of Boss’ Healthy Buddies Nutritional Program in Elementary School Students

In the United States, the rates of childhood obesity have more than tripled since 1971. From 2011 to 2014, the prevalence of childhood obesity remained stable at 17%. The prevalence of obesity for preschool aged children was 8.9%, elementary students 17.5%, and adolescents displayed the highest rate of obesity at 20.5% (Ogden, Carroll, Fryar & Flega, 2015). Childhood obesity is linked to countless immediate and long-term health issues including heart problems, sleep apnea, diabetes, and even certain cancers. Childhood obesity is currently the number one health concern according to the American Heart Association (2016).

Obesity is correlated not only to health risks but also developmental problems such as poor academic performance, low self-esteem, and behavioral problems. In a study examining the relationship between childhood obesity and its educational correlates, obese girls were 1.51 times more likely to be held back a grade and 2.9 percent more likely to self-report being a poor academic student (Falkner et al., 2001). Obese boys were 1.46 times more likely to self-report being a poor student and 2.18 times more likely to quit school (Falkner et al 2001). Obesity may contribute to reduced academic performance through a variety of ways including self-esteem and problem behavior. Children with obesity were almost two times more likely to report low self-esteem when compared to children with normal body weights (Wang & Wild, 2009). One study looking at the association between externalizing behavior problems and childhood obesity found that obese children were 2.9 times more likely to be engaged in aggressive and destructive behaviors (Anderson, He, Schoppe-Sullivan & Must, 2010).

CATCH is a health program developed by the CDC which aims to target children’s health through a “whole school, whole community, whole child” approach. CATCH is defined as the “coordinated approach to child health” and includes a nutrition program, an in-class
curriculum, a physical education supplemental program, and a parental education program. The goal of the program is to address children’s health holistically and provide educators with the tools to improve health education from within the school environment (Coordinated School Health, 2017). Coleman et al. (2005) examined the effectiveness of the CATCH program from third grade to fifth grade when compared to a school without a school health program. The researchers found that girls had a significantly greater risk of becoming overweight than boys from third to fifth grade. However, the increase was significantly lower for the school with the CATCH program at a 2% rate of increase compared to 13% at the control school. The results suggested that CATCH is somewhat effective at improving children’s health (Coleman et al., 2005).

The biggest problem with the CATCH program is its high cost to schools. A two-year subscription for the K-5 school CATCH bundle is priced at $3,495. In low-income school districts, this may not be feasible and creates a further separation between schools that can afford to implement this program and schools that are unable to. Wang (2001) found that, in the United States, children in low SES households were at an increased risk for obesity. Therefore, the schools that would benefit the most from nutrition programs may be the schools that are unable to afford them. Boss’ Healthy Buddies attempts to solve this issue as a cost-free alternative to CATCH. Boss’ Healthy Buddies includes lessons designed for 5K through 4th grade focusing on nutritional education and the importance of physical health. Boss’ Healthy Buddies also incorporates South Carolina state education standards into each of the lessons to encourage teachers to use the program as both a health education tool and as a part of their normal lesson plans.
The current study included three Spartanburg elementary schools that received Boss’ Healthy Buddies lessons (intervention school), the CATCH program (positive control school), or no nutrition education (negative control school). Students were assessed on their nutrition knowledge at the beginning of the school year. The intervention school received weekly Boss’ Healthy Buddies lessons which included topics such as the importance of nutrition and physical activity, general information of certain foods and their proper proportions, and the difference between “Go”, “Slow”, and “Whoa” foods. The intervention and positive control school were re-assessed after an eight-week period.

It was hypothesized that daily eating habits and nutrition knowledge of the intervention school would improve after Boss’ Healthy Buddies lessons. It was expected that Boss’ Healthy Buddies would be as effective as CATCH. It was hypothesized that schools receiving nutrition education would display improved eating habits and nutrition knowledge when compared to the negative control school.

