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The Feasibility of Using “Nudges” in the School Food Environment To Influence Healthy Food Choices at School

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Abstract

Every schoolday, over 31 million U.S children eat school lunches. Unfortunately, students often do not choose the healthy options in the cafeteria. This study used formative research to design a behavioral economics-based intervention of “nudges” or cues from the cafeteria (cafeteria staff encouragement, food labels, Harvest of the Month posters), school (morning announcement messages, writing prompts about cafeteria foods), and parents (school newsletter articles, parent listserv messages) to promote student selection of fruit and vegetables in the cafeteria. A pilot study of the intervention was conducted from January to May 2012 in six intervention schools and two control schools. There were no significant differences in the number of servings of fruit and vegetables served per student per day, averaged over the study period. Process data revealed low implementation of the intervention components, which may partially explain results.

Keywords: National School Lunch Program, fruit, vegetables, behavioral economics, environment, school, cafeteria

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Introduction

The National School Lunch Program (NSLP) offers nutritious lunches in 99% of U.S. public schools (Fox MK, December 2004; *National School Lunch Program Report*, 2011). In fiscal year 2011, approximately 31 million school children participated in the NSLP each school day (*National School Lunch Program Report*, 2011). Although the USDA has nutrition standards for meals, students often do not choose the healthy cafeteria options. Student fruit and vegetable intake is low in schools (Cullen & Zakeri, 2004; French & Stables, 2003) and over the entire day (Stallings, 2008). Fruit and vegetable consumption has been associated with lower adiposity and reduced risk of chronic diseases and some cancers (Maskarinec, Novotny, & Tasaki, 2000). Therefore, intervening with youth to improve dietary choices of fruit and vegetables at school is an important strategy to improve energy balance and maintain appropriate growth.

Choice architecture, a Behavioral Economics strategy, proposes that the ways that choices are presented to individuals in their environments may influence food selection decisions (Thaler & Sunstein, 2008). One's environment, personal characteristics, and behavior interact with and influence one another as operationalized in Social Cognitive Theory (Bandura, 1986). Therefore, subtle environmental cues or "nudges" could encourage students to select certain foods. In a cafeteria lunch line there are several points of influence. For example, marketing research shows that food presentation counts: items displayed more prominently, at eye level, or first in the line, tend to be chosen more often than other items (Mancino & Guthrie, 2009).

Few studies have tested behavioral economics approaches in schools. One elementary school cafeteria intervention included four components (an extra fruit or vegetable in the lunch line daily, attractive food presentation, verbal encouragement to try fruit and vegetables from cafeteria staff as students went through the line, and fruit and vegetable tastings in the cafeteria) (Perry et al., 2004). Significant increases were found for fruit intake; this increase was significantly associated with verbal encouragement by the cafeteria staff. Two other studies included verbal encouragement for selecting fruit, juice or vegetables from school staff. In two elementary schools, about 80% of intervention school students selected a fruit or juice, compared with 60% in the comparison school (Schwartz, 2007). When teachers asked preschool children if they wanted fruit and vegetables, the children had higher acceptance of and took more bites of

fruit and vegetables (Hendy, 1999). In another observation study, however, although cafeteria staff endorsed suggesting healthful food selections to students going through the line, no cafeteria staff made food choice recommendations (Fulkerson, French, Story, Snyder, & Paddock, 2002). A majority of the cafeteria staff did report an interest in learning how to offer encouragement to students as they went through the lunch line.

This report describes the formative, process and outcome results of a pilot study to improve elementary school student fruit and vegetable selection. The innovative school-based program was based on formative research with integrated “nudges” or cues from the cafeteria staff, school, and parents to promote healthy student food choices in the cafeteria. We hypothesized that intervention school students would select more fruit and vegetables in the school cafeteria than comparison school students.

Description of Study

This study was conducted with elementary schools, cafeteria staff, parents and students in nine elementary schools in a large urban school district in Houston, Texas. The ethnicity of the district's enrolled students was 61% Hispanic, 28% African American, 8% white, and 3% other at the time of the study. Formative research was conducted during the first year. The pilot study was conducted during the second year. This study was approved by the Institutional Review Board of Baylor College of Medicine. Informed consent was obtained from all who took part in the focus group discussions and interviews. Cafeteria staff and parents were recruited for the focus groups and to complete the anonymous surveys from three schools. These schools had a majority of Hispanic students and 50 to 96% of the students were eligible for free or reduced price meals. Six additional schools with diverse student populations were recruited for the pilot feasibility study; 57 to 97% of the students were eligible for free or reduced price meals.

Formative research

One focus group with cafeteria staff at each school was planned (three groups). All participants provided informed consent prior to participation and received a small gratuity of \$10. Following accepted practice (Krueger, 1994), a prospective list of questions was generated by the research team. The questions sought staff input on ways to promote the school cafeteria fruit and vegetable menu items. The assistant moderator took notes. The moderator and assistant moderator debriefed immediately after each focus group and produced a report for each group. The assistant moderator used thematic analysis (Braun and Clarke, 2006) to identify the major outcomes from the discussions.

Individual telephone interviews were planned with parents to explore the methods and strategies they believed would help them to influence healthy food selections in the cafeteria by their children. Participants received a small gratuity of \$10. Difficulty in recruitment led to IRB approval to provide anonymous parent questionnaires at three parent-teacher meetings. The questionnaire contained the same questions used in the interviews. The assistant moderator used