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The Effect of Nutrition Education on Children’s Healthy Food Choices

A thesis submitted in partial fulfillment of the requirement for the degree of Bachelors of Science in Psychology from The College of William and Mary

by

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Accepted for ____________________________
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The Effect of Nutrition Education on Children’s Healthy Food Choices

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Abstract

Currently, a third of children in the United States are classified as overweight or obese, and the prevalence of obesity has doubled for children between the ages of six and eleven over the past thirty years. In order to address this serious public health problem, a variety of nutrition programs are being implemented across the country. The present research aims to analyze the effectiveness of one such program, the School Health Initiative Program, in two local Williamsburg-James City County Schools. Children at one school (n=28) received information about healthy eating and exposure to a variety of healthy foods, while children at the other school (n=30) received the health information, but not the healthy food exposure. Assessment of children’s knowledge about healthy eating and their willingness to try eight different fruits and vegetables before and after the program indicated that health knowledge increased as a result of the program at both schools regardless of the food exposure component. However, children at the school with the food exposure were more likely to try fruits after the program than were children who did not have the exposure. These results suggest that while providing children with nutritional information may increase their knowledge about healthy eating, their willingness to consume healthy foods is enhanced by exposure to fruits and vegetables.
The Effect of Nutrition Education on Children’s Healthy Food Choices

The growing obesity epidemic is profoundly impacting the nation’s health (Dietz, Benken, & Hunter, 2009). Currently, obesity is considered to be the leading lifestyle-related cause of disease and death in the United States after smoking (Mokdad, Stroup & Gerberding, 2004). The high prevalence of obesity, among children in particular, has recently risen to startling proportions (Vonzie, 2009). Approximately 33% of children in the United States are currently classified as overweight or obese (US Department of Health and Human Services, 2009), and the prevalence of obesity has doubled for children between six to eleven years of age in the past thirty years (Institute of Medicine, 2009). This is a grave public health concern because overweight and obese children are at an increased risk for a number of serious health complications that were previously considered rare in children, such as Type 2 diabetes, gallbladder disease, high blood pressure, and sleep apnea (Lee, Herman, McPheeters & Gurney, 2006).

Fruits and vegetables provide many necessary nutrients (vitamin E, calcium, magnesium, potassium, and fiber), including those that the USDA claims are currently the most under-consumed (USDA, 2005). Nutritional experts believe that improving fruit and vegetable consumption can effectively promote a healthy diet. Consuming between five and thirteen servings (or the equivalent of 2.5-6.5 cups a day) of fruits and vegetables daily is correlated with a decreased risk of disease and healthier body weight (USDA, 2005). Currently, only 9.8% of girls and 13.8% of boys aged 4-8 consume the recommended levels of fruits and vegetables (Jan, Bellman, Barone, Jessen, & Arnold, 2009). Research has shown that children’s eating habits are influenced by their biological
preferences for energy dense foods, which are often sweet and salty, as opposed to healthier foods, which may be bitter or sour tasting (Desor, Malor & Greene, 1977). This evolutionary predisposition for energy dense foods is suspected to have arisen to protect children from consuming toxins. In addition to these innate preferences, children also often demonstrate “neophobia,” defined by Rozin (1976) as the reluctance to try novel foods, which may have evolved from a fear of being harmed or poisoned (also known as the “learned fear hypothesis”). Rigal (2000), concluded that about two-thirds of children between the ages of three and ten exhibit varying amounts of neophobia (as cited in Bellisle, 2009). This is significant because neophobic children consume fewer fruits and vegetables than non-neophobic children (Cooke, Haworth & Wardle, 2007). Even though neophobia may have a genetic component, it can be modified through environmental exposure (Cooke et al., 2007). Despite their innate predispositions, children can learn to like many foods they initially reject if exposed to the proper food environment. Just as a child’s unhealthy eating habits are heightened by media popularity and advertising, similar positive exposure to healthy foods could increase fruit and vegetable appeal and consumption (Birch & Marlin, 1982).

Research indicates that children’s preferences for healthy foods will increase if they are repeatedly exposed to these foods, and if they experience a variety of flavors in their diets (Forestell & Mennella, 2007; Pliner, 1982; Wardle, Herrara, Cooke & Gibson, 2003). By adding familiar ingredients to new or disliked foods, parents can further encourage the consumption of healthy foods (Stallberg-White & Pliner, 1999). Although taste exposures appear to be more effective than visual exposures in reducing food neophobia (Birch, McPhee, Shoba, Pirok, & Steinberg, 1987), Pelchat and Pliner (1995)
also found that emphasizing a novel food’s pleasant taste increased the likelihood that children would try it. In this study, when children were presented with familiar and novel foods, the statement, “Would you like to try it? It tastes good.” was considerably more effective in increasing their willingness to try a food than asking, “Would you like to try it?” This strategy could therefore serve as an effective tool for encouraging children to try fruits and vegetables.

The Role of Nutrition Education

In an effort to effectively respond to the childhood obesity epidemic, government agencies and community groups have begun to develop strategies that encourage healthy eating (CDC, 2009). In January of 2010, Michelle Obama announced her childhood obesity initiative to decrease the early onset of obesity by having the federal government partner with local communities (Hellmich, 2010). Consistent with this, a primary goal of the government objective “Healthy People 2010” (USHHS, 2000) is to decrease the prevalence of obesity among children by promoting physical activity and healthy eating. Research by the Robert Wood Johnson Foundation and two national programs, “Active Living Research” and “Healthy Eating Research,” have found that increasing access to healthy foods, encouraging physical activity, and decreasing sedentary behavior can help curb childhood obesity (Lavizzo-Mourey, 2009).

Because children spend a large amount of time in educational environments, schools have been identified as key venues for the implementation of nutrition intervention programs (Mullen & Shield, 2004). There is some evidence that nutrition education programs that contain only school-based components can be effective in
improving health knowledge. For example, The Shape It Up program, which promotes healthy eating and exercise at school, has been presented to almost 90,000 elementary students in over 257 New Jersey schools. This program teaches children about the food pyramid, the importance of eating fruits and vegetables, the benefits of drinking milk and water, and how to keep a healthy heart. These workshops significantly improved children’s responses to a health knowledge questionnaire (Jan et al., 2009). This suggests that targeting the school-based setting may be sufficient to increase nutrition knowledge; however, this type of program is not always successful at increasing consumption of healthy foods. Because not all nutrition programs are equally effective, and their success in encouraging healthy eating behaviors depends on many different factors, it is important to determine which aspects of these programs are most effective at modifying behavior over the long term. By comparing outcomes of specific programs that vary in home, school and community components, we can acquire a better understanding of how these components work together to produce effective behavioral change.