**Method**

**Participants**

Participants included 1,624 students from kindergarten to fourth grade attending public elementary schools in Spartanburg, SC in the Fall of 2017. Three elementary schools were involved in the current study. The intervention school included 434 students receiving Boss’ Healthy Buddies lessons. The positive control school included 615 students receiving CATCH nutrition lessons. The negative control school included 575 students that did not receive nutrition education.
Assessment

The participants were assessed on three categories that included questions based on beverage choices, daily eating habits, and nutrition knowledge. The beverage choice category included six questions assessing knowledge about milk, sugar in drinks, and preferred drinks of choice. The daily eating habits category consisted of five questions that assessed food consumption, such as how many fruits, vegetables, desserts, bread, and meat students eat in a typical day. The nutrition knowledge section consisted of 11 questions that asked the participants to choose the healthiest option out of two foods and questions about “Go”, “Slow”, and “Whoa” foods. “Go” foods can be eaten readily and have the most nutritional value. “Slow” foods should not be eaten as readily as “Go” foods, but they do contain some nutritional value. “Whoa” foods should be avoided and are the least healthy.

Lessons

Each 5K through 4th grade class at the intervention school was taught a twenty-minute lesson from the Boss’ Healthy Buddies resource once a week for eight weeks. All classes received a lesson on why it is important to be healthy the first week followed by the 5-2-1-0 lesson the second week. Starting on the third week, instructors were given the opportunity to choose which lesson they wanted to teach out of 10 lessons listed in Appendix A.

Statistical Analysis

A within-subjects design measured changes between pre- and post-assessments in the intervention and positive control school using paired samples t-tests. Repeated measures ANOVAs were conducted to compare answers from the post-assessment of the intervention school to the positive control school and negative control school in a between-subjects design. If
main effects of school were found, post-hoc Bonferroni tests were utilized to determine where significance occurred.

**Results**

**Beverages**

Participants were asked what their preferred drink of choice was out of five options: water, milk, juice, soda, and tea. As shown in Figure 1, the intervention school chose water significantly more (15%), $t(4) = 4.909, p = .008$, and milk significantly more (6%), $t(4) = 3.303, p = .036$, after nutrition education. The intervention school chose soda significantly less (17%) after nutrition education, $t(4) = 3.519, p = .024$, as seen in Figure 1. There were no significant changes in drink choices for the positive control school after nutrition education. As seen in Figure 2, post-assessment responses for drink of choice were compared across the three schools. There was a main effect of school for milk, $F(2,12) = 6.8, p = .010$ and soda, $F(2,12) = 5.5, p = .020$ with the intervention school choosing milk significantly more than the negative control school, but not more than the positive control school. The negative control school chose soda significantly more than the intervention school.

Participants were assessed on changes in milk-drinking habits at their home. There was no significant change in the percentage of participants who drank white milk or chocolate milk at home after nutrition education for the intervention or the positive control school.

Participants were assessed on their nutrition knowledge of beverages. Participants were asked to decide whether skim milk or whole milk is healthier or if they are the same. After nutrition education there was a significant reduction (14%) in those who chose that the two were the same, $t(4) = 7.054, p = .002$ in the intervention school, as shown in Figure 3. This indicates that more students knew that there was a difference between skim and whole milk following the
eight-week intervention. There was no significant change from pre- to post-assessment in the positive control school. There were no significant differences between the three schools at post assessment.

Participants were asked whether chocolate milk or soda has more sugar or if the beverages contain the same amount. After nutrition education in the intervention school, there was a significant reduction in those that said soda and chocolate milk have the same amount of sugar (8%), $t(4) = 2.835, p = .047$, and a nonsignificant 6% increase in those that said soda had the most sugar, as seen in Figure 4.

**Daily Eating Habits**

Participants were asked how many servings (0-5) of desserts did they eat each day. For the intervention school, there was a significant decrease in the response of two servings, $t(4) = 4.153, p = .014$ and a nonsignificant 10% increase in responses of zero to one, as seen in Figure 5. There was a main effect of school for zero to one daily servings of desserts, $F(2,12) = 5.425, p = .021$ in the post-assessment data with the intervention school and the positive control school responding zero to one significantly more than the negative control school (Figure 6). There was no significant difference between the intervention school and the positive control school.

