

Promoting a Healthy Breakfast Composition among Kindergarten Students

Jennifer Krites

Columbus, Ohio

Key Words

Breakfast, Health, Nutrition, Kindergarten, Cognitive Performance

Abstract

Concerns about the diets of school-aged children and new nutrition recommendations for the U.S. population have increased interest in the nutritional quality of meals available through National School Lunch and Breakfast Programs. My research sought to determine whether the implementation of a breakfast promotion curriculum intervention based on healthy eating habits would improve the nutritional quality of food selection at breakfast time for my kindergarten students.



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Educational Significance of Inquiry

Breakfast makes a significant contribution to a child's daily nutritional food intake. Concerns about the diets of school-aged children and new nutrition recommendations for the U.S. population have increased interest in the nutritional quality of meals provided through the National Breakfast Program. Research indicates that breakfast consumption among children has declined and unhealthy eating habits are on the rise (Radcliffe, Ogden, Welsh, Carroll, Coyne and Craig, 2005). As a consequence there has been an increased recognition of the educational and nutritional benefits of a good breakfast and of the need to instill in children good breakfast-eating habits. Observations of my own 25 kindergarten students at a school that participates in the National Breakfast Program has led me to believe that when given a choice, students choose the unhealthy option for breakfast consumption. I believed that my students' poor choices were contributing to a faster hunger rate and a lack of energy in the afternoon, and I wanted to find a way to address this problem.

Question

The purpose of this action research study was to determine whether a healthy nutrition instructional curriculum could change kindergarteners' breakfast choices. Students in two kindergarten classes were assessed for their ideas about ideal breakfast foods, and a two-week curricular unit, "Building Better Breakfasts," was used with one of the classes. Afterward, the students' ideas about breakfast and their behaviors in selecting breakfast foods were assessed again to determine if there was a difference between the control and experimental groups.

Literature Review

Breakfast has been described as the most important meal of the day, contributing substantially to daily nutrient intake and energy needs (Mahoney, Taylor, Kanarek and Samuel, 2005). For children, breakfast consumption has been associated with increased learning and better performance in schools. Previous researchers have indicated that there is a significant positive cognitive effect on students who eat breakfast in comparison to students who skip breakfast (Tapper et al., 2007). There has been an increased recognition by researchers of the educational and nutritional benefits of a good breakfast and of the need to instill children with good breakfast-eating habits (Shemilt, O'Brien, Thoburn, Harvey, Belderson, Robinson, 2003). There are federal guidelines for school breakfast programs that specify what nutrients should be offered in order to maintain a student's physical and cognitive functioning throughout the morning. In practice, though, there is a lack of oversight of the nutritional quality of school breakfast programs.

School Breakfast Program

The school meal program plays a major role in the diets of school-aged children in the United States. In 1966, the federally legislated Child Nutrition Act established a free school breakfast program for students whose families met certain poverty standards (Morrell & Atkinson, 2001). Most of the nation's public schools (80 %) participate in the National Breakfast Program. On a typical day in 2007, 10 million children ate a school provided breakfast (Crepinsek, Gordon, McKinney, Condon & Wilson, 2009).

The purpose of the free breakfast program is to provide children with minimal nutritional requirements which they may not receive at home. The National Breakfast Program's typical breakfast must include ½ cup of juice or fruit, ½ cup of cereal or bread, and ½ pint of milk. In addition, one of the following items should be served four out of five times per week: cooked meat, fish or poultry, cheese, egg, beans or peas, or peanut butter. Also, to make the meal "attractive" to children, a high sugar item, such as syrup, chocolate or a sweet roll, is typically included in the breakfast. The typical meal served to students under the federally funded breakfast program is relatively high in carbohydrates and low in protein, the type of breakfast that results in children complaining of hunger and fatigue (Morrell & Atkinson, 2001).

The meal pattern for the National Breakfast Program was designed to ensure that breakfast would provide approximately 20% to 25% of children's daily nutrition needs. To determine if the meal plan was effective, the USDA conducted a research study called the School Nutrition Dietary Assessment Study (SNDA). During the 1991-1992 school year, fat and saturated fat content of the breakfasts were too high, and by 1998-1999 school breakfasts met most of the standards except for energy, which was below the recommended energy allowance by one fourth (Crepinsek et al., 2009). In comparison to the 2005 statistics gathered on breakfast guidelines, on average, breakfasts in most schools in 2009 were high in sodium and low in dietary fiber. As a result, less than one in five schools offered or served breakfasts that met all the standards in 2009 (Clark & Fox, 2009).

