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Testing the Delivery of an Interactive Second Grade Nutrition Education Curriculum

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ABSTRACT

Childhood obesity rates in the United States are alarming. Interventions incorporating nutrition education and physical activity are important for initiating behavior changes that may reduce the risk of childhood obesity and future health complications. The availability of nutrition curriculum for use in a second grade audience is limited. For this project, a nutrition education curriculum for second grade students was developed and tested over a two-week period in the fall of 2013. Six second grade classrooms (N=118) received four 20-minute interactive nutrition lessons. Lesson topics included: MyPlate, Handy Portions, Sugar Shockers, and MyTray. Pre and post assessments of nutrition knowledge were used to determine the effectiveness of the nutrition education. Overall, there was an increase in the number of correct survey responses recorded following the nutrition education. By category, there were increases in the students' ability to identify healthy snacks, grains, dairy products, and protein sources, but not fruits and vegetables. Further development and testing of innovative nutrition education curriculum for the second grade audience is an important step in establishing the knowledge to influence lifelong behavior changes that could reduce future risk of obesity.

INTRODUCTION

Childhood obesity is a preventable condition that affects around 20% of children ages 6-11 in the United States.¹ Obese children are more likely to have high blood pressure, high

cholesterol,² impaired glucose tolerance, insulin resistance, type 2 diabetes,³ sleep apnea, asthma,^{4,5} fatty liver disease, gallstones, gastro-esophageal reflux,^{3,4} and social and psychological problems.^{3,6,7} Childhood obesity is especially alarming due to the fact that obese children with at least one obese parent are up to 79% more likely to be obese as an adult.⁸ According to the Centers for Disease Control and Prevention, childhood obesity is a result of over consumption of energy and lack of physical activity.⁹

In a study by Cardoso da Silveira et al., researchers found that school-based nutrition education is effective in reducing the body mass index of children and adolescents, regardless of the intervention components.¹⁰ Previous childhood obesity interventions tend to focus on two preventable lifestyle factors that have been shown to contribute to obesity: excessive food intake and low levels of physical activity. Nutrition education interventions have been developed over the years to increase awareness of healthy and appropriate food intake. Although there are many interventions available for pre-schoolers¹¹ and those above third grade,¹⁰ few childhood nutrition interventions have been developed and validated for use among a second grade audience. Second grade students are in the 8 to 9-year-old age range, which is a prime age for learning about the importance of nutrition for their life long well-being. In a country where most people get their nutrition information from the media,¹² it is important to capitalize on opportunities to teach reliable nutrition education. Therefore, the objective of this study was to develop, implement, and test the effectiveness of a nutrition education program specifically designed for a second grade audience.

METHODS

The South Dakota State University Institutional Review Board approved this study. In collaboration with a South Dakota State University nutrition instructor, seven senior-level university students developed a nutrition education program to be delivered and tested for effectiveness in second grade elementary students. The program was implemented in six second-grade classrooms (N-118) over the course of two weeks during regular classroom hours. The program was broken into a series of 20-minute interactive question-answer lessons. The topics covered include: introduction to MyPlate (day one), handy portions (day two), sugar shockers (day three), and MyTray (day four).

In the first lesson, MyPlate was introduced to the students and foods from each food group were identified. The students classified various foods into the five food groups of MyPlate: fruits, vegetables, grains, liquid dairy, and protein. The second lesson covered portion control. Students were taught how to measure portions using their hands so they could learn the correct amount of various foods to eat. On the third day, a visual demonstration displayed the amount of sugar in commonly consumed sugar-sweetened beverages. Sugar cubes, in plastic bags, were held up alongside various drinks; students were asked to correctly match the amount of sugar with the corresponding beverage. Along with the visual demonstration, two short videos¹³ addressing the consumption of sugary beverages in the United States were shown. On the final day, the students applied their knowledge gained over the course of the curriculum to create their own healthy lunch. Using trays from the lunchroom, the students walked around the classroom and selected pictures of healthy and unhealthy food options to create a balanced meal. The students were encouraged to create a meal they would actually eat. The students then “checked out” with one of the nutrition education instructors to ensure a food from each food group was chosen. Prizes were distributed during the lessons as an incentive for participation in the discussions.

An Expanded Family Nutrition Education Program (EFNEP) assessment tool that had been used in several other studies to determine nutrition knowledge among kindergarten to second graders¹⁴ was used to evaluate the effectiveness of the program. The paper survey was delivered both prior to and following the delivery of the lessons. This 10-question, picture based tool (Appendix A) was adapted from its original form to keep costs of delivery within budget. The tool focused on broad nutrition questions, but was primarily intended to assess the ability of students to visually identify particular food groups. Only questions related to the education provided were evaluated to determine efficacy of the program. Statistical analysis of results was conducted using Microsoft Excel.