There were no significant changes in the percent of daily servings for fruit, vegetable, or bread eating habits in the intervention school or positive control school after the nutrition education. There were no main effects of school in fruit, vegetable, or bread eating habits across the three schools. There were no significant changes in meat eating habits in the intervention school or positive control school, although, there was a main effect of school with the intervention school choosing zero to one servings of meat significantly more than the negative
control school, but not significantly more than the positive control school, $F(2,12) = 5.514, p = .020$.

**Nutrition Knowledge Following Intervention**

Participants in the intervention group were asked to choose the healthier option out of two food choices or to indicate if the choices were equal in healthiness before and after nutrition education. Figure 7 shows percentage of responses before and after nutrition education. For fried chicken compared to baked chicken there was no significant difference in the intervention school following nutrition education, but there was a nonsignificant 10% increase in the correct response of baked chicken. There was a significant 17% increase in the correct response of microwave popcorn as the healthiest option when compared to movie popcorn for the intervention school following nutrition education, $t(4) = 5.827, p = .004$. There was a significant 21% increase in the correct response of pizza with whole grain crust compared to pizza with white flour crust for the intervention school following nutrition education, $t(4) = 4.929, p = .008$, and a significant 12% decrease in the incorrect response of the two pizzas are equally healthy following nutrition education, $t(4) = 3.696, p = .021$. There was a nonsignificant 13% increase in apple as the healthier option when compared to applesauce for the intervention school following nutrition education. There was a significant 13% decrease in the incorrect response of mac and cheese, $t(4) = 3.301, p = .030$ paired with a nonsignificant 14% increase in beans as the healthier option for the intervention school following nutrition education. This suggests that nutrition education had a positive effect on the increasing nutrition knowledge of the intervention school.

**Nutrition Knowledge Across the Three School Conditions**

To assess the efficacy of the Boss’ Healthy Buddies and CATCH nutrition education programs compared to no nutrition education program, the post-assessment answers to which
food is healthiest or are the foods the same were compared. Figure 8 shows the percentage of responses across each condition. There was a main effect of school for fried chicken, $F(2, 12) = 3.820, p = .052$ with the negative control school choosing fried chicken more than both the positive control school and the intervention school. There was a main effect of school for fresh fruit, $F(2,12) = 4.360, p = .038$ and for the same, $F(2,12) = 6.270, p = .013$, with the negative control school choosing fresh fruit significantly less than the positive control school and the intervention school. Demonstrating the importance of nutrition education, the negative control school also chose the same significantly more than the intervention school, but this did not differ from the positive control school. There was a main effect of school for apple, $F(2,12) = 5.357, p = .022$, and for applesauce, $F(2,12) = 4.965, p = .027$, with the positive control and the intervention school choosing apple significantly more than the negative control school and the negative control school choosing applesauce significantly more than positive control and the intervention school. There was also a main effect of school for mac and cheese, $F(2,12) = 4.812, p = .029$, with the intervention school choosing mac and cheese significantly less than the negative control school. Finally, there was a main effect of school for microwave popcorn, $F(2,12) = 3.856, p = .051$, with the intervention school choosing microwave popcorn significantly more than the negative control school. The similarities between the intervention and positive control school paired with consistent differences when compared to the negative control school suggest that some nutrition education is better than no nutrition education and that Boss’ Healthy Buddies is equally effective as CATCH in improving nutrition knowledge.

**Go, Slow, and Whoa Foods**

Participants were assessed on their knowledge of “Go” foods which are foods that can be eaten readily and have the most nutritional value. “Go” foods include fruits, vegetables, skim
milk, low fat cheese and yogurt, and whole grains. Participants were asked to select the correct “Go” food from the options of popcorn, beans, bananas, jello, and hotdog. There was a significant 23% increase in the correct response of banana, \( t(4) = 2.846, p = .046 \) with the largest decrease in response being a 10% decrease in hotdog as shown in Figure 9. Analysis across the three schools revealed a main effect of school for banana, \( F(2,12) = 7.320, p = .008 \), with post-hoc tests revealing that the intervention school and the positive control school chose banana significantly more than the negative control school, however, the intervention school and the positive control school did not differ significantly. Further evidence of the benefits of nutrition education is demonstrated by a main effect of school for popcorn, \( F(2,12) = 5.943, p = .016 \); jello, \( F(2,12) = 4.372, p = .037 \); and hotdog, \( F(2,12) = 5.800, p = .017 \), with the negative control school choosing each of the incorrect options as the healthiest “Go” food significantly more than either nutrition education program as shown in Figure 10.