Effects of Breakfast Composition on Cognitive Functions

Previous research suggests that skipping breakfast adversely affects problem solving, short-term memory and attention (Tapper et al., 2007). Differences in breakfast composition may account for some of the results across studies (Gleason & Sutor, 2001). Mahoney, Taylor, Kanarek, and Samuel (2005) studied the effect of breakfast composition on learning and found that there were differences in the cognitive abilities of students who ate oatmeal for breakfast versus those who consumed ready-to-eat cereal. While the two foods provided the same amount of carbohydrates and fat, the oatmeal contained more fiber and protein, which may have contributed to improved performance in alertness and motivation (Polliett, 1995). The students who ate oatmeal improved their spatial and short term memory to a greater degree than those students who ate the ready-to-eat cereal. Interestingly enough, this same group of researchers did a similar study with younger participants ranging in age from six to eight years old. Their hypothesis was that "younger children may not only be more susceptible to changes in cognitive performance due to

Children who ate better breakfasts showed improvement in spatial and short-term memory, but younger children also improved in auditory memory

nutrient composition differences, but they may also benefit more from these differences” (Mahoney et al., 2005, p. 640). The results seemed to confirm their hypothesis; that there is a relationship between breakfast composition and cognitive performance (Simeon & Grantham-McGregor, 1989). The research went one step further to conclude that younger children were affected more dramatically than older children (Mahoney et. al, 2005). This is evident in the increased number of measures affected; both younger and older children who ate better breakfasts showed improvement in spatial and short-term memory, but younger children also improved in auditory memory (Michaud, Musse, Nicolas, Mejean, 1991; Pollitt, 1995).

Interventions

So, how do we get children to eat a healthy breakfast? In an attempt to resolve the problems associated with unhealthy breakfast choices, a group of researchers in Florida added a nutritional educational component to their curriculum titled “Building Better Breakfasts” (Bobroff, Christian, Lieberman, Guyer & Frazee, 1996). The program was designed to teach young children about the importance of eating breakfast and give them practical strategies for selecting nutritious foods for breakfast. The students learned creative ways to include at least one serving from three of the six food groups (fruit or vegetable; grain; and dairy) in their breakfast meal. The program contained age appropriate evaluation instruments to test knowledge gained and identify changes in eating behaviors. Participating Florida teachers reported that 97% of children agreed that “eating a lot of bread, cereal and other grains is good for you,” and expressed interest in increasing the variety of foods in their diets: 90% agreed that “trying new foods is good for you.” (Bobroff et al., 1996).

Literature Review Summary

Schools have been identified as a major venue for addressing childhood obesity and fostering healthy eating habits among school-aged children. In relation to this finding it is also important to realize that there has been an increase among children in skipping breakfast all together. Accordingly, those students who skip breakfast are more likely to be overweight, have poor food choices over the rest of the day and in the long term, and an increased risk of obesity (Radcliffe et al., 2005). Not only is eating breakfast important, but it has been reported that what children eat also makes a difference. Proper food consumption for breakfast (one high in a variety of nutrients) has been linked to improved cognitive behavior in terms of short term memory, spatial skills, and auditory memory. Therefore, recognition of the educational and nutritional benefits of a good healthy breakfast needs to be instilled in children as part of the educational curriculum.

Not only is eating breakfast important, but it has been reported that what children eat also makes a difference.

Although there have been some federal interventions and guidelines put into place, the regulations are not being implemented routinely enough, resulting in inadequate federally funded programs nationwide. The school food service industry has been critiqued for selling food to children rather than simply trying to provide for their nutritional needs, and for treating students as customers by catering the menu toward what appeals to kids (Gupta, 2010).