RESULTS

Overall, six out of 10 questions were chosen for analysis based on correspondence to the delivered nutrition education. Questions regarding personal hygiene and exercise were not covered during the lessons and, therefore, were not included in the analysis.

Table 1: The changes in responses from the pre and post nutrition assessment survey (N=118) can easily be seen in the table below.

	Desired Change		No Change		Undesired Change	
	--- n ---	--- % ---	--- n ---	--- % ---	--- n ---	--- % ---
Food Group	Increase in correct responses		No change in correct responses		Decrease in correct responses	
Q.1 Healthy Snacks	10	8	102	86	6	5
Q.4 Vegetable Group	6	5	102	86	10	8
Q.5 Fruit Group	11	9	94	80	13	11
Q.6 Grain Group	55	47	52	44	11	9
Q.7 Dairy Group	23	19	77	65	18	15
Q.8 Protein Group	51	43	55	47	12	10

Overall, there was an increase in the number of correct responses recorded from pre to post assessments, indicating an overall improvement in nutrition knowledge (Table 1). There were also slight improvements in the ability of students to identify healthy snacks; however, a majority of students had no change in the amount of correct versus incorrect responses. Surprisingly, there was a slight decrease in correct responses from the pre to post assessments for the identification of foods in both the vegetable group and the fruit group. Positive improvements were seen on questions regarding protein, dairy, and grain identification. There was a 47% increase in the number of correct responses for identification of grains and only a 9% decrease in the number of correct responses. There was a 19% increase in correct answers to the dairy identification question and a 15% decrease in correct responses. Finally, a significant improvement was shown for answering the protein identification question correctly from pre to post surveys (43% increase in correct student responses).

DISCUSSION & CONCLUSION

The objective of this study was to develop and implement a second grade nutrition education program and to test the effectiveness of the program in changing basic nutrition knowledge. There is sufficient evidence to support the theory that the school environment is a good location for the delivery of nutrition education.^{15, 16, 17} Following the delivery of nutrition education, students displayed significant improvement in protein identification and moderate improvement in both dairy and grain identification, suggesting that the program was effective for these categories. Also, there was an overall increase in the number of correct responses to the survey, suggesting that the intervention was beneficial. Decreases in nutrition knowledge can be explained by non-consecutive education days, the overwhelming amount of education delivered, and inconsistencies in delivery methods due to the variety of university students teaching the curriculum. Enhancement of nutrition education by teachers in between the delivered nutrition lessons was not measured; however, additional education may have influenced the results.

In the past, nutrition education programs for elementary students have been shown to be a promising tool for weight reduction.¹⁰ Even though the delivered nutrition education program was effective for increasing the recognition of certain healthy food categories,

more reinforcement of these messages from a variety of sources is recommended for establishing long-term behavior change that results in obesity reduction. Future nutrition education recommendations for the second grade audience include 1) choose consecutive days of the week to deliver nutrition education, 2) suggest ways for teachers to continue integrating the delivered nutrition messages throughout activities during the school year, 3) ensure consistent delivery methods of nutrition education, making an effort to have the same educators delivering the lessons each day, and 4) deliver a follow-up survey to determine students' long-term recall. Combining nutrition education with other tools may also be a way of increasing behavior change among the elementary audience. Other studies have found that positive outcomes in nutrition education programs have been attributed to the incorporation of parents in the nutrition education intervention.^{14, 16} Involvement of school faculty members to support nutrition messages within the school meal program has also been cited as contributing to positive outcomes in the nutrition education program.¹⁸ Modification of the school environment including incorporation of competitive food policy, psychosocial support, and food service, has been considered a top priority for shaping student health behavior.¹⁷ Technology-driven education has also been suggested for improving adolescent nutrition messages.¹⁹ Additionally, the use of school gardens combined with nutrition education has been shown to increase vegetable consumption among second grade students,²⁰ as well as increasing overall well-being and strengthening the school environment for positive youth development.²¹ Incorporating any or all of these ideas into school-based nutrition education should be considered for impacting overall behavior change among elementary students.

Delivery of school-based nutrition education has the potential to help prevent excessive weight gain and future related complications. The school provides a great environment for the early establishment of nutrition education curriculum for a second grade audience. Effective and lasting nutrition education curriculum for the second grade audience is limited. Continued development, publication, distribution, and testing of nutrition education for the second grade audience will enable researchers and educators to help advance this limited, but growing field of interest.