Participants were assessed on their knowledge of “Slow” foods which are foods that should not be eaten as readily as “Go” foods but that do contain some nutritional value. Examples include peanut butter, nuts, canned fruits and vegetables, 2% milk, and fruit juice. Participants were asked to select the correct “Slow” given the options of peanut butter, carrots, skim milk, pizza, and cookies. While there were no significant changes in the choices of the intervention school following nutrition education, there was a nonsignificant 14% increase in the correct choice of peanut butter and a nonsignificant 17% decrease in the choice of pizza as shown in Figure 11. In general, correctly identifying “Slow” foods is a harder concept that “Go” and “Whoa” foods for elementary students. As shown in Figure 12, each school made incorrect “Slow” food selections. The negative control school selected the “Go” food, carrots, significantly more than the nutrition education schools \( F(2,12) = 6.062, p = .015 \), while the intervention
school incorrectly selected the “Whoa” food of cookies $F(2,12) = 5.957, p = .016$ and the positive control school incorrectly selected the “Whoa” food of pizza $F(2,12) = 6.947, p = .010$.

Finally, participants were assessed on their knowledge of “Whoa” foods which are foods that should be avoided and are the least healthy. Examples include cake, ice cream, fast food, and soda. Participants were asked to select the correct “Whoa” food given the options of soda, eggs, cheese, yogurt, and apple. There was a significant 23% increase in the correct response of soda for the intervention school following nutrition education, $t(4) = 3.414, p = .027$ with overall decreases in the choices of all incorrect foods as shown in Figure 13. Comparing all three schools there was a main effect of soda, $F(2,12) = 28.105, p < .001$ as the correct “Whoa” food with both the intervention school and the positive control school correctly choosing soda more than the negative control school. As shown in Figure 14, there was a main effect of yogurt, $F(2,12) = 5.006, p = .026$; cheese, $F(2,12) = 39.325, p < .001$; and eggs, $F(2,12) = 30.433, p < .001$ selected as incorrect “Whoa” foods by the negative control school when compared to the intervention and positive control school, which did not differ.

**Discussion**

The aim of the current study was to assess the effectiveness of the Boss’ Healthy Buddies nutrition program in order to provide a cost-free alternative to the commercially available CATCH nutrition education program. It was hypothesized that Boss’ Healthy Buddies Program would be as effective as CATCH in teaching children nutrition knowledge.

**Beverages**

When choosing their preferred drink of choice, for the intervention school, there was a shift in answers from soda to water and milk meaning participants were able to identify water and milk as the healthier option after nutrition education. Although children successfully
identified milk as a healthier option, there was no change for the percentage of children who drank chocolate milk at home. A possible explanation of this pattern could be that nutrition education was implemented at school and parents were not informed about the program and therefore did not lead to purchasing changes in the household. In addition, knowledge of healthy choices may have increased while eating habits remained unaffected.

There was a significant reduction in children who identified skim milk and whole milk as the same. There was also a decrease in the number of participants that chose soda and chocolate milk as having the same amount of sugar following nutrition education. Although children were unable to successfully identify skim milk as the healthier option and soda as having more sugar, they were able to recognize a difference between the two drinks. A possible explanation as to why children were unable to identify skim milk as the healthier version is because whole milk is often considered a healthier option for younger children while skim milk is often suggested for the older grades. Whole milk provides extra fat and calories needed for proper development in children from kindergarten through second grade.