Context

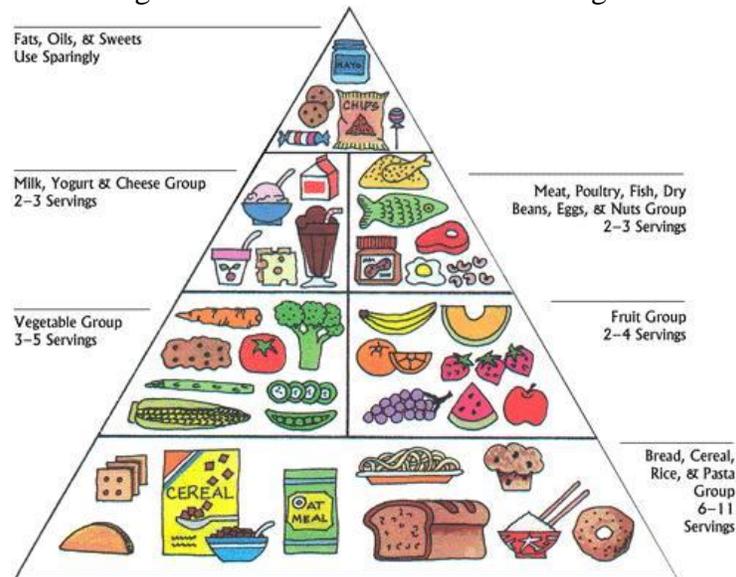
This study took place at an urban charter school in Columbus, Ohio. At the time of the study, the school was awarded free breakfast for 100% of the student population under federal guidelines; most of the school's 400 students in grades kindergarten through eight qualify for the free and reduced lunch as well. The breakfast program begins each morning at 7:15 am and is available to students until 7:55 am. One exception to the time frame is a late bus. The students arriving to school on the late bus are still required to go through the breakfast line upon their arrival. Every student that enters the building during the designated breakfast time is required to go through the line. Each student in line is required to take a breakfast tray, however their choice and consumption are not regulated. As long as the staff has made the food available, the students can make their own choices. Unfortunately, with so many students arriving early in the morning and so few staff members available for breakfast duty, there are many students who bypass the breakfast line altogether and go straight to their classrooms. The teachers are often unaware that a child has skipped breakfast or are misinformed by the student because he/she claims to have eaten a breakfast when he/she has not because they do not "like" the breakfast choice of the day. The kitchen staff does not get to choose the food that is given to the students; rather, they simply prepare and serve the food that is sent to the school through a federally regulated food service provider.

Each morning, as I observed the students eating breakfast I was concerned about a number of issues. First was the amount of waste the students were producing. The majority of the food on each student's tray ended up in the trash can for reasons ranging from "I don't like it" to "I already ate at home." Second was the nutritional value of what was being served to the students. Without exactly calculating the nutritional content of the breakfast, my assumption based on observation was that most of the meals were high in sugar and carbohydrates while lacking in protein and fiber. The lunch room environment was also a bit disturbing. The combination of all ages of students eating at the same time was affecting the behavior of the younger students. I noticed the younger students copying the actions of the older students and adopting their "bad" eating habits such as eating only the high sugar items off of their trays and dumping the rest, or only drinking the juice and giving away the rest of the food to a fellow classmate.

Teacher Intervention

In order to see whether it would have an impact on my students' behavior, I implemented a two week healthy nutrition unit in my kindergarten class. For the first week, I followed an existing curriculum, "Building Better Breakfasts." This education program was developed from a project funded by a grant from the Florida Nutrition Education Training (NET) Program, under the State of Florida Department of Education. I obtained the curriculum materials by writing to the administrator of the Food and Nutrition Service U.S. Department of Agriculture, in Alexandria, Virginia.

The curriculum focuses on teaching the importance of eating breakfast, and providing practical strategies for selecting and/or preparing palatable, culturally acceptable, and nutritious foods for breakfast. The six food groups – grain, fruit, vegetable, dairy, protein, and sweets/fats – are introduced, and students learn to choose from four of these groups (fruit or vegetable, grain, and dairy) to construct a healthy breakfast. This unit consists of five lessons that were designed for use with children in kindergarten through fifth grade.



Descriptions of the lessons from the Building Better Breakfasts curriculum (Bobroff et al., 1995):

[Lesson 1 – Foods & Energy to Grow](#)

Breakfast provides our bodies with "Energy Foods" to start our day. The importance of breakfast and the foods needed daily is the focus of Lesson 1. This lesson provides a foundation for learning about a healthy diet using the food pyramid and the effect of going without breakfast.

[Lesson 2 – The Breakfast Rule](#)

Variety is the secret to healthy breakfast choices presented as the "Breakfast Rule". Choosing at least three of the six food groups is the key to variety. The children are encouraged to focus on choosing from the grain, dairy and fruit/vegetable groups for breakfast meals. The students create their own breakfast plate being sure to choose one food from each of the necessary three food groups mentioned.

[Lesson 3 – Cultural Diversity](#)

Appreciating and respecting others' food preferences is the theme of this lesson. Worksheets and teacher/student made Venn Diagrams illustrate ways for the children to discover the food preferences of individuals, families and other cultures.

[Lesson 4 – Unusual & Silly Breakfasts](#)

Children can discover that any combination of the three food groups learned in Lesson 2 can be a "healthy breakfast." The students take turns choosing a food from each of the three emphasized food groups to create unique and silly breakfast foods then vote on their class favorite.

[Lesson 5 – Building a Breakfast Bread](#)

The skill of making quick breads is the objective of Lesson 5. The students have the fun opportunity to make and taste banana bread as a class.

During the second week of the teaching intervention, I compiled my own unique curriculum based upon further research that had been conducted by the Florida Interagency Food and Nutrition Committee in 2008. The agency added to the Building Better Breakfast program with the Wake Up To Breakfast initiative that focused more specifically on each one of the food groups. So, I focused on a different food group each day.