One aspect of nutrition education that may be important is the length of the program. Although there is some evidence that some shorter programs can be effective in increasing children’s knowledge about healthy eating, they have not all been as successful in encouraging behavioral change. For example, a seven-week program addressing healthy food choices and the importance of physical activity through informational handouts and motivational posters resulted in a significant improvement in nutrition knowledge, compared to a no intervention control group (Minnerath, 2009). However, based on food diaries, it was not clear that participants actually changed their patterns of eating. As illustrated, short-term nutrition education may be an effective
strategy for increasing nutrition knowledge, but may not be as effective in producing significant behavioral changes. In contrast, children who participated in a three-year school-based nutrition education program that encouraged healthy eating through increased awareness of healthy food choices in multiple settings (home, school, etc.), made healthier food choices (Ellis, 2008). In addition, Ellis (2008) reported that the children who took part in this nutrition program had an overall decrease in body mass indices. The effectiveness of changing eating behavior over time raises the possibility that longer nutrition education programs may produce better behavioral outcomes.

In addition to the length of the program, the types of messages communicated to children appeared to affect their willingness to try healthful foods. For example, Wardle and Huon (2000) found that while nutrition education encouraged consumers to make healthier choices in general, children did not always consider healthy food desirable. When told a particular beverage was healthy, children were less likely to consume it and less inclined to ask their parents to buy it in the future, compared to the same drink without the healthy label. These findings are consistent with recommendations that nutrition education should not only inform children about healthy choices, but also encourage more positive perceptions of nutritious and healthy foods (Douglas, 1998).

Seaman and Kirk (1995) have argued that traditional methods of nutrition education that capitalize on memorization and regurgitation of facts may be tedious and ineffective, whereas interactive and practical nutrition education, involving hands on learning, such as cooking classes or computer-based methods (McCullough, 2004), tend to be more effective in promoting a positive behavioral change in children. Of these, the best-known and publicized programs have been those initiated by the USDA.
The Team Nutrition program, which was established by the Food and Nutrition Service of the USDA in 2002, is a multifaceted program that provides nutrition education to both children and parents, offers support for food services at schools, and promotes healthy eating and physical activity (USDA, 2009). Because pilot testing demonstrated that behavioral changes are more marked when multiple channels of communication are employed, this program involves a wide variety of media, such as computer games, colorful posters, and interactive online worksheet materials that are catered towards children and their parents. This suggests that programs that provide children with a variety of messages about healthy eating in both the home and school environment may be more effective in improving eating habits. However, specific behavioral outcomes from this study have not yet been measured. Based on the successful implementation of this program, the USDA has initiated other similar programs such as the “Eat Smart. Play Hard.™” program, which provides families with the resources necessary to continue nutrition education in the home environment. Current research suggests that these modes of education are feasible with sufficient support and cooperation among staff and site leaders (USDA, 2009). However, the effectiveness of this particular school-home based program has not yet been evaluated.

Not all comprehensive nutrition education programs that focus on providing messages about healthy eating across the home and school environments have demonstrated behavioral change. For example, one such program, which was based on the “5-A-Day” fruit and vegetable campaign, entailed bi-weekly lessons encouraging fruit and vegetable consumption. In addition to the classroom education component, students identified fruits and vegetables in their lunch, and trained monitors reported
whether students consumed these foods. Finally, parents were sent nutritional information and cookbooks to facilitate healthy eating at home. The researchers reported a positive impact on nutrition knowledge, but moderate and variable results for eating behavior changes (Blom-Hoffman, Kelleher, Power & Leff, 2004). Perhaps the lack of specific formalized exposure to fruits and vegetables as part of the program limited actual eating behavior modification.

Because research has often supported repeated exposure as an effective method for increasing children’s consumption and reducing food neophobia (Gerrish & Mennella, 2001; Pliner, 1982; Wardle, Herrara, Cooke & Gibson, 2003), some programs have incorporated exposure-based interventions. For example, Reverdy et al., 2008 found that nutrition education that encourages novel healthy food consumption and provides the opportunity to taste novel foods, decreased neophobia in children aged 8-10 compared to age-matched controls. This research illustrates that the combination of information and exposure-based education can effectively enhance children’s liking and acceptance of healthy foods. The current study aims to build on this research by providing kindergarteners with a specific school-based and supplemental home-based intervention that involves either nutrition education alone, or both nutrition education and the opportunity to taste healthy foods.

**Current research**

The research proposed herein aims to determine how dietary education programs offered by the Williamsburg-James City County School Health Initiative Program (SHIP) affects students’ knowledge about healthy eating and their willingness to try nutritious
foods such as fruits and vegetables. The SHIP program provides information about healthy eating, as well as exposure to healthful foods, such as fruits and vegetables, each week (see Appendices 2&3) based on the Organ Wise Guys Nutrition Program (Organ Wise Guys Inc., Duluth, GA) and the USDA’s Fresh Fruit & Vegetable Program.

Each year, the Organ Wise Guys Program is initiated with a school assembly explaining the role of the organs in maintaining health. The program subsequently extends into the classroom with regular activities including music about healthy eating, books, games, and other activities (SHIP, 2008). This program encourages physical activity through daily stretches, activity enhanced lessons, and nutrition education. The nutrition component of the program features multiple organ characters that impart healthy messages to the children (i.e., Hardy Heart does not like fatty foods). Education consists of a variety of handouts and activities (puzzles, word searches) that encourage novel and familiar fruit and vegetable consumption. In addition, exposure to a variety of fruits and vegetables is offered through the USDA Fresh Fruit & Vegetable Program, along with nutritional information on sampled foods. This health information is sent home along with tips on how to prepare foods sampled in the classroom.

The unique Organ Wise Guys’ component of interactive books, games, activities, and lessons associated with the healthy organ characters (Tuuri et al., 2008) has also been included in other programs. In Louisiana, a statewide twelve-week nutrition elementary program known as “Smart Bodies” included the Organ Wise Guys nutrition education components to encourage consumption of fruits and vegetables. Tuuri et al. demonstrated that the Organ Wise Guys program increased nutrition knowledge in fifth and sixth grade students and effectively encouraged students to try fruits and vegetables.
While children’s particular fruit and vegetable preferences did not change as a result of the program, nutrition knowledge and self-efficacy for trying fruits and vegetables were positively impacted.