**Daily Eating Habits**

Daily eating habit questions assessed whether children were applying their nutrition knowledge to their food choices. When identifying dessert servings, there was a significant decrease in children who said they had 2 desserts per day with an increase in 1 desserts per day by 10%. The main effect of schools revealed that more children from the Boss’ Buddies nutrition program and CATCH said that they had 0 to 1 desserts a day compared to children attending school without a nutrition program. In support of the hypothesis, these results revealed that Boss’ Buddies Nutrition Program was equally effective as CATCH in teaching children the importance of limiting their sugar intake. Boss’ Healthy Buddies was only implemented at the intervention
school for 8 weeks. The hope is that yearlong implementation of Boss’ Healthy Buddies might change additional eating habits. Repeated exposure to the program in grades kindergarten through 4th grade will increase the likelihood of influencing the behavior of the participants.

**Nutrition Knowledge**

Nutrition knowledge questions were asked to assess the amount of nutrition information learned after intervention. Prior to nutrition education, many children were unaware of the health differences between similar food types. Students were asked to identify the healthier option for the following: baked chicken vs. fried chicken, microwave vs movie popcorn, pizza with whole grain crust vs white flour crust, apples vs. applesauce, and beans vs mac and cheese. In the intervention school, there were significant increases in the correct responses of microwave popcorn and pizza with whole grain crust after nutrition education as well as nonsignificant but relatively large increases in the correct response of baked chicken (10%), apples (13%), and beans (14%) after Boss’ Healthy Buddies Lessons. This suggests that there was a positive effect of nutrition education. The intervention school correctly chose the healthier options just as often as the positive control school and significantly more than the negative control school. This supports that having nutrition education is better than not having nutrition education, and that Boss’ Healthy Buddies was just as effective as the CATCH program in the improvement of nutrition education.

For the concept of, “Go” and “Whoa” foods, children from the intervention group were more likely to identify the correct response than children from the negative control group who were more likely to identify an incorrect response. There was no difference between the positive control group and the intervention group, therefore, in agreement with the hypothesis, Boss’ Healthy Buddies program was just as effective as CATCH. Each school made incorrect “Slow”
food choices with the negative control school incorrectly choosing the “Go” food, carrot, as the “Slow” food suggesting that they had no conceptualization of “Slow” foods as even slightly unhealthy. In contrast, both the intervention and positive control school incorrectly chose “Whoa” foods as the “Slow” food suggesting that they understood that “Slow” foods are not healthy, but were unable to differentiate them from foods that were even more unhealthy. This suggests that neither nutrition education program was more effective at teaching “Slow” foods. Overall, the results demonstrate that Boss’ Healthy Buddies nutrition program was as effective as CATCH. Most importantly, and that schools with a nutrition program in place outperform schools that do not have a program implemented to teach nutrition knowledge.

Childhood obesity has nearly tripled in the past three decades, and it is important to understand the major implications due to its high prevalence in current society. Past research has found an association between childhood obesity and poor academic performance due to its negative effect on physical and psychosocial health. For example, a child may have a lack of energy due to improper nutrition resulting from obesity that leads to trouble concentrating in school. Studies have found a reduction in learning in rats placed on a high fat and high fructose diets which further supports that obesity can have negative effects on academic performance (Greenwood & Winocur, 1996). Low self-esteem may also lead to a decrease in academic and social motivation due to the potential increase in obesity related bullying. The physical and psychosocial consequences of obesity can potentially result in issues that carry into adulthood, which is why it is crucial to act on the problem of obesity in childhood. Childhood is a crucial time for physical development and the formation of healthy habits, so the sooner children can be educated on health, the more likely they are to make healthier decisions as adults (Li & O’Connell, 2012).
One limitation of Boss’ Healthy Buddies is that it does not contain a parent component to the program. The program focused on improving nutrition education and improving healthy eating choices overall, but children are often limited in their choices at home due to purchasing choices made by the parents. Moving forward, it will be important to place focus on eating habits at school when children have more control over their food choices. Another limitation to the current findings is that the children in kindergarten and first grade may not have fully grasped the questions asked on the pre- and post-assessments. This, however, does not likely affect the results, because questions were consistent between all schools. It may be beneficial for future studies to make the assessment more comprehensive for the younger children. Finally, the older children in the study may have internalized the information more effectively than the younger children due to their increased ability to comprehend the topics and because of the lessons for the older students included more activities while the lessons for kindergarten and first grade emphasized reading comprehension and did not include additional activities.