Descriptions of the lessons I created for the second week of my healthy nutrition curriculum:

[Lesson 1- Whole Grain Choo Choo Train](#)

The lesson provides an introduction to whole grains, where they come from, examples of each and how they can be a healthy breakfast choice. The students listen to an interactive story and create their own whole grain choo choo train tickets (Reeves, Stickney, & Bowden, 2008).

[Lesson 2- Fruit Medley](#)

The lesson attempts to familiarize the students with a variety of fruits. The students play a fruit bingo game and taste test exotic fruits such as mangos, guavas, and papayas (Florida Interagency Food and Nutrition Committee, 2007).

[Lesson 3- Dairy Day](#)

The objective of Lesson 3 is to broaden students' perspectives on dairy products beyond that of milk and cheese. The students listen to a finger puppet play about dairy products and then make their own puppets to repeat the play with the teacher.

[Lesson 4- Food Group Test](#)

The lesson assesses the students' ability to recognize all of the food groups learned in the previous lessons. The students work in small groups to create food group collages using magazine images. Each collage is then critiqued as a class and displayed in the hallway.

[Lesson 5- Portion Control](#)

Lesson 5 helps students understand the importance of portion size. The students consider various bowl sizes, using measuring cups and cereal. The side label of the cereal box is used to determine correct portion size and the students eat the correct amount to give feedback on how they felt after eating the proper amount (Florida Interagency Food and Nutrition Committee, 2005).

The main objectives for the two week curriculum intervention were to provide the students with a basic foundational awareness of the five (excluding the sixth food group of sweets/fats) food groups, to understand the importance of including the three groups of dairy, grain, and fruit/vegetable at every breakfast, and to broaden the students' attitudes about variety at breakfast.

The students also spent a day investigating sugar content in cereal. After a discussion about sugar in fruit and juice the children became interested in discovering the amount of sugar in breakfast foods. So, I brought in four different boxes of cereal for the children to graph the amount of sugar per serving size. The results were then discussed in comparison to taste and displayed in the hallway.



Class Created Food Group Pyramid Assessment
(see lesson 4 above)

Class-created “Sugar in Cereal” Graph

Study Design

I sent out letters of parental consent to determine which students would take part in the study. Based upon the small number of approvals I received back and the likelihood that a student would attend school breakfast time on a regular basis, I could choose only five students from my class to act as an experimental group and five students from a colleague’s class to act as a control group. All of the students who took part in the study were kindergarten students ranging in age from five to six. One student began the study in the control group, but withdrew from the school during the third week of the study and was unable to complete the study.

As a first pre- and post- intervention measure of the success of the curriculum, I asked each participating student to create a magazine collage of what they like to eat for breakfast. The children were given approximately 30 minutes to create their collage from newspaper grocery store advertisements and magazine pictures. The prompt given to the students can be found in Appendix A. I grouped the pictures chosen by the students into various categories, and counted the frequency with which they occurred in the students’ collages.



Experimental Group



Control Group

As a second measure of the children's understanding of healthy breakfast composition, each child was asked to use puppets and create a short 3-4 minute skit about what they like to eat for breakfast. The verbal prompt given to the students can be found in Appendix A. The students were allowed to choose one other peer to be in the video with them, and they were aware that they were being videotaped. I provided the students with handmade puppets (cardstock cartoon characters taped onto craft sticks with small pieces of magnetic tape stuck on the hands) as well as various types of healthy and unhealthy breakfast foods for the puppets to choose from. The food was colored card stock pictures that had magnetic tape on the bottom of each one. Therefore the puppet could "pick up" by magnetic force which ever items he/she was going to eat for breakfast. Again, students in both the control and experimental groups participated in the activity. I recorded the students' talk about the food they chose, and again analyzed the data for overall patterns in the kinds of breakfast foods suggested by students.



A third source of data for this study was an observation journal, in which I made daily records of what each student taking part in the study was eating for breakfast for one week prior to the curriculum intervention and for one week after the intervention. In addition, throughout the two weeks, I took anecdotal records of learning gains evident among the students in my classroom (the experimental group undergoing the "healthy breakfast" curriculum) and wrote specific quotes in the observation journal when a child in the study made a connection to the intervention.

All of the data sources in this study were analyzed in order to determine whether the healthy nutrition curriculum unit made a difference in my students' understanding of desirable breakfast composition, and their willingness to make better food choices at breakfast time. The main objective of the teaching intervention was to provide the students with a basic foundation of the six food groups, to communicate the importance of including the three groups of dairy, grain, and fruit or vegetable at every breakfast, and to expand the students' conceptualization of breakfast combinations. I was looking to see whether my kindergarteners' post-intervention answers would look significantly different from the data I gathered from students in the control group (a separate kindergarten classroom that did not implement the healthy nutrition curriculum). I also wanted to know whether their food choices I observed during school breakfast time would change after the intervention.

