

Fruit and Vegetable in Obesity Reduction via Interactive Teaching and Experiments

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Objectives

Childhood obesity has been identified as a major health issue to children's health throughout the entire world. Promoting fruit and vegetable consumption among young children may possibly have an optimistic impact on public health. This research project aims to develop a set of comprehensive experiential learning strategies for promoting the inclusion of fruits and vegetables (FV) as an essential part of the daily diet of young children and their families to enhance their daily dietary intake and help reduce their risk for obesity. Therefore, the objectives for this study were to 1) develop and test a set of hands-on nutrition educational activities for preschoolers; 2) use educational modules/tools to conduct a pilot nutrition education intervention to promote the consumption of fruits and vegetables among preschoolers; and 3) assess the impact of socioeconomic/demographic factors on children's eating behaviors.

Activities

A set of comprehensive experiential learning strategies/interventions were developed. The intervention activities included three Phases.

Phase I: Preliminary Screening and piloting of educational intervention to increase children's knowledge and consumption of F&V. Twenty two children enrolled in the NCA&T Child Development lab participated in the intervention. Children participated in 4 educational activities centered on FVs: Grocery store simulation, 5-a-Day Activity module, Multimedia Media Module (Songs about fruit and veggies and interactive computer games) and Food Guide Pyramid Activity Mat where children match a specific food with the right food group. The impact of these activities on children's preference on FVs was assessed by baseline and follow up questionnaires.

Phase II: Validation and enhancement of educational intervention from Phase I Educational Intervention modules piloted in Phase I was administered to children in 5 Guilford County (NC) Head Start programs. A total of 102 children ages 3-5 years participated in this study with a completion rate of 63%. Dietary behaviors of children and feeding practices of parents were assessed using the FV Intake, Child Eating Behaviors, Parent/Caregiver Feeding Behaviors and caregivers' background questionnaires. Data were statistically analyzed to identify the significant factors that impact children's food preferences. The impact of intervention on children's preference of FV were evaluated by simulated grocery shopping in two schools. Most students in school A were from mid class families with higher education levels, while students in school B were mostly from low social economic families.

Phase III: Hands-on experiential learning activities in the computerized Sensory Lab Experiential learning activities involving children and parents include the use of fruits and veggies to make children's favor characters and sensory evaluation/taste testing. Total 27 children from 4 different schools participated in this intervention. Children were first provided nutrition education such as the health benefits of common fruits and vegetables to be used, and then asked to create their favorite cartoon characters such as ants on a log (using raisins, celery and lettuce), lady red (using strawberry, grapes and carrots), and sponge bob (using pineapple, blueberries, carrots and raisins), using different varieties of pre-cut fresh FV. The impacts of the intervention on children's preference of FV were assessed by sensory evaluation using the facial expression 3- point hedonic scale of Like, Maybe, and Don't Like. Children's knowledge of FV were evaluated using pre-and post-intervention questionnaires suitable for the children in this age group. These activities were conducted in a state-to-art sensory lab equipped with touch screen computers with Compusense 5 software.

Beneficiaries: Preschool Children, parents, educators/teachers, health professional, fruit and vegetable producers, and food product developers

3-Point Hedonic Scale



Results

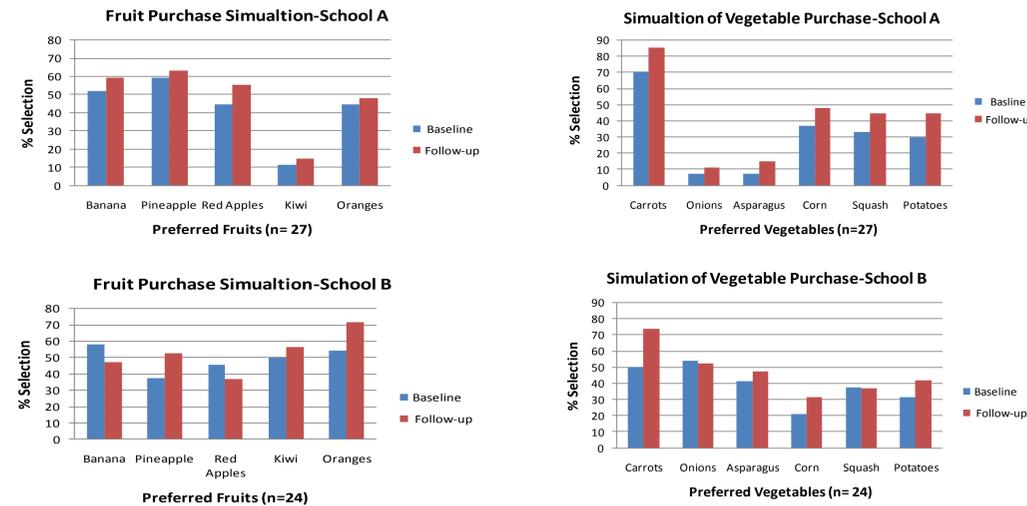


Figure 1: Most preferred fruits picked throughout the Grocery Store Simulation among children from 2 schools