In the James City/Williamsburg area, Matoaka Elementary School remains unique in that while nutrition education is provided, no novel foods are introduced to the students as part of the program. This situation provides a unique opportunity to compare the effectiveness of fruit and vegetable exposure across nutrition programs by comparing students at Matoaka Elementary School, with those at James River Elementary School, which provides both nutrition education and exposure to healthy foods as part of their program. To this end, the goal of the present study was to test children’s nutrition knowledge and their willingness to try fruits and vegetables before and after the school-based nutrition curriculum at these two schools. Based on previous research, we hypothesized that children who received both nutrition education and novel foods as part of the health education program would exhibit a higher level of performance on the Health Knowledge Assessment and demonstrate a greater willingness to try fruits and vegetables in comparison to those who received education alone. Therefore, according to this hypothesis, we predicted that children at James River Elementary School would show more improvement on the Health Knowledge Assessment and try more of the fruits and vegetables in the post-test than children at Matoaka Elementary School.

Method

Participants

Consent forms were sent home with 196 kindergarten students at two Williamsburg area
Effect of Nutrition Education

schools: Matoaka Elementary School and James River Elementary School. A total of 59 parents, from Matoaka (n=30) and James River (n=29), returned the consent forms. Participants were tested at their schools for 10-15 minute sessions. All procedures were approved by the James City-Williamsburg County School Board and the William & Mary Institutional Review Board.

Materials

*Health Knowledge Assessment.* Questions adopted from the Organ Wise Guys Assessment of Health Knowledge asked children to answer fourteen questions about healthy versus unhealthy food choices (i.e., What is a healthier after school snack: celery or brownies?; see Appendix 1A). These questions were designed to measure content learned during the Organ Wise Guys health education program. Each question was presented on a laminated 8x11 inch card with two illustrated answer choices.

*Foods.* Eight foods (four vegetables and four fruits) were packaged in individual (4 oz.) plastic containers. The vegetables included acorn squash, baby spinach, cucumber slices, and sugar snap peas. The fruits included pears, pink grapefruit, papaya, and kiwi.

Procedure

Kindergarten children at Matoaka and James River elementary schools were individually tested in the fall, at the beginning of the SHIP nutrition education program, and again after approximately five months of the program. At the beginning of the fall session, the experimenter recorded the height and weight of each child. Both test
sessions were conducted at a small table, which was located in a quiet corner of the hall outside of the classrooms. At the start of both experimental sessions, children were asked whether or not they felt hungry and whether they could define what a healthy food was. If children were unable to respond with an accurate definition of a healthy food, the experimenter explained that a healthy food was something that was good for the body.

Each session consisted of two main components. The first component (Task 1) involved presenting children with questionnaire cards for the Health Knowledge Assessment. The second component (Task 2) gave children the opportunity to try novel and familiar fruits and vegetables.

**Task 1 - Health Knowledge Assessment.** At the beginning of Task 1, the experimenter asked each child if they would like to play a card game. After a non-food example that demonstrated how to complete the task (i.e., Which game is more fun to play? Checkers or Basketball), fourteen illustrated questions were presented to the children one at a time in random order. Each card was laid out on the table and the questions were read aloud as the experimenter underlined each word with her finger, and pointed to each of the answer choices. If the child did not respond after fifteen seconds, the question was repeated and the child was given another chance to answer. Both pointing to the correct choice/picture and a verbal response were considered acceptable forms of answering.

**Task 2 - Willingness to try foods.** Children were then presented with eight different fruits and vegetables in random order and given an opportunity to eat as much
or as little of the food as they liked. For each food item, the children were asked if they were familiar with the food, if they could identify the food, if they liked the food, and if they would like to try it now. Each container was opened and displayed to the child for taste trials and sealed and put to the side after each trial. After the children were given a chance to try and identify each food once, they were then informed of the correct identification for each food and provided with an additional opportunity to try the identified food. The experimenters recorded whether the children were familiar with the food, if they could identify it, whether they were willing to try the food, and whether or not they liked it (see Appendix 1B).

Results

Participant Characteristics. All of the students who were recruited completed both test sessions, except for one child who left the school district. Therefore the final analyses included a total of 58 participants. As shown in Table 1, participants at both schools were similar in age, BMI, and gender. However, the percentage of Caucasian children (hereafter referred to as white) was smaller at James River \( (p=.023) \) than at Matoaka.

Children were also categorized according to their free, reduced, or regular lunch status. According to these guidelines, a family of four would be eligible for free meals if they made less than $28,665, while those who made between $28,665.01-$40,793 annually would be eligible for reduced priced lunch. Children whose parents made more than $40,793 a year paid the regular lunch price. Because only six children were in the reduced lunch category, we combined them with the children who were in the regular lunch category, creating a mid-high income group and a low-income group. When the
percentage of children within these categories was compared between schools, there were fewer children in the low-income category at Matoaka than at James River ($p<0.001$). As a result of the differences in race and income between the schools, these variables were considered in all analyses.

**Baseline Health Knowledge.** During the initial testing phase, children at both of the schools performed very well on the Health Knowledge Assessment (adopted from the Organ Wise Guys Health Assessment) used in Task 1; answering 87.7% (SEM=2.1) of the questions correctly overall. The most difficult question for the children was, “Which is a healthier food choice for lunch-A) pizza or B) a sandwich?” On average only 58.6% of the children at James River and 76.7% of the children at Matoaka answered this question correctly.

To compare children’s baseline performance on Task 1 at Matoaka and James River, we conducted a t-test, which indicated that children at Matoaka performed marginally better (92.8% ± 9.2 answers correct) than those at James River (86.3%± 16.3 answers correct ($F(1, 58)=3.67, p=.06$). Further, white children’s performance was comparable to that of non-white children. However, mid-high income children’s performance was significantly better than the low income children ($t(56)=2.11, p<0.05$).

While many participants claimed they were familiar with the foods, ranging from cucumbers (80.6%), which were the most familiar, to acorn squash (21.5%), which was the least familiar, they were not as successful at identifying the foods (see Table 2). When children were presented with the fruits and vegetables in Task 2, and asked “Do you know what this food is?” they were generally unable to identify the foods. A series
of chi square analyses indicated that the percentage of children who correctly identified each of the fruits and vegetables did not differ between schools (all $p$'s $> 0.05$). This similarity is not a function of baseline familiarity either, as students at both schools had comparable familiarity ratings for all the foods except spinach. Students at James River recognized spinach significantly more than students at Matoaka ($\chi^2(1, N=58)=4.6, p=0.03$). Further, there were no racial differences in identification or recognition, and no income differences with the exception of pink grapefruit identification. Low-income children were significantly better at identifying pink grapefruit than the mid-high income children ($\chi^2(1, N=58)=6.5, p=0.01$).