Results

After a short two week intervention, the data obtained from the collages, the puppet show, and my in-class observations indicate that there was a marked difference in the answers given by students in the control and experimental groups. The results of my records of students' actual food choices during breakfast time were more ambiguous.

The first data source I considered was the "Breakfast Collage;" I asked students to create a collage of what they like to eat for breakfast. They used the same teacher-provided magazines and newspaper advertisements. The results can be found in Table 1.

Collage Results

Product	Prior to Intervention		Post Intervention	
	Control Group	Experimental Group	Control Group	Experimental Group
Meat	14	2	11	4
Fruit	1	0	3	5
Vegetable	3	0	2	0
Yogurt/ Milk	1	3	0	3
Chips	0	4	0	1
PopTarts	1	1	0	1
Pizza	0	1	0	0
Tacos	2	0	0	0
Candy	1	1	1	0
Muffin/Cake/Cookies/Doughnuts	3	7	6	1
Fruit Snacks	1	1	0	0
Cereal	3	3	1	4
Bread	0	1	0	2

Table 1. The frequency of foods represented in kindergarten students' collages, made in response to the question "What do you like to eat for breakfast?"

Before the intervention, students in the control and experimental groups constructed fairly similar collages, in that a range of foods were chosen by the students for inclusion in their pictures. For the control group, "meat" was the most frequently chosen type of

desirable breakfast food; the students chose pictures of bacon, steak, crab legs, chicken, ribs, hamburgers, and turkey. This result stayed the same on the control group's post-study collages; meat was still the most frequently chosen type of food. On the other hand, the collages made by students in the experimental group changed between the pre- and post-intervention period. At the beginning of the study, children in the experimental group chose muffins/cake/cookies/donuts more frequently than other kinds of foods, but after the healthy nutrition curricular unit, these students placed "fruit" such as grapes, apples, and watermelon in their collages most often, followed by cereals and meats. This result seemed to align with the goals of the curriculum unit, which emphasized student awareness of the five food groups and the importance of including dairy, grain, and fruit or vegetable servings at each breakfast.

I was also interested in determining whether students' collages indicated a specific awareness of including a variety of food groups in a healthy breakfast. I re-examined the pictures to determine the number of food groups represented in the collages, and the change from pre- to post-intervention responses. The results are shown in Table 2 below.

Food Group Balance in Collages

Student	Number of Food Groups Represented		Pre-/Post-Difference
	Pre	Post	
Exp Group Student A	2	3	+1
Exp Group Student B	1	2	+1
Exp Group Student C	2	4	+2
Exp Group Student D	3	1	-2
Exp Group Student E	2	2	0
Control Group Student F	3	3	0
Control Group Student G	5	3	-2
Control Group Student H	3	4	+1
Control Group Student I	3	3	0

Table 2. The frequency of food groups represented in kindergarten students' collages made in response to the question "What do you like to eat for breakfast?"

Examination of the student-made collages for the frequency of food groups represented indicated that the experimental group had three out of the five students increase the variety of food groups chosen in their post collages. On the other hand, in the control group, only one student increased the number of food groups represented in the collage.

The average number of food groups represented in the experimental group's collages went from 2 in the pre-assessment to 2.4 in the post-assessment, whereas the average for the control group went from 3.5 to 3.25. Because of the small sample size, it is difficult to say definitively that these differences were due to a desire to show food group balance, rather than some other random factor (e.g., the pictures available in the magazines and newspapers given to the students may have had mostly pictures of one kind of food group, or the way a student allotted his or her time during the activity).

On the other hand, the results of the puppet show activity indicate more clearly that students did seem to change their understanding of "healthy breakfast composition" as a result of the curriculum intervention. The videotaped puppet shows were examined for general trends in student talk, and representative quotes are collected in Table 3 below.