South Carolina is ranked 7th in the nation for obesity. Approximately 15% of children under the age of 18 are overweight and 16.7% are obese (Kirby, 2012). There are 575,261 students enrolled in South Carolina public elementary schools who could benefit from nutrition education (South Carolina Elementary Schools, 2017). The goal is to implement Boss’ Healthy Buddies program in as many public elementary schools in South Carolina as possible. From this implementation, it is expected that students would increase their knowledge of healthy eating which is a crucial step toward eliminating childhood obesity.
References

American Heart Association (2016). Overweight in Children. *American Heart Association*


Figure 1. Percentage of responses to what the drink of choice was out of five options: water, milk, juice, soda, and tea. Pie charts comprise data from the intervention school before and after nutrition education. One asterisk represents significance at a level of $p < .05$. Two asterisks represent significance at a level of $p < .01$. 

**Intervention School: Boss' Healthy Buddies**

Increase in Water $t(4) = 4.909, \ p = .008$; Increase in Milk $t(4) = 3.103, \ p = .036$
Figure 2. Comparison of intervention, positive control, and negative control schools. Bars represent the percentages of responses to water, milk, juice, soda, and tea for each school. One asterisk represents significance at a level of $p < .05$. Two asterisks represent significance at a level of $p < .01$.

Main effect of Schools for Milk $F(2, 12) = 6.8, p = .010$ and Soda $F(2, 12) = 5.5, p = .020$

Milk Negative Con < Exp $p = 0.011$ and Soda Negative Con > Exp $p = 0.018$
Intervention School: Boss' Healthy Buddies
Decrease in Skim and Whole Milk are equally healthy $t(4) = 7.054, p = .002$

Figure 3. Percentage of responses to whether skim milk or whole milk is healthier or if they are the same. Pie charts comprise data from the intervention school before and after nutrition education. One asterisk represents significance at a level of $p < .05$. Two asterisks represent significance at a level of $p < .01$. 
**Intervention School: Boss' Healthy Buddies**

Which drink has more sugar?
Decrease in the same amount of sugar. $\kappa(4) = 2.835, p = .047$

*Figure 4.* Percentage of responses to whether chocolate milk or soda has more sugar or if they contain the same amount. The pie charts comprise data from the intervention school before and after nutrition education. One asterisk represents significance at a level of $p < .05$. 
**Intervention School: Boss’ Healthy Buddies**
How many servings of desserts do you eat each day? Decrease in two daily servings of desserts $t(4) = 4.153$, $p = .014$. 10% increase in 0-1 daily servings of desserts.

*Figure 5*. Daily number of servings of desserts for the intervention school before and after nutrition education. One asterisk represents significance at a level of $p < .05$. 
Figure 6. Comparison of daily number of servings of desserts across Intervention School, Positive Control School, and Negative Control School. Asterisks represent significance at a level of $p < .05$.

Main effect of school for **0-1 daily servings of desserts** $F(2, 12) = 5.425, p = .021$

Negative Control $<$ Positive Control ($p = .036$) $=$ Intervention ($p = .029$)
Figure 7. Percentage of responses to which food is healthier or are the foods the same for the intervention school before (PRE) and after (POST) nutrition education. One asterisk represents significance at $p < .05$ and two asterisks at $p < .01$. 
Figure 8. Percentage of post-assessment responses to which is the healthier food or if the foods are the same for the intervention school (gold), positive control school (green), and negative control school (gray). Asterisks represent significance at a level of $p < .05$. 
**Intervention School: Boss’ Healthy Buddies**

Significant increase (23%) in the correct *go food* of bananas \( t(4) = 2.846, p = .046 \) with the largest decrease (10%) in the worst choice *hot dog*.

*Figure 9.* Percentage of responses to “Go” food for the intervention school before and after nutrition education. Asterisks represent significance at a level of \( p < .05 \).
Main effect of school for **banana** as the correct "go food" $F(2, 12) = 7.320, p = .008$ for both Positive Control and Intervention. Main effect of school for **popcorn** $F(2, 12) = 5.943, p = .016$; **Jello** $F(2, 12) = 4.372, p = .037$; and **hotdog** $F(2, 12) = 5.800, p = .017$ as incorrect "go food" for the Negative Control.