Children’s willingness to try foods at baseline: At baseline, children at both schools were somewhat willing to try the foods presented to them (see Table 2). Using a series of chi-square analyses, it was found that children at the two schools did not differ in their willingness to try fruits or vegetables at baseline (all $p$s $>.05$) with the exception of acorn squash. Children at Matoaka were more likely to try squash at baseline compared to children at James River ($\chi^2(1, N=58)=4.7, p=0.03$). The only significant difference between white and non-white children’s willingness to try the foods was that non-white children were significantly more likely to try acorn-squash than white children ($\chi^2(1, N=58)=4.3, p=0.04$). Children in the low-income group were also more likely to try acorn squash ($\chi^2(1, N=58)=6.2, p=0.02$). In addition, the non-white children tried marginally more fruits ($M=3.4\pm.21$) during baseline than the white children ($M=2.7\pm1.4; F(1, 55)=3.4, p=0.070$). Children in the low income group also tried marginally more of the fruits ($M=2.4 \pm .2$ vs.
M=3.5 ± .2; $t(56)=2.7, p<0.08$) and significantly more vegetables (M=2.7 ± .2 vs. M=3.5 ± .3; $t(55)=1.8, p<0.01$).

**Changes in Knowledge about Healthy Eating as a Function of Nutritional Education:**

To determine whether children’s knowledge about healthy eating increased after the SHIP program, a repeated measures ANOVA was conducted to compare the difference between baseline and post-test scores on the Health Knowledge Assessment. As shown in Figure 1, children demonstrated increased knowledge about healthy eating after the SHIP program by scoring higher on the Health Knowledge Assessment at the post-test than at baseline ($F(1, 58)=10.3, p<.01$), regardless of which school they attended. Further, the increase in scores observed between baseline and post-test was similar for the white and non-white students and for students of different income statuses. However, overall the low-income children did not perform as well as the mid-high income children on the Health Knowledge Assessment (M= 83.5 ± 5.8 vs. 92.5 ± 1.5, $F(1, 56) = 6.0, p<0.02$).

Similar analyses indicated that children correctly identified significantly more fruit in Task 2 of the post-test regardless of whether they had exposure to food during their nutrition program ($F(1, 54)=21.5, p<0.001$). However, overall identification of vegetables did not improve after the SHIP program. These post-test differences were consistent across schools. Further, no income or racial differences were found in post-test identification ability. Also, participants who claimed they remembered the foods from last time did not demonstrate any significant differences between baseline and post-test measures for fruits or vegetable identification.
Changes in Willingness to Try Healthy Foods. In general, children’s reported hunger state was consistent between the baseline and post-test ($\chi^2(1,N=58)=2.8, p>0.05$). To determine whether their willingness to try the foods changed as a function of the SHIP program, we conducted a repeated measures ANOVA with time (baseline vs. post-test) as the repeated measures variable and school (Matoaka vs. James River) as the between subjects variable. When looking at children’s willingness to try the vegetables presented to them, these analyses indicated that there was no significant main effects or interaction. However, when these analyses were repeated for fruits, they revealed that although children did not try more fruits after the program overall, there was a significant time by school interaction ($F(1, 56)=4.8, p=.033$). As shown in Figure 2, participants at James River, who were provided with exposure as part of their program, tried significantly more fruits in the post-test than they did during baseline ($F(1, 26)=4.7, p=.039$). In contrast, children at Matoaka, who did not receive food exposure as part of the SHIP program, tried a similar number of fruits in the baseline and post-tests. There was no significant race x time or income x time interactions in children’s willingness to try fruits, suggesting that race and income were not responsible for changes in children’s willingness to try fruit at the two schools. Further, chi-square analyses conclude that the only post-test differences between race and income are that low-income students are more likely to try grapefruit ($\chi^2(1,N=57)=4.4, p=.03$) than mid-high income students and non-white students are more likely to try grapefruit ($\chi^2(1,N=57)=7.5, p=.006$) and kiwi ($\chi^2(1,N=58)=3.8, p=0.048$) than white students.
In order to determine whether children at James River were more likely to try the specific foods that they were exposed to during the program than children at Matoaka, we created one group of foods that were exposed as part of the program (i.e., pears, pink grapefruit, cucumbers, and kiwi) and another group consisting of foods that had not been exposed during the program (acorn squash, baby spinach, papaya, and sugar snap peas). Separate repeated measures ANOVAs were then conducted with time as the repeated measures variable, school as the between subjects variable, and percent of foods tried for the exposed and unexposed foods as dependent variables. As shown in Figure 3A, these analyses yielded a significant time by school interaction \(F(1, 58)=3.81, p=.05\) for the exposed foods. Simple main effects analyses indicated that while children at James River ate marginally more of the exposed foods during the post-test \(t(26)=1.89, p=0.07\), children at Matoaka were not more willing to try these foods after exposure to the program \(t(29)=.841, p=0.41\). For the foods that were not exposed at James River, the repeated measures analyses did not produce a significant time x school interaction (Figure 3B).

Discussion

The present study analyzed the effectiveness of a nutrition education program at two local elementary schools. At one school the program only included The Organ Wise Guys Nutrition Program (Matoaka Elementary School), whereas at the other school (James River Elementary School), the program employed both the Organ Wise Guys Nutrition Program and weekly food exposure. It was hypothesized that the children at James River Elementary School, who received both education and food exposure would
demonstrate better proficiency on the Health Knowledge Assessment and a greater willingness to try the fruits and vegetables.

Consistent with our hypothesis, our results indicated that children exposed to a variety of fruits and vegetables at James River (see Appendix 3) demonstrated a greater willingness to try fruits compared to children at Matoaka. These findings suggest that the food exposure component of the nutrition program may be responsible for this change. Consistent with this, Gerrish & Mennella’s research demonstrated that infants who were exposed to a variety of vegetables for a two-week period were more willing to try a novel vegetable at the end of the exposure period (2001). Although children at James River were more likely to try fruits after the exposure period, their willingness to try vegetables did not increase. Three potential explanations may account for this finding.

First, it is possible that the appeal of vegetables did not change because the children were largely exposed to fruits during the program (see Appendix 3). In fact, of the four fruits tested in Task 2, the children had been introduced to three of them (all except papaya) during the program. When we analyzed children’s willingness to try exposed versus unexposed foods before and after the program, we found that children at James River were significantly more willing to try foods they had been exposed to compared to children at Matoaka (Figure 3A). However, there was no difference between schools in children’s willingness to try the foods that were not included in the program (Figure 3B). Likewise, other studies have observed that the greater the exposure, the more willing children are to try those foods (Wardle, Herrara, Cooke & Gibson, 2003; Reverdy et al., 2008). It is possible that exposure to the pears, pink grapefruit and kiwi during the program decreased neophobia for these particular fruits resulting in an
increased willingness to try these now familiar foods. However, some studies show that children need to be repeatedly exposed to these foods if they are going to learn to like them better (Pliner, 1982).