Puppet Show Quotes

Experimental Group

Time 1 (Prior to Intervention)	Time 2 (Post Intervention)
Student A "I like to eat cookies, I like to drink orange juice! It's so fun, I like to eat! So Yummmm, delicious!, I like to eat doughnuts too, so Yummm! I like to eat poptarts, This is delicious!"	"I said let's eat some cereal, I'm going to drink some orange juice, yummm this is so delicious! I'm going to eat an apple for some fruit."
Student B " I want some yogurt, I want some pop, I'm the doughnut monster! And I'm eating some yogurt. Hey no fair! I want some cookies too!"	"Are we supposed to eat a healthy breakfast? Yes! I'm drinking some milk, I'm eating some pancakes and a banana. It is delicious!."
Student C " I like doughnuts they are sooo good!, I like my milk.	"Hello! I like to eat doughnuts and I like cereal.Mama said it's time to eat some breakfast lets eat some cereal. I ate some pancakes, I ate everything Yeah! I'm full."
Student D " I like to eat pancakes, where is that Coca Cola?, Yummmm it is sooo good, I am stuffed!"	"I'm drinking some milk, gulp gulp gulp gulp, I'm eating some pancakes, I want some orange juice."
Student E " I'm eating some pancakes, It's raining cookies, yum, yum, yum, yum, yum!"	"Do we have to eat good food? Yes! Don't eat any more sweets, not pop, not chocolate chips, or poptarts, we have to eat pancakes and cereal, we have to eat healthy."

Control Group

Time 1	Time 2
Student F “ It is my delicious juicie, bananas is my favorite juicy flavors. I like to eat poptarts, I like to eat cereal.”	“ I like to eat bread and I like to eat doughnuts, I like to eat cookies and cupcakes and I like to drink milk”
Student G “muffins are good, I like to eat doughnuts, and I really like to eat calories”	“ mmmm poptarts, I like to eat pancakes, I like to eat doughnuts, I like to drink juice, I like to eat eggs and apples.”
Student H “Hello, I like to eat bananas, hello! I like to eat cereal, and I like to eat 80 calories, and I like to drink juice”	“My calories are apples and yogurt. I like to eat doughnuts, I like to drink Pepsi, I like to eat poptarts crunch, crunch, crunch I’m going to eat all the poptarts. I like to eat McDonalds hamburgers”
Student I “Where are the cheeseburgers? That is milk not juice! My girl eats bagels and drinks milk”	“ I like to eat cheeseburgers, I like to eat cereal, I like to drink milk, I like to eat a lot of calories, thats my favorite.”

Table 3. Recorded quotes from the students during a videotaped, student created puppet show done pre- and post- intervention.

Admittedly, scanning student-made puppet shows for trends in the ideas expressed presents the opportunity for researcher bias. To control for this, I asked a colleague to view the video recordings of the pre- and post-intervention puppet shows. My colleague’s feedback allowed me to detect a slight bias in my initial viewings of the recordings, and I made changes in the quotes I recorded according to her input on the trends she noticed in the student comments. In the puppet show activity, the control group remained consistent with their choices of breakfast foods both pre- and post-intervention. By consistent, I mean that both pre- and post- intervention the participants in the control group randomly chose items that they “liked” with no concern for nutritional value or variety. However, the experimental group changed their puppet show characters’ overall food choices after the curriculum intervention. Prior to the healthy lessons intervention, the students chose what they “liked” to eat such as poptarts, donuts and cookies. However, the second puppet show indicated that the students were aware of making healthier choices by choosing whole grains in the forms of cereal and pancakes, fruits such as apples and bananas, and dairy products such as milk while staying away from high sugar foods. In a few instances, their language explicitly mentions “eating healthy,” and the structure of some of their sentences indicates an awareness of food groups; for example, “I’m going to eat an apple *for some fruit*” or “Don’t eat any more *sweets*.”

Finding a change in my students’ food consumption behavior during the school breakfast time proved more difficult. I recorded the portions of various school breakfast food offerings that students in the control and experimental groups consumed for five days occurring one week before the “healthy breakfast” unit, and again for five days, one week after the completion of the unit. The results are shown in Figures 1 and 2 below.

Experimental Group's Breakfast Food Consumption

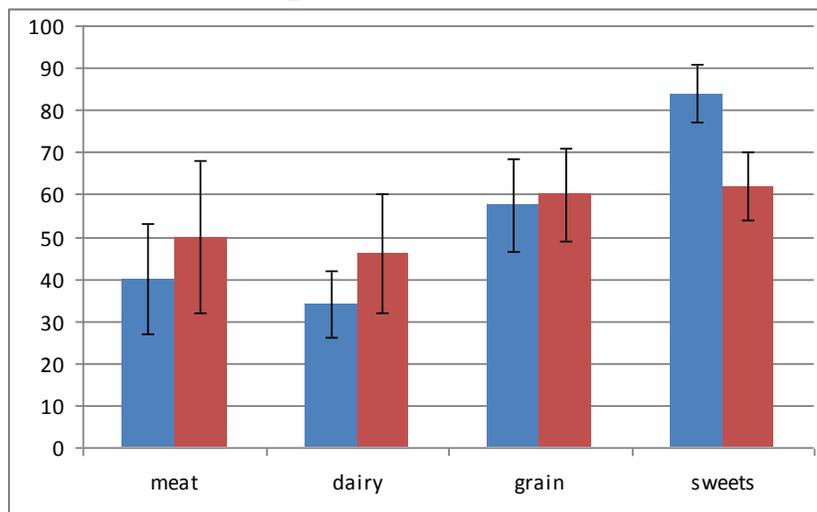


Figure 1. The percentage of available servings of meat, dairy, grains, and sweets consumed by the experimental group during the pre- (blue) and post- (red) intervention periods. Fruits and vegetables are not shown because foods in those groups were not provided by the school as breakfast choices.