*Figure 10.* Percentage of post-assessment responses to “Go” food for the intervention school (gold), positive control school (green), and negative control school (gray). One asterisk represents significance at a level of $p < .05$. Two asterisks represent significance at a level of $p < .01$. 
**Intervention School: Boss’ Healthy Buddies**

No significant effects. The correct "slow food" peanut butter increased 14% while pizza decreased 17%.

*Figure 11.* Percentage of responses to “Slow” food for the intervention school before (PRE) and after (POST) nutrition education.
Figure 12. Percentage of post-assessment responses to “Slow” food for the intervention school (gold), positive control school (green), and negative control school (gray). One asterisk represents significance at a level of $p < .05$. Two asterisks represent significance at a level of $p < .01$. 

Significant main effect of school for carrot $F(2, 12) = 6.062, p = .015$; cookies $F(2, 12) = 5.957, p = .016$ and pizza $F(2, 12) = 6.947, p = .010$ as incorrect "slow foods". There was no effect for the correct "slow food" peanut butter.
**Intervention School: Boss’ Healthy Buddies**

The correct "whoa food" soda increased 23% $r(4) = 3.414, p = .027$ with all incorrect foods decreasing.

*Figure 13.* Percentage of responses to “Whoa” food for the intervention school before (PRE) and after (POST) nutrition education. Asterisks represent significance at a level of $p < .05$. 
Figure 14. Percentage of post-assessment responses to “Whoa” food for the intervention school (gold), positive control school (green), and negative control school (gray). One asterisk represents significance at a level of $p < .05$. Two asterisks represent significance at a level of $p < .01$. 

Significant main effect of school for soda $F(2, 12) = 28.105, p < .001$ as the correct "whoa food" for both the Positive Control and the Intervention and yogurt $F(2, 12) = 5.006, p = .026$; cheese $F(2, 12) = 39.325, p < .001$ and eggs $F(2, 12) = 30.433, p < .001$ were more often chosen as incorrect "whoa foods" by the Negative Control.
### Appendix A
Boss’ Healthy Buddies Lessons and Objectives

<table>
<thead>
<tr>
<th>Lesson</th>
<th>Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Why is it important to be healthy?</td>
<td>Explain the benefits of being in good health and discuss ways to stay healthy.</td>
</tr>
<tr>
<td>5-2-1-0</td>
<td>Healthy Daily Lifestyle Guide: 5 servings of fruits and vegetables, 2 hours of screen time, 1 hour of physical activity, 0 sugary drinks</td>
</tr>
<tr>
<td>Go, Slow, &amp; Whoa Foods</td>
<td>Define Go, Slow, &amp; Whoa Foods. Recognize the importance of eating more Go foods and limiting Slow and Whoa foods.</td>
</tr>
<tr>
<td>Calories</td>
<td>Understand what a calorie is and how they hurt or help the body. Explain where to find calories on the food label.</td>
</tr>
<tr>
<td>Drinks</td>
<td>Discuss what types of drinks have sugar in them and why sugary drinks are not healthy. Understand how to locate sugar content on a food label.</td>
</tr>
<tr>
<td>Fruits</td>
<td>Learn about different types of fruits and why fruits are important for health. Discuss how to incorporate more fruits into a diet.</td>
</tr>
<tr>
<td>Vegetables</td>
<td>Learn about different types of vegetables and why they are important for health. Discuss how to incorporate more vegetables into a diet</td>
</tr>
<tr>
<td>Dairy</td>
<td>Understand where dairy products come from and how they are made. Understand the health benefits of dairy.</td>
</tr>
<tr>
<td>Whole Grains and Fiber</td>
<td>Learn about the different kinds of whole grains. Explain what fiber, relate it to whole grains, and discuss the benefits of fiber.</td>
</tr>
<tr>
<td>Cooking Healthy at Home</td>
<td>Understand the importance of cooking at home and how it can be healthier than eating out. Recognize basic cooking tools and learn how to read a recipe from start to finish.</td>
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