Some research has also shown that children prefer fruits to vegetables, potentially because they are more palatable and less bitter tasting (Domel et al., 1993). There is also some evidence from animal studies that the appeal of food diminishes as the flavor becomes less palatable (Forestell & LoLordo, 2004). If this is the case, then 25 weeks of food exposure as part of the nutrition program may not have been sufficient to improve children’s preferences for vegetables.

Research also supports the possibility that exposure to specific fruits can decrease neophobia for fruits in general (Mustonen & Tuorila, 2010). According to this idea, a wide variety of exposure to certain groups of food can result in greater willingness to try similar foods (Birch, Gunder, Grimm-Thomas & Laing, 1998). These exposure experiences may accumulate over time to decrease neophobia for certain categories of foods (Cooke & Wardle, 2005), potentially accounting for the increased willingness to try fruits (but not vegetables) after several months of mostly fruit exposure.

It should be noted that many of these children were already familiar with the foods they were exposed to during the program, suggesting prior exposure. Moreover, even though many of the children were not able to identify what the specific foods were, many were still willing to try them. It is possible that in our study, demand characteristics encouraged children to try the foods presented to them. However, the experimenters made sure to let the children know that they had the choice of whether or
not to try the foods. Thus, perhaps it was their combined experiences at home and at school that enhanced their willingness to try the exposed foods.

With respect to nutrition knowledge, children in both schools exhibited similar increases in their Health Knowledge Assessment performance, regardless of whether they were exposed to food during the program. Therefore, it appears that exposure to foods in conjunction with the education program did not specifically improve the children’s knowledge of nutrition more than the effects of the education component alone. It is worth noting, however, that the children in this study exhibited above average levels of nutrition knowledge prior to the SHIP program, (i.e., between 80%-90%). The high scores seen at baseline suggest that these kindergarten-age children may benefit from a higher level of nutrition education, especially since the Health Knowledge Assessment was designed to mirror the Organ Wise Guys programming provided as part of SHIP.

Although the children performed well on the Health Knowledge Assessment, their limited ability to correctly identify the fruits and vegetables presented at baseline suggests that their knowledge in this area could be improved upon. Interestingly, during the post-test children at both schools were able to identify significantly more fruits, but not vegetables compared to baseline. While the cause of this difference is not apparent, it seems unlikely to be due to food exposure, since children at Matoaka were also better at the post-test identification. It is possible that another aspect of the nutrition programming was responsible for this change, or that there was more exposure to fruits outside the classroom environment. Perhaps children are relatively poor at identifying vegetables compared to fruits because they are exposed to fruits more frequently than vegetables in their every day lives.
According to Bronfenbrenner’s Ecological Systems Theory, the variety of spheres that children are exposed to during the course of a day interact to influence behavior, and this theory can be applied to eating behavior as well (Davison & Birch, 2001). Thus, parental food preferences, culture and modeling can also affect a child’s food consumption habits (Harris, 2008; Hughes, Patrick, Power, Fisher, Anderson & Nicklas, 2007; Davison & Birch, 2001). The SHIP program attempted to capitalize on this by providing parents with instructions about how to prepare the foods their children had been exposed to at school. Unfortunately, limited access to information outside the school’s database restricted our ability to understand the eating habits of the children’s parents. Thus, it was not possible to evaluate whether the home component may have supplemented the children’s nutritional experiences at school.

Moreover, research on family involvement in school-based health promotion remains controversial. Some studies suggest that home-based components may not contribute significantly (Blom-Hoffman, Wilcox, Dunn, Leff & Power, 2004), while other studies have found improvements in healthy eating when children receive consistent messages at school and at home (Davison & Birch, 2001; USDA, 2009). Future studies that more closely examine parental eating behavior and nutrition messages provided in the home may provide important insight into nutritional programs aimed at school-aged children.

One factor that affects family eating habits is race/ethnicity (Kumanyika, 2007; Forestell & Mennella, 2008). Research has shown that certain minorities have diets that are high in fruits and vegetables. For example, research by Mennella, Turnbull, Ziegler, & Martinez revealed that Mexican women eat more fruits during pregnancy and feed
their infants fruit at much younger ages than mothers in other cultures (2005). This observation may account for some of the increased willingness of non-white children to try fruits in our study. Unfortunately, the small sample size of minority students in our study limited our ability to draw any firm conclusions about racial and ethnic food preferences. Because there was a significant overlap in income and race (i.e., approximately 80% of the non-white children were of low-income status), it is an unfortunate but real possibility that the increased willingness of minority children to try the foods was due to greater hunger. While we did not see overall differences in children’s subjective reports of hunger, this analysis may not have been sufficiently sensitive enough to reveal potential unreported or underlying differences among small subsets of our sample.

The present study found that low-income children scored significantly lower on the Health Knowledge Assessment at both baseline and post-test. A potential explanation is that low-income children are less often exposed to the dichotomy of healthy versus unhealthy food, which was assessed in many of questions. Research shows that families of lower socio-economic status are less likely to eat fruits and vegetables, since they are more expensive and less accessible (James, Nelson, Ralph & Leather, 1997). Thus, children from low-income families may have less exposure to healthy foods at home. Moreover, in our study some of the novel exposed foods were more expensive than more common foods. This may have further limited access to their exposure in the low-income group. The USDA Fruit & Vegetable Program that is part of SHIP, provides schools with funding to purchase both novel and familiar fruits and vegetables throughout the school year. This might be an important aspect of the program for low-income children
since it would increase their access and exposure to healthy foods. Interestingly, our data illustrated that low-income children were especially willing to try the healthy foods presented to them in Task 2. Therefore, limited access to healthy food at home may limit health knowledge, but not necessarily willingness to try healthy foods.

Although the children at James River demonstrated an increased willingness to try some of the foods during the post-test, the question remains as to whether the SHIP program improved their overall eating habits. Even though a significant effort was made to present foods in a consistently familiar form (i.e., cooked or sliced), the testing situation may have been more contrived than what children experience during meals and snacks. Thus, in the absence of additional study it is difficult to extrapolate whether the increased willingness to eat certain healthy foods as a result of the program extends to the home or school cafeteria settings. Likewise, parents may influence children differently than an experimenter or teacher. In addition, peer pressure and the propensity of children to eat in groups at school may have an important influence over children’s healthy food choices (Salvy, Kieffer & Epstein, 2008).