Control Group's Breakfast Food Consumption

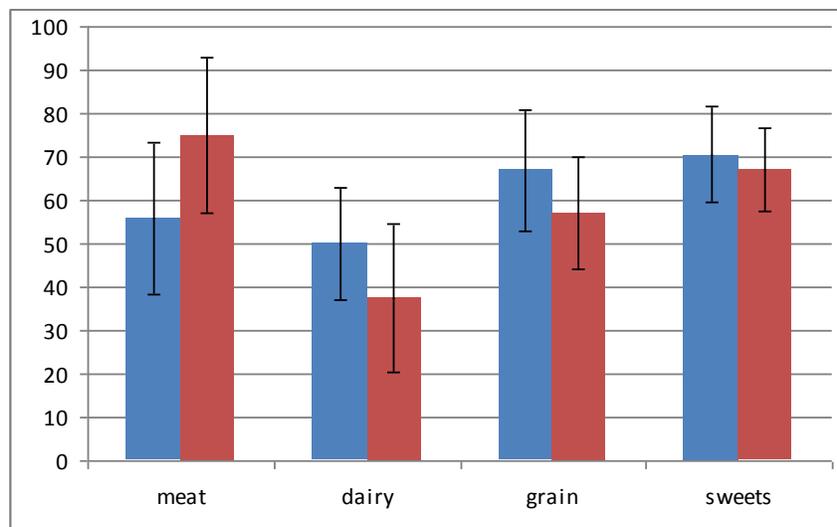


Figure 2. The percentage of available servings of meat, dairy, grains, and sweets consumed by the control group during the pre- (blue) and post- (red) intervention periods. Fruits and vegetables are not shown because foods in those groups were not provided by the school as breakfast choices.

The figures above illustrate the percentage of available portions of each of the food groups actually consumed by the students during the pre- and post-intervention periods. Figure 1 indicates that for the experimental group, meat and dairy consumption went up, grain consumption stayed the same, and sweets consumption went down between the two

data collection periods. Figure 2 illustrates that for the control group, meat consumption went up, dairy and grain went down, and sweets stayed about the same. However, there is a lot of room for error in numbers like these (because of the small sample size), and many factors are involved in breakfast consumption – the type of food offered, the student’s frame of mind, and so on. So the standard error was calculated for each of the percentages of food consumed, and error bars were added to the graphs to show the actual range of percentage of food consumption that could fall within an ‘expected’ range. With the error bars added, it becomes apparent in a pre/post comparison that the only significant change that occurred in the students’ behavior (the only place where error bars do not overlap in the pre-/post- comparisons) is that the experimental group consumed significantly fewer sweets offerings than before the intervention. In other words, students in the experimental group significantly reduced the amount of sweets they consumed after the “healthy breakfast” curriculum intervention.

Although encouraged by the fact that students in the experimental group consumed fewer sweets for breakfast, I was curious to look in more detail at exactly what they were being offered for breakfast. Table 4 below provides an overview of the foods that were made available to students for breakfast in the weeks during which I collected data.

Food Group Representations by Date

Date	Grain	Meat	Dairy	Sweet
March 3	1	1	1	1
March 4	1		1	1
March 5	1	2	1	1
March 11	1		2	1
March 12			2	1
April 12	2		1	2
April 13	2	1		1
April 14	1			2
April 15			1	2
April 16		1	1	1

Table 4. The food groups that were made available to the students each morning for breakfast. Again, no fruits or vegetables were offered.

Although the school breakfast program is federally funded and supposed to be nutritionally balanced, Table 4 indicates that the major food groups are not being offered on a daily basis. The fruit and vegetable food group is not offered at all on any day (fruit juice was offered but was classified as a “sweet” given that the ingredient label indicated a very high sugar content), three out of the ten days the grain group is missing from the menu, half of the days are missing a meat option, two of the ten days a dairy choice was not given; however, a sweet was represented at every meal choice at least once and three times it was offered twice. This table also helps to put Figures 1 and 2 into perspective by comparing what food groups were available to the students to choose to what they actually consumed. In fact, it makes the fact that my students’ consumption of sweets went down in the post-instruction period a little more remarkable, given what was available to them for breakfast.

