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Impact of Commercials on Food Preferences of Low-Income Minority Preschoolers

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Abstract

Objective—To determine if fruit and vegetable (FV) commercials have an impact on preschool children's preferences for specific FV.

Design—A year of extensive formative assessment was conducted to develop two 30-second commercials; "Judy Fruity" promoted apples and bananas and "Reggie Veggie" promoted broccoli and carrots. The commercials were embedded into a 15-minute TV program. FV preferences were assessed before and after four exposures to each of the commercials.

Setting/Participants—One hundred eighty-three preschool children (39% African-American; 61% Hispanic-American) from four Head Start centers in Houston, Texas.

Main Outcome/Analysis—A general linear model was used to assess whether FV preferences were significantly higher in the treatment group than the control group, controlling for baseline FV preferences, age, race and intervention dose in the model.

Results—There was a significantly higher preference for broccoli and carrots ($p = 0.02$) in the intervention group compared to the control group after multiple exposures to the vegetable commercial.

Conclusions/Implications—Data suggest that commercials promoting vegetables may be an effective strategy to influence young children's preferences for vegetables. This may not be the case with fruit preferences which are already high in this age group.

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Keywords

preschoolers; food preferences; commercials

INTRODUCTION

Television food advertising has recently been under scrutiny (1-3) because of its adverse effect on eating behaviors of children (4,5) that may contribute to poor health outcomes (6). US children between the ages of 2 and 4 view two hours of television daily (1). Children in low income families tend to watch more television (7,8), thus they have greater exposure to food advertisements. Food is the most frequently advertised product category on US children's television programs, accounting for over 50% of all ads targeting children (4,9-11).

The types of foods advertised are similar to those in many other industrialized countries (8,12-18). Content analysis of advertisements on children's television demonstrated that the foods most commonly advertised were high-calorie foods of poor nutritional quality, rather than nutrient rich foods (4,19,20). Approximately 98% of foods advertised were high in sugar, fat or sodium (21). These advertisements promoted soft drinks, candy, cakes, chips, cookies, pastries, high sugar breakfast cereals and fast foods (4,10,19,22,23). Fewer advertisements focused on healthful foods such as fruits and vegetables (1,10,24).

Several studies have documented the positive association between television viewing and consumption of snack foods, soda, and fast foods (4,25). The relationship between television viewing and fruit and vegetable consumption is less clear (26). The increased consumption of energy dense foods, increased snacking (27), and meal frequency (28) with television viewing may explain the increase in overall food and total energy (22,29,30) intake associated with television viewing.

Studies of the relationship of television viewing to children's diets have examined behavioral links between television and children's food consumption patterns. These studies have documented a positive correlation between television viewing with the number of children's food requests and parents' purchases (11,18,29,31). These studies all provide behavioral evidence that television food advertisements can be a powerful vehicle for persuasion, influencing children's eating related behaviors.

A majority of the studies investigating the relationship between television food advertising and children's eating behaviors were conducted 20 years ago. The non-experimental nature of much of this research has provided suggestive findings but has not allowed for direct examination of advertising effects on children's eating behaviors. Borzekowski and Robinson conducted an experiment to examine whether televised food commercials influenced preschool children's food preferences (32). They found that children exposed to the videotapes with embedded commercials were significantly more likely to choose the advertised unhealthy food items than children who saw the same videotape without commercials. Moreover, findings suggest that it took only 1 to 2 exposures to a 10- to 30-second food commercial to influence 2- through 6-year-olds' short-term preferences for specific food products. Based on the findings from this study, the authors recommended that additional work be conducted to examine with a preschool sample, whether children are influenced by televised commercials with messages promoting healthful food choices.

Young children's intakes of fruit and vegetables (FV) do not meet the recommended minimum of 5 daily servings (33) and thereby increasing youths' risk for development of

cancer and several chronic diseases (34-36). This pilot-study focused on FV preferences in two low-income minority groups, African-Americans and Hispanic-Americans, at risk for developing obesity and cancers later in life. Since children's food preferences and practices are initiated early in life (e.g., 2 to 5 years of age) (37-39), early dietary intervention programs will have immediate nutritional benefit for young children and should reduce cancer risk when the learned habits and preferences are carried into adult years. This work was conducted in child-care settings because they are important social environments within which food-related behaviors of young children are developed (40-42). Food preferences, the primary predictor of food consumption in children, are influenced by availability, variety, taste, and repeated exposure. The goal of this pilot study was to test the feasibility of using healthy food commercials to favorably influence fruit and vegetable preferences of low income, minority preschool children.