Although it appears that food exposure is an important piece of the SHIP program, it remains difficult to tease this effect apart from the effects of the other components in this multi-faceted nutrition education approach. Research by Cerin, Barnett & Baranowski (2009) revealed that variability in nutrition program design and execution makes it difficult to draw firm conclusions about effectiveness. They argued that future interventional programs should systematically analyze important variables to more rigorously evaluate the efficacy of the intervention.
Therefore, while difficult to gauge overall effectiveness, our preliminary evaluation of the SHIP program suggests that its current length and design was appropriate to improve children’s health knowledge. This research also revealed that the food exposure portion of the program at James River was a valuable addition because it led to a significant increase in the children’s willingness to try some healthy foods. This suggests that encouraging an expansion of this program might contribute to the promotion of healthier lifestyles. Still, more long-term studies are necessary to evaluate the efficacy of these behavior-modifying programs in remediating the alarming growth of childhood obesity. Future research should also evaluate how to improve nutrition education programs so that they can become more effective across a wider range of racial and socio-economic groups. However, this research serves as an important starting point, as it illustrates that children are susceptible to messages and education about healthy eating, and are capable of behavioral change over the short term.
References


based education program to promote healthy eating and exercise developed by a health plan in collaboration with a college of pharmacy. *Journal of Managed Care Pharmacy, 15*(5), 403-413.


Rozin, P. (1976). The selection of food by rats, humans and other animals. In


Figure Caption

Figure 1. Children demonstrated increased knowledge about healthy eating after the SHIP program by scoring higher on the Health Knowledge Assessment during the post-test compared to baseline ($p<.01$), regardless of which school they attended. *Indicates significant difference at $p < .05$. 
Figure 1.
Figure Caption

Figure 2. Students at James River who received exposure to fruits and vegetables as part of their nutrition program were significantly more likely to try fruits in the post-test compared to baseline measures ($p=.039$). Children at Matoaka, who did not receive food exposure as part of the SHIP program, tried a similar number of fruits in the pre- and post-tests. *Indicates significant difference at $p < .05$. 
Figure 2.
Figure Caption

Figure 3. Number of foods that children were willing to try during baseline and the post-test as a function of the school they attended. Graph A depicts the mean number of foods tried that were exposed during the program at James River (i.e., pears, kiwi, pink grapefruit, and cucumber), and graph B depicts the mean number of foods tried that were not exposed during the program at James River (i.e., papaya, baby spinach, acorn squash, and sugar snap peas). While children at James River ate marginally more of the exposed foods during the post-test ($p=0.07$), children at Matoaka were not more willing to try these foods after exposure to the program ($p=0.41$). For the non-exposed foods, there was not a greater willingness to try the foods between baseline and post-test measures for either school. *Indicates significant difference at $p < .05$. 
Effect of Nutrition Education

Figure 3A

![Figure 3A showing the number of exposed foods tried at baseline and post-test for James River and Matoaka.]

Figure 3B

![Figure 3B showing the number of unexposed foods tried at baseline and post-test for James River and Matoaka.]

* indicates a significant difference.
### Table 1. Demographic Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>James River</th>
<th>Matoaka</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants, n</td>
<td>28</td>
<td>30</td>
</tr>
<tr>
<td>Age, mean ± SEM, years</td>
<td>5.3 ± 0.1</td>
<td>5.4 ± 0.1</td>
</tr>
<tr>
<td>BMI, mean ± SEM, kg/m²</td>
<td>16.5 ± 0.4</td>
<td>16.1 ± 0.3</td>
</tr>
<tr>
<td>Race and Ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>14</td>
<td>25</td>
</tr>
<tr>
<td>Black</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>Asian</td>
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<td>3</td>
</tr>
<tr>
<td>Hispanic</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Unknown/Other</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Income Bracket</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Free lunch</td>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td>Reduced lunch</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Regularly priced lunch</td>
<td>11</td>
<td>27</td>
</tr>
</tbody>
</table>

1 Mean ± SEM (all such values).
Table 2. Children’s responses to questions about the foods presented in Task 2 and their willingness to try them.

<table>
<thead>
<tr>
<th>Food</th>
<th>Baseline James River</th>
<th>Baseline Matoaka</th>
<th>Post-test James River</th>
<th>Post-test Matoaka</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pears</td>
<td>% correct ID 3.7</td>
<td>% familiar 79.2</td>
<td>% correct ID 29.6</td>
<td>% familiar 88.8</td>
</tr>
<tr>
<td></td>
<td>% familiar 29.6</td>
<td>% correct ID 13.3</td>
<td>% familiar 96.3</td>
<td>% correct ID 79.3</td>
</tr>
<tr>
<td>Grapefruit</td>
<td>% correct ID 3.6</td>
<td>% familiar 38.5</td>
<td>% correct ID 7.1</td>
<td>% familiar 6.6</td>
</tr>
<tr>
<td></td>
<td>% familiar 28.5</td>
<td>% correct ID 3.3</td>
<td>% familiar 27.7</td>
<td>% familiar 35.3</td>
</tr>
<tr>
<td></td>
<td>% tried 9.6</td>
<td>% correct ID 28.5</td>
<td>% familiar 13.3</td>
<td>% familiar 53.3</td>
</tr>
<tr>
<td>Acorn Squash</td>
<td>% correct ID 3.6</td>
<td>% familiar 16.0</td>
<td>% correct ID 3.6</td>
<td>% familiar 0</td>
</tr>
<tr>
<td></td>
<td>% familiar 28.5</td>
<td>% correct ID 0</td>
<td>% familiar 36.6</td>
<td>% familiar 40.0</td>
</tr>
<tr>
<td>Spinach</td>
<td>% correct ID 7.1</td>
<td>% familiar 66.6</td>
<td>% correct ID 10.7</td>
<td>% familiar 10.0</td>
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<tr>
<td></td>
<td>% familiar 35.7</td>
<td>% correct ID 33.3</td>
<td>% familiar 66.6</td>
<td>% familiar 61.1</td>
</tr>
<tr>
<td></td>
<td>% tried 26.6</td>
<td>% correct ID 26.6</td>
<td>% familiar 67.9</td>
<td>% familiar 56.7</td>
</tr>
<tr>
<td>Papaya</td>
<td>% correct ID 0</td>
<td>% familiar 23.1</td>
<td>% correct ID 0</td>
<td>% familiar 0</td>
</tr>
<tr>
<td></td>
<td>% familiar 21.4</td>
<td>% correct ID 5.3</td>
<td>% familiar 26.9</td>
<td>% familiar 21.1</td>
</tr>
<tr>
<td></td>
<td>% tried 36.6</td>
<td>% correct ID 36.6</td>
<td>% familiar 78.6</td>
<td>% familiar 66.6</td>
</tr>
<tr>
<td>Kiwi</td>
<td>% correct ID 17.8</td>
<td>% familiar 52.2</td>
<td>% correct ID 28.6</td>
<td>% familiar 51.7</td>
</tr>
<tr>
<td></td>
<td>% familiar 39.3</td>
<td>% correct ID 58.8</td>
<td>% familiar 95.6</td>
<td>% familiar 81.3</td>
</tr>
<tr>
<td></td>
<td>% tried 20.6</td>
<td>% correct ID 23.3</td>
<td>% familiar 78.6</td>
<td>% familiar 76.6</td>
</tr>
<tr>
<td>Sugar snap-peas</td>
<td>% correct ID 3.6</td>
<td>% familiar 28.0</td>
<td>% correct ID 0</td>
<td>% familiar 3.33</td>
</tr>
<tr>
<td></td>
<td>% familiar 42.9</td>
<td>% correct ID 52.6</td>
<td>% familiar 32.0</td>
<td>% familiar 57.9</td>
</tr>
<tr>
<td></td>
<td>% tried 30.0</td>
<td>% correct ID 30.0</td>
<td>% familiar 71.4</td>
<td>% familiar 63.3</td>
</tr>
<tr>
<td>Cucumbers</td>
<td>% correct ID 57.1</td>
<td>% familiar 87.5</td>
<td>% correct ID 67.9</td>
<td>% familiar 50</td>
</tr>
<tr>
<td></td>
<td>% familiar 17.9</td>
<td>% correct ID 33.3</td>
<td>% familiar 85.7</td>
<td>% familiar 70</td>
</tr>
</tbody>
</table>