Finally, I kept an observation journal in which I recorded evidence of students' understanding of the food groups and of a balanced meal composition. Table 5 below presents a sample of the quotes collected.

Student Quotes from Experimental Group

Experimental Group	Date	Quote Recorded
Student A	4/20	"I brought three fruits to be healthy."
	5/25	"I drank all of my milk and ate my green beans to be healthy."
Student B	5/11	"I don't want to eat cupcakes for the birthday because I only want to eat healthy stuff."
Student C	4/8	"Look, my lunch has all of the food groups, fruit, dairy, vegetable, grain and meat!"
Student D	5/24	"I don't eat candy and cake it has too much sugar."
Student E	3/18	"The fruits can run faster than the sweets."

Table 5. Experimental group students' comments recorded after lunch (during recess) during and after the curricular intervention.

The quotes can be explained as an indication of the desire of young students to please adults – their teacher in particular. Each quote was recorded during a time when the student approached me to imply that he/she was gaining knowledge from the healthy nutrition lessons in hopes of receiving a positive reaction in the form of praise or recognition. However, the statements are still evidence of students' awareness of healthy food groups and the nutritional value of certain types of foods.

Conclusions

Overall, results from this study indicate that a two week educational intervention on basic healthy nutrition did make an impact on my kindergarten students and their understanding of healthy breakfast choices. The data from the collage and puppet show activities recorded for the experimental group point toward a change in understanding of what comprises a healthy breakfast choice as well as the importance of variety. In comparison to the control group, the experimental group definitely made conscious healthy choices during the puppet show, whereas the control group remained consistent in their poor choices of desirable breakfast foods. Students in the experimental group were more likely to choose a variety of food groups in their puppet show performances, whereas the control group chose what they liked to eat with no concern as to the food group. The collages also indicate that the students in the experimental group increased the amount of food groups represented at a breakfast meal. Based on my observational notes, I can conclude that the experimental group consumed significantly fewer sweets after the curriculum intervention, whereas the control group remained consistent in their food group choices. Given that no fruits or vegetables and an excess of sweets were available to my students at breakfast, this behavior change is even more noteworthy.

Limitations

Over the course of the study, there were a few limitations and problems. There were originally five students in each group; however, a student that was from the control group switched schools a week into the study. Therefore, his data could not be used in the final results. The young age of the children constrained my study; for example, their limited handwriting capabilities meant that I had to be creative in how I collected data (I couldn't survey them to determine their understanding); also, I had to rely on parental consent for participation in the study, which limited my sample size. The sample size of only nine students was small in comparison to many other studies of this nature. The school-provided breakfast program also brought on limitations, because the children were forced to choose what was being offered by the school. If I had performed the same experiment, but offered fresh produce along side of the grain, meat and dairy products, the results may have been different. Additionally, my time was limited to school hours for observational and intervention purposes. Finally, I tried to control for bias in the examination of qualitative data from the puppet show by comparing a colleague's analysis of the videos for inter-rater reliability when looking for patterns and important quotes, but reliability would have been enhanced if I had pressed more colleagues into service.

Future Directions

I would encourage future researchers to extend upon this brief study by further investigating the academic effects a healthy breakfast has on elementary students. If it were possible to provide balanced, fresh breakfast choices to students, it may be useful to compare the students' cognitive functions such as memory and attention span to that of previous studies done using the current government regulated breakfast meal. Another area of concern is the regulation of the breakfast programs being provided to the qualified schools. A policy change in terms of nutritional value of the breakfast foods and the consistency of maintaining the necessary guidelines may be needed in the future, as well as a look at the problem with catering to students as customers.

Based on the results of this study, a better nutrition curriculum introduced at the kindergarten level can successfully introduce students to the idea of a healthy diet and the importance of breakfast at a young age. Although the children may not totally transfer the knowledge and consistently make healthy choices if the chance arrives, they are perhaps more likely to make the change than if they had never been exposed to the "right" choices.

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Appendix A

Verbal Study Prompts

Prompt 1: Today I want you to look through the magazines I have on the table for things that you like to eat for breakfast. If you find something you like, use your scissors to cut it out and your glue stick to glue it onto your piece of construction paper. I want you to use a marker and write your name on your paper right now, so I will remember who did which picture. After you write your name, turn your paper over to the other side to start gluing your pictures on.

Prompt 2: Today you are going to work as a team. You get a chance to be movie stars today! I have a video camera, a few puppets and some food props. I am going to give each one of you a puppet to use and show you the food that I brought in. I am going to give you a few minutes to choose a partner and think about a show you could make up. Then the two of you will get to perform a puppet show, while I video tape you. The puppet show should be about breakfast.