METHODS

Overall Approach to Development of Commercials

The development of the FV commercials was completed in two phases: Phase I included the development of the FV commercials; Phase II was the pilot-study which involved testing whether the FV commercials had an impact on young children's FV preferences. Preschoolers were recruited through Head Start (HS) centers in Houston. Children in the HS centers are predominantly low-income African-American (AA) and Hispanic-American (HA) preschoolers, majority of which are Mexican Americans. Participants were recruited following standardized procedures that have been used in the past ten years of research conducted with this population. Approval to conduct the study was obtained from the district HS director and the managers and the teachers at each HS center. The teachers were actively engaged in the recruitment process and obtaining consents. For the development phase of the study, teachers contacted the parents and obtained consents until the specified sample was obtained. All parents of the children were approached and consents were obtained for the entire eligible sample in the pilot study.

Phase I: Development of the FV Commercials

Advisory Panel—An advisory panel (a nutritionist, a behavioral scientist, a child development psychologist, a health educator, an AA mother, a HA mother and two consultants (e.g., designer of the characters and the producer of the commercials) participated in all aspects of the research to ensure that the commercials were developmentally appropriate and that they were sensitive to the cultures of the target population. An expert panel meeting was held to discuss the necessary processes in creating and producing commercials for the specified target audience, review data from the focus groups, discuss modifications to the FV characters to be used in the commercials, and to develop a background theme and storyline for the commercials. The study protocols for Phase I and Phase II were reviewed and approved by the Baylor College of Medicine Internal Review Board. Assent was obtained from all participants. Informed consent was obtained from adult participants, and parental consent was obtained for child participants.

Formative Assessment—Formative assessment included focus groups and individual interviews.

Focus Groups: Eight focus groups (4 HA; 4 AA) including a total of 55 mothers (25 AA; 30 HA) were conducted across four HS centers. Focus group questions included the following topics: influences on children's food preferences, the impact of TV commercials on children's food preferences, types of characters that attract preschool aged children and the type of music preschool-aged children liked. Sketches of the FV cartoon characters (e.g.,

Judy Fruity and Reggie Veggie) were also tested. The recordings of the focus group sessions were professionally transcribed and translated. The transcripts were analyzed using NVIVO (43) and common themes were identified.

There were three focus group questions specific to commercials. *Question 1: What is in a commercial that makes it a strong influence on 3 to 5 year old children?* Several characteristics of the commercials were identified such as: contains a lot of action and dancing, catchy phrases or a song, bright colors, and the character is a cartoonist or a real life celebrity associated with a popular toy, prizes or food product. *Question 2: How might a cartoon character influence your child's preference for certain food?* The cartoon characters have a major influence on young children. Fastasy motivates the children because they make believe that they are the character when they eat the food. Children want to imitate the characters like eating what they eat, having the same haircut and same color of backpack. If the character eats the food and makes him grow or have muscles that will get the children to ask for the food. *Question 3: How might music contribute to a commercial?* Music gets children's full attention so they are focused on the commercial. If children are away from the television and they hear the music in a commercial, they recognize the product. The music makes the commercial interactive by motivating the children to sing and dance with the commercial.

Individual interviews: Individual interviews were conducted with 40 (20 HA; 20 AA) preschool children across two HS centers. Colored pictures of different cartoon characters were presented to the children as well as colored pictures of Judy Fruity and Reggie Veggie. The children participated in a paired ranking exercise to determine their most favorite character. The interviewer marked the facial expressions the child made when presented with two characters at a time and when asked what character they liked best. The paired characters were randomly chosen at each interview. The most popular characters chosen were then ranked in order of preference. Drafts of the Judy Fruit and Reggie Veggie commercials were shown to each child. Following each commercial the child was asked what they saw in the commercial and to name what fruits and vegetables they saw. Additional questions were asked about each commercial character, such as, "What was Judy Fruity doing in the cartoon?" or "What does Judy Fruity like to do?"

FV Characters—Using information obtained from the formative assessments and from the expert panel, two characters were created for the two commercials: Judy Fruity and Reggie Veggie (Figure 1).

Theme and Storyboards—Judy Fruity and Reggie Veggie were set in a background setting of a circus with the two characters as the stars. Storyboards, which are a series of illustrations or images displayed in sequence for the purpose of pre-visualizing a motion graphic, were created. In the Judy Fruity commercial, apples and bananas were the targeted fruits that were emphasized. In Reggie Veggie, broccoli and carrots were highlighted. The storyboards were shown to ten parents (5 HA; 5 AA), and their comments were elicited. The proposed circus theme and storyline were very well-received by these parents.

Thirty-second Script—A 30-second script was developed for each commercial based on the storyboards. The script detailed specific actions and timings, explanations of those actions and associated dialogue. The Persuasive Health Message (PHM) - Model (44) provided the theoretical framework for the commercials (45). This model, comprised of elements from the theory of reasoned action (46), the elaboration likelihood model (47), and protection motivation theory (48), provided an integrated approach to generating the commercials. Based on the PHM model, published literature and input from the expert panel, there were four behavior change strategies incorporated into the commercials:

modeling, reinforcement, encouragement and rationale/reason. These four behavioral strategies are defined below with specific examples provided.