LIMITATIONS

Some of the limitations of the delivery of this nutrition education are beyond the control of the researchers. Limitations include scheduling conflicts, forcing nonconsecutive delivery of nutrition lessons, possible lack of reinforcement of messages beyond the lessons delivered, and limited time slots available to deliver the planned nutrition education. Variations in teaching methods of the nutrition educators could have also caused inconsistent delivery of messages. Continued collaboration with school leaders and faculty may help overcome some of these barriers in future programming. More extensive training in the delivery of nutrition lessons may help attenuate differences among educators.

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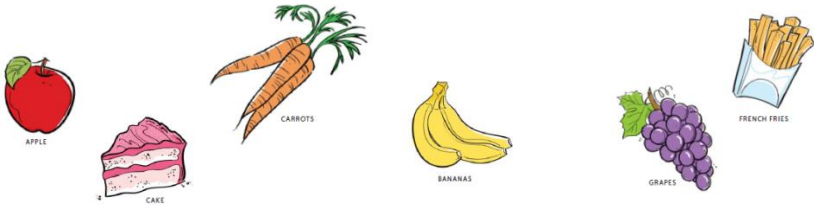
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ID _____
Pre _____ Post _____

APPENDIX A: Youth Knowledge Evaluation

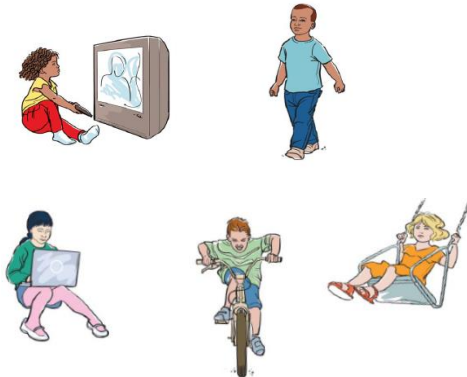
1. Circle the healthy snacks.



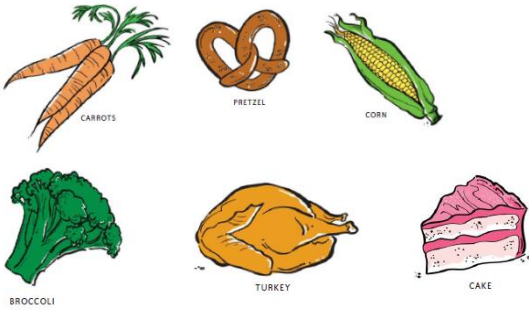
2. Circle when you should you wash your hands before eating.



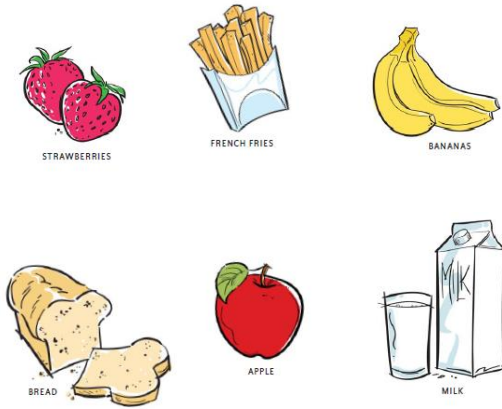
3. Circle the pictures that show physical activities.



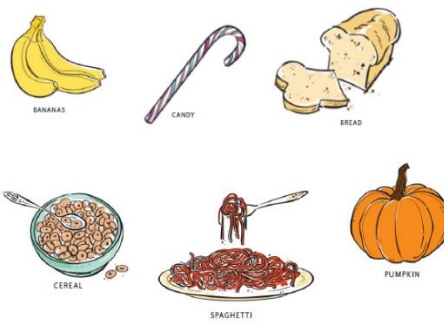
4. Circle foods from the vegetable group.



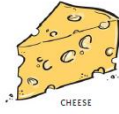
5. Circle foods from the fruit group.



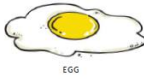
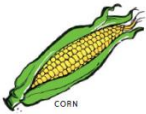
6. Circle foods from the grains group.



7. Circle foods from the dairy group.



8. Circle foods from the protein group.



9. At your home, do you have vegetables to eat?



Never



Almost Never



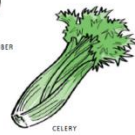
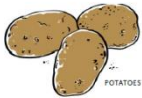
Sometimes



Almost Always



Always



10. At your home, do you have fruits to eat?



Never



Almost Never



Sometimes



Almost Always



Always



APPLE



BANANAS



GRAPES



WATERMELON



KIWI



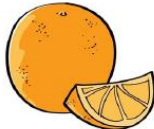
BLUEBERRIES



CANTALOUPE



STRAWBERRIES



ORANGE



PEAR