Figure 2: Most preferred vegetable picked throughout the Grocery Store Simulation among children from 2 schools

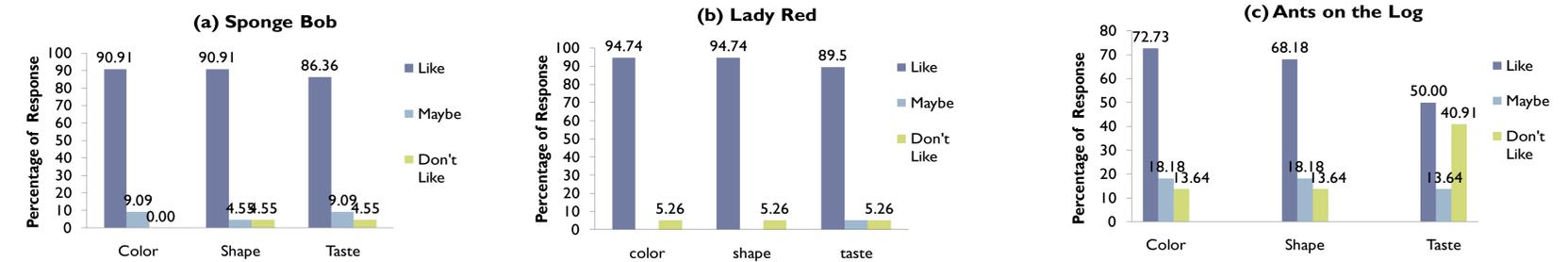


Figure 3: The Impact of experiential learning on children's preference of FV. (a) Sponge Bob, (b) Lady Red and (c) Ants on the Log. Number of participants n= 27

Table 1. The Awareness of health benefits of fruits and vegetables before and after intervention (n=21)

Fruit Type	# of Boys	Base line	Follow up	% Change	# of Girls	Base line	Follow up	% Change
Pineapple	9	3	9	66.67	9	1	7	66.67
Blueberry	9	4	8	44.44	9	7	3	-44.44
Raisin	9	1	3	22.22	9	4	1	-33.33
Carrot	9	8	8	0.00	9	7	6	-11.11
Strawberry	13	9	13	30.77	8	4	7	37.50
Grape	13	9	13	30.77	8	5	6	12.50
Carrot	13	7	10	23.08	8	6	5	-12.50
Celery	11	2	7	45.45	9	5	5	0.00
Lettuce	11	10	11	9.09	9	7	9	28.57



Summary & Conclusions

Summary of Results: A set of comprehensive experiential learning strategies/interventions were developed, including Grocery store simulation, 5-a-Day Activity module, Multimedia Media Module, Food Guide Pyramid Activity Mat and hands-on experiential learning. Results from phase I activities show that intervention had a significant impact on the preschoolers' knowledge, interest, and intake of FV, evidenced by their actual selection of FV increasing from 62% to 68% from the baseline to immediate follow-up. The baseline data from Phase II activities indicate that social economic status, feeding behavior and education level of parents had significant effect on children's food preference and eating habits among many factors. The intervention had more impacts on children of low socioeconomic status (SES). Data from simulated grocery store shopping of fruits (Fig.1 and Fig.2) show that the Intervention increased the number of students that select all vegetables available. More than 88% of participants enjoyed the creative work and expressed their interest to do it at home. Lady Red was the most liked finished cartoon character followed by Sponge Bob, and Ants on the Log was the least liked in terms of color, shape and taste (Fig.3). Among all sensory attributes evaluated, taste may be the major factor preventing children from consuming sufficient amount of FV daily. Among the fruits and vegetables used for creative activities, strawberry and pineapple were the most liked, raisin and celery were the least liked. The impact of nutritional education on the knowledge of health benefits of fruits and vegetables was gender dependent. After intervention, the awareness of health benefit of FV among boys increased 0-67% depending, but girls showed more negative response to the knowledge of health benefits of FV.(Table 1).

Expected Impacts: Among all the interventions, Grocery store simulation and hands-on experiential learning showed more impacts on children's, interest, knowledge and preference of FV. The intervention showed more impact among children of low socioeconomic status (SES) and child learning appeared to be independent of SES. The hands-on interactive learning activities enhanced the impact. Inclusion of the latter in the preschool curriculum is needed to reinforce long-lasting healthy eating habits. Children's knowledge about the health benefits of fruits and vegetables will influence their food preference during their childhood. Regularly nutrition education in school may enhance such knowledge. Because the feeding behavior and education level of parents have significant effects on children's food preference and eating habits, the enhancement of nutritional knowledge of parents and caregivers becomes very important. Therefore, professionals in the child development area should be given sufficient nutritional education, who can then teach children how to eat healthy to prevent obesity and associated diseases.

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