Modeling: A character who inspires children to imitate his/her behavior. *"Judy Fruity takes a huge bite of an apple." "Reggie Veggie tosses up a carrot and eats it."*

Positive Reinforcement: The character adds a stimulus which will increase a specific response. *"I'm Reggie Veggie, veggies are a blast." "Yum, yum-yummy! In my Tum-Tummy."*

Encouragement: There is an expression of approval and support. *"The circus audience gives a thunderous applause when Judy Fruity takes a big bite of the apple." "The commercials end with "Eat Em Up."*

Rationale and Reason: The characters provide some logic, basis, or grounds for doing a specific behavior. *"Apples are my favorite, apples give me energy." "Broccoli makes me big and strong to play all day."*

Animatics—Once the storyboards were created, simplified mock-ups called "animatics" were created to give a better idea of how the scene would look and feel with motion and timing. An animatic is a series of still images edited and displayed in a sequence to test whether sound and images work effectively together.

Production—At the conclusion of Phase I, two animated characters were created and two 30 second scripts were finalized and put into full animations with music and voicing to match the storyboards. Permission was obtained to embed the commercials into episodes from a common children's television program series aired on a national broadcast network. English- and Spanish-language versions of the commercials were developed. The same episodes were used for the control version, which included a non-food related animated clip approximately 30 seconds in length. One of the commercials was shown at the beginning of the episode and another commercial at the end. The English scripts were recorded using local talent and our Spanish speaking staff were coached and used as the voices for the Spanish version of the commercials. The final version of the FV commercials can be viewed from the website. Examples of segments in the commercials are illustrated in Figure 2.

Phase II: Pilot-testing of the FV Commercials

The intervention involved a pre-test for fruit and vegetable (FV) preferences, followed by four exposures to each commercial, and a post-test for preferences for the same FV. Preferences for 11 fruits and 15 vegetables were measured using a validated FV Preference Measure (49). The preference scores ranged for 0 to 2 ("0" for yucky, "1" for okay and "2" for yummy). Preferences for juice were not assessed in the analyses because it was not one of the outcomes of this study. For each FV, "Chipper" told the child what the item on the screen was, and "Chipper" (the animated bird) asked the child if the specific FV tasted "yummy", "yucky", or just "okay". A non-gendered face with expressions representing preference accompanied each response. The eyes blinked on the "yummy" face, the tongue appeared on the "yucky" face, and the eyes moved from side to side on the "okay" face. The child used a touch screen to select the face that corresponded to his or her preference. To minimize distractions, during the whole administration of the measure, the children wore earphones connected to the computer. A research assistant stayed with each child during the entire FV preference measure to facilitate administration and to address any problems (e.g., the child did not understand, the computer malfunctioned).

The intervention was scheduled on a two-week cycle. Week 1 was designated for pre-tests and Week 2 for exposures to the treatment videos followed by post-testing. Four Head Start centers were chosen according to the demographic breakdown of the children and enrollment numbers. The classrooms in the Head Start centers that agreed to participate were then randomized into intervention or control group. The videotapes were shown to the children in a closed room to avoid contamination. A process evaluation form was completed during the intervention to describe program implementation, to provide information for quality control and monitoring, and to explain program effects. This process form documented each time a child watched the videotape; whether the child was distracted during the videotape; any interruptions that may have occurred during the showing of the videotape; and, whether the whole videotape was shown.

Statistical Analysis

A total fruit preference score was created by averaging the eleven fruit preference scores. A targeted fruit preference score was created by averaging the apple and banana preference scores which were highlighted in the Judy Fruity commercial. A total vegetable preference score was calculated by averaging all 15 vegetable preference scores. The targeted vegetable preference score was created by averaging the broccoli and carrot preference scores which were highlighted in the Reggie Veggie commercial. A total FV preference score was calculated by averaging all of the FV preference scores. The total targeted FV score was the average of the apple, banana, broccoli, and carrot preference scores.

Means for each preference score were calculated with SAS. Although this small pilot study delivered the intervention at the group level and would thus be amenable to analysis using methods for group randomized controlled trials to make between group comparisons (mixed model ANOVA or a random coefficients model) (50), we had only four Head Start centers, which is far below the recommended 8-10 groups per condition (51) The proc GLM procedure was used to assess whether FV preferences were significantly higher in the treatment group than the control group. The dependent variable in the model was the average score at visit 2 and the independent variable was assignment to treatment/control group. Baseline preference scores (visit 1 scores), age, race and intervention dose were controlled for in the model.