1 Percent of children who indicated the food was familiar after the experimenter correctly identified it
Appendix 1A

Task 2: Health Knowledge Assessment

1. Which is a healthy food to eat with lunch?

   A. a peach               B. a bag of chips

2. Which is a healthy drink that helps keep your bones strong?

   A. soda                  B. milk

3. Which food is a fruit?

   A. corn                  B. orange
4. Which is a healthier after school snack?

A. celery  
B. brownies

5. Which food is a healthy choice for dessert?

A. cake  
B. yogurt

6. Which is a healthier food choice for lunch?

A. pizza  
B. sandwich
7. Which food is healthier to eat with dinner?

A. broccoli  B. French fries

8. How do you feel about eating vegetables?

A. happy  B. sad

9. How do you feel about eating fruits?

A. happy  B. sad
10. What is a healthy food to eat for breakfast?

A. cereal  
B. a cookie

11. Which food is a healthy snack choice?

A. candy bar  
B. an apple

12. Which is a healthier drink choice?

A. soda  
B. water
13. Which is a healthy food to eat with breakfast?

A. a banana  
B. a chocolate donut

14. Which food is a vegetable?

A. a pear  
B. a carrot
Appendix 1B
Health Knowledge Assessment and Food Willingness Record Sheets

1. Which is a healthy food to eat with lunch?  
   - A  
   - B

2. Which is a healthy drink that helps keep your bones strong?  
   - A  
   - B

3. Which food is a fruit?  
   - A  
   - B

4. Which is a healthier after school snack?  
   - A  
   - B

5. Which food is a healthier choice for dessert?  
   - A  
   - B

6. Which is a healthier food choice for lunch?  
   - A  
   - B

7. Which food is healthier to eat with dinner?  
   - A  
   - B

8. How do you feel about eating vegetables?  
   - A  
   - B

9. How do you feel about eating fruit?  
   - A  
   - B

10. What is a healthy food to eat for breakfast?  
    - A  
    - B

11. Which food is a healthy snack choice?  
    - A  
    - B

12. Which of these drinks is a healthier choice?  
    - A  
    - B

13. Which is a healthy food to eat with breakfast?  
    - A  
    - B

14. Which food is a vegetable?  
    - A  
    - B
Do you know what a healthy food is? Y/N
Explanation: A healthy food is something that is good for our body.
Are you hungry? Y/N

**Pears:**
Have you seen this food before? Y/N
Do you know what it’s called?: RECORD RESPONSE BUT DO NOT ID FOOD NOW:
Like the food? Y/N
Like to try it now? Y/N
Facial responses:

**Pink Grapefruit:**
Have you seen this food before? Y/N
Do you know what it’s called?: RECORD RESPONSE BUT DO NOT ID FOOD NOW:
Like the food? Y/N
Like to try it now? Y/N
Facial responses:

**Acorn squash:**
Have you seen this food before? Y/N
Do you know what it’s called?: RECORD RESPONSE BUT DO NOT ID FOOD NOW:
Like the food? Y/N
Like to try it now? Y/N
Facial responses:

**Baby spinach:**
Have you seen this food before? Y/N
Do you know what it’s called?: RECORD RESPONSE BUT DO NOT ID FOOD NOW:
Like the food? Y/N
Like to try it now? Y/N
Facial responses:

**Papaya:**
Have you seen this food before? Y/N
Do you know what it’s called?: RECORD RESPONSE BUT DO NOT ID FOOD NOW:
Like the food? Y/N
Like to try it now? Y/N
Facial responses:

**Kiwi:**
Have you seen this food before? Y/N
Do you know what it’s called?: RECORD RESPONSE BUT DO NOT ID FOOD NOW:
Like the food? Y/N
Like to try it now? Y/N
Facial responses:
Cucumber slices:
Have you seen this food before? Y/N
Do you know what it’s called?: RECORD RESPONSE BUT DO NOT ID FOOD NOW:
Like the food? Y/N
Like to try it now? Y/N
Facial responses:

Sugar snap peas:
Have you seen this food before? Y/N
Do you know what it’s called?: RECORD RESPONSE BUT DO NOT ID FOOD NOW:
Like the food? Y/N
Like to try it now? Y/N
Facial responses:

IDENTIFY ALL FOODS ONE AT A TIME AND ASK AFTER EACH ID-
Have you seen this before? Do you like it? Would you like to try this now?

<table>
<thead>
<tr>
<th>Food</th>
<th>Seen</th>
<th>Like</th>
<th>Try</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pears</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Response</td>
</tr>
<tr>
<td>Pink Grapefruit</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Response</td>
</tr>
<tr>
<td>Acorn Squash</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Response</td>
</tr>
<tr>
<td>Baby Spinach</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Response</td>
</tr>
<tr>
<td>Papaya</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Response</td>
</tr>
<tr>
<td>Kiwi</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Response</td>
</tr>
<tr>
<td>Cucumber</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Response</td>
</tr>
<tr>
<td>Sugarsnap peas</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Y/N</td>
<td>Response</td>
</tr>
</tbody>
</table>
Appendix 2

Example of food exposure program materials and curriculum

Pomegranates!

**USDA Fresh Fruit & Vegetable Program**

**Simple 3-step no mess process to enjoy pomegranates:**

1. **CUT OFF THE CROWN, THEN CUT THE POMEGRANATE INTO SECTIONS.**
2. **PLACE THE SECTIONS IN A BOWL OF WATER, THEN ROLL OUT THE ARILS (JUICE SACS) WITH YOUR FINGERS. THE SEEDS WILL SINK. DISCARD EVERYTHING ELSE.**
3. **STRAIN OUT THE WATER. THEN EAT THE SUCCULENT ARILS.**

- The name "pomegranate" comes from *pomum* ("apple") and *granatus* ("seeded").
- Pomegranates grow on a shrub-like tree, with vivid orange-red flowers and glossy leaves.
- The fruit is about the size of an apple, and has a leathery, deep red to purplish red rind.
- When you split the hard fruit open, a mass of red seeds in a spongy white membrane is revealed. Only the seeds, with their sweet-tart flavor and juice squirting texture, are edible.
- For home use, the whole fruit or seeds can be refrigerated in plastic bags or the seeds can be frozen.
- Pomegranates are high in vitamin C and potassium, a good source of fiber and low in calories. Pomegranate juice is high in three different types of polyphenols, a potent form of antioxidants, which may help in the prevention of heart disease and cancer.

**SOURCES:** www.pomegranates.org

http://en.wikipedia.org/wiki/Pomegranate
## Appendix 3

Food exposure tables (Courtesy of Pam Dannon, SHIP Program)

<table>
<thead>
<tr>
<th>Week</th>
<th>Week of</th>
<th>Day</th>
<th>FFV Afternoon Snack</th>
<th>Nutrition Ed</th>
<th>Special Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>9/8/09</td>
<td>Tues</td>
<td>Whole fresh apple</td>
<td>½ pg Intro note to parents (home Thurs)</td>
<td>ER 12:35-bag lunch</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wed</td>
<td>Watermelon cubes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wed</td>
<td>Bagged grapes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thurs</td>
<td>Assorted berries</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fri</td>
<td>Fruit Salad</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>9/14/09</td>
<td>Mon</td>
<td>Asian Pears (600 whole)</td>
<td>VA Grown seasonal list</td>
<td>Sensory boxes during lunch (Pam) 10:40-12:20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tues</td>
<td>Local eggplant (cooked)</td>
<td></td>
<td>Cooking &amp; nutrition lesson lunch demo (Pam) 10:40-12:20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wed</td>
<td>Local sweet green peppers w/dip AND local grape tomatoes</td>
<td></td>
<td>ER 1:15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thurs</td>
<td>Cactus Pears</td>
<td>Coloring contest sheets go home</td>
<td>Coloring contest-drop box in foyer, due 9/22, 1 winner per grade, art teacher to choose/announce</td>
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<tr>
<td></td>
<td></td>
<td>Fri 18th</td>
<td>Whole banana</td>
<td></td>
<td>10:00 F&amp;V Characters skit assembly w/video - 20 min.</td>
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<tr>
<td></td>
<td></td>
<td>Fri</td>
<td>Star Fruit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>9/21/09</td>
<td>Mon</td>
<td>Tropical Fruit Salad</td>
<td>Making Lunch Veggielicious</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tues</td>
<td>Kiwano Melon</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wed</td>
<td>Red White &amp; Blue Salad (lettuce mix, radishes, red pepper, purple cabbage, cauliflower, jicama-as available)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thurs</td>
<td>Yellow &amp; Red grape tomatoes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fri</td>
<td>Whole apple - variety</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>9/28/09</td>
<td>Mon</td>
<td>Guava</td>
<td>Size Wise Nutrition</td>
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<tr>
<td></td>
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<td>Tues</td>
<td>Angelo Plums</td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td>Wed</td>
<td>Broccoli/Cauliflorets Mix</td>
<td></td>
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<tr>
<td>Date</td>
<td>Fri</td>
<td>Snack Description</td>
<td>Notes</td>
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<tr>
<td>10/5/09</td>
<td>M,W,F</td>
<td>Dragon Fruit</td>
<td>BB-1: Get Kids Involved</td>
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<td>2-3&amp;4-5: MyP worksheet</td>
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<td>Wed ER 1:15</td>
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<td>Schedule: M: BB-1st grade</td>
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<td>W: 2-3 grade</td>
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<td>F: 4-5 grade</td>
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<tr>
<td>10/12/09</td>
<td>M,W,F</td>
<td>Empire apples</td>
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<tr>
<td>10/19/09</td>
<td>M,W,F</td>
<td>Rambutan</td>
<td>Exotic Fruit Summary</td>
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<td>10/26/09</td>
<td>M,W,F</td>
<td>Cucumber slices</td>
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<tr>
<td>11/2/09</td>
<td>M,W,F</td>
<td>Persimmons</td>
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<td>11/9/09</td>
<td>T</td>
<td>Bagged apples (600)</td>
<td>Wed ER</td>
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<tr>
<td>11/16/09</td>
<td>TWF</td>
<td>Pomegranate</td>
<td>Pomegranates!</td>
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<tr>
<td>11/23/09</td>
<td>TWF</td>
<td>NO SNACK</td>
<td>No school W-Th-Fri</td>
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<tr>
<td>11/30/09</td>
<td>MWF</td>
<td>Grapple</td>
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<td>12/7/09</td>
<td>T,F</td>
<td>Kumquat</td>
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<tr>
<td>12/14/09</td>
<td>MWF</td>
<td>Clementines</td>
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<td>2-3: FUTP x2</td>
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<td>4-5: FUTP x2</td>
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<tr>
<td>12/21/09</td>
<td>MWF</td>
<td>NO SNACK</td>
<td>No school W-Th-Fri</td>
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<tr>
<td>12/21/09</td>
<td>MWF</td>
<td>Kiwi &amp; Seckel pears</td>
<td>Wellness news w/kiwi info</td>
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<td>Tangerines (pass out as students arrive)</td>
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<td>1/11/10</td>
<td>MWF</td>
<td>Blood oranges &amp; bagged apples</td>
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<td>1/18/10</td>
<td>TWF</td>
<td>Red Anjou Pears &amp; bagged carrots</td>
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<td>1/25/10</td>
<td>MTW</td>
<td>Honey bells</td>
<td>Th ER, no school Fri</td>
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<tr>
<td>2/1/10</td>
<td>TWF</td>
<td>Star fruit 300 &amp; Pink Lady Apples 600</td>
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<td>2/8/10</td>
<td>MWF</td>
<td>Mangoes &amp; Papayas (precut)</td>
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<td>2/15/10</td>
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<td>Bananas &amp; cut mixed fruit (melons)</td>
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<td>2/22/10</td>
<td>MWF</td>
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<td>Blueberry activity sheet</td>
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<td>3/1/10</td>
<td>MWF</td>
<td>? red mini bananas</td>
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