RESULTS

Demographics of the Sample

A total sample size of 183 children participated in the pilot-study; 77 children in the control group and 106 children in the intervention group. The percent of males and females was close to 50/50 in both groups. The ages ranged from 3 to 6 years of age, with the majority of the children ages 4 to 5 years in both the control and intervention group. The two ethnic groups that participated in the study were AA (35%) and HA (65%).

Outcome

Compared to control children, there was a significantly higher preference for broccoli and carrots (the targeted vegetables in the vegetable commercial) ($p = 0.02$) than in the intervention group (Table 1). Based on multivariate standardized effect size of .03 the increase in target vegetable preference was small. Twenty-one percent of the variance in the targeted vegetables was explained by the treatment status. There was no significant difference in fruit preferences which can be explained by a “ceiling effect” resulting from the high preference for fruit in this age group.

DISCUSSION

This pilot-study was a dietary change intervention targeted at children in Head Start (HS). The goal of this exploratory study was to test an innovative approach to favorably influence FV preferences among minority preschool children attending HS centers. The intervention was designed to motivate and persuade children to make healthful food choices by reaching them in a language they speak and in ways that are engaging and entertaining. The intervention included videotaped FV commercials that incorporated encouragement, modeling, and appropriate reinforcement for FV consumption. FV preference is a major correlate of FV consumption. Thus, the primary endpoint was change in FV preferences.

This study provides preliminary data supporting the use of videotaped FV commercials as an intervention strategy to favorably influence FV preferences among preschool children. Compared to control children, there was a significantly higher preference for broccoli and carrots in the intervention group. There was no significant difference in fruit preferences which may be explained by a “ceiling effect” resulting from the high preference for fruits in this age group. Previous work has reported that HS preschool children’s mean preference for total fruits was 1.35 (HA) and 1.41 (AA) using the same preference measure (49). Our results add to the body of literature showing that multiple exposures to commercials can influence children’s short-term preferences for a healthier food, like vegetables.

The use of food commercials is an appropriate medium of intervention to use with preschool children based on their level of cognitive development. Children of this age are pre-literate. Therefore, they are almost entirely visual and attracted to visual media. Food commercials are the ideal and most potent visual medium. Research consistently indicates that children’s attitudes toward commercials are negatively correlated with age meaning the younger the child the more likely he or she will hold a positive attitude toward television advertising. This is logical given that younger children by virtue of their limited cognitive development are less likely to comprehend the persuasive intent of advertising. The most common theme or appeal (i.e., persuasive strategy) employed in advertising to children is associating the product with fun and happiness, rather than providing any factual product-related information (52).

The pilot intervention consisted of eight exposures to the commercials; four exposures to Judy Fruity and four exposures to Reggie Veggie. The results could potentially be an artifact of the brief timeframe of the intervention. However, the number of exposures to the commercials was higher than what was found in another study (32). Borzekowski and Robinson (32) found that it took only one to two exposures to a 10- to 30-second food commercial to influence 2- through 6-year-olds short-term preferences for specific food products. Additional research is needed to determine whether the positive gains observed short-term are sustained over time.

Although scheduling this intervention was relatively easy and well accepted, we found it very difficult to precisely measure the effect in a free-living environment. Ideally, the targeted fruits and vegetables would be served during the time of the exposures to the commercials; however, this was not practical in the HS setting. There also were no attempts made to try and understand what FV these children were already familiar with. This may have introduced a considerable source of confounding in the analysis. However, with randomization one can assume that the potential confounding was consistent across the two treatment conditions. In our efforts to expand our work with these FV commercials, we plan to conduct a well-controlled experiment in a laboratory. We are interested in the effects of the commercials on actual FV consumption and frequency of choosing the targeted FV.

IMPLICATIONS FOR RESEARCH AND PRACTICE

The use of food commercials to promote healthier eating behaviors of young children has the potential of reaching a larger audience of ethnically diverse groups, in a cost effective manner that is more standardized and easily controlled than conventional methods that have been used. Thus, the potential public health advantages to such an approach could be substantial.

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Figure 1.
Reggie Veggie and Judy Fruity.

Figure 2.
Examples of segments in the commercials.

Table 1

Impact of Commercials on Mean FV Preference Scores at Follow-up[a]

	Control (n=77) Mean (Standard Deviation)	Intervention (n=106) Mean (Standard Deviation)	F value	P value	Multi Effect Size	Overall R^2
All Fruits	1.33 (.39)	1.42 (.46)	.83	.36	.005	.34
Targeted Fruits	1.57 (.46)	1.60 (.52)	.03	.87	<.01	.06
All Vegetables	1.12 (.48)	1.20 (.51)	1.24	.27	.007	.38
Targeted Vegetables	1.01 (.73)	1.26 (.67)	5.94	.02	.03	.21

[a]The proc GLM procedure in SAS was used to test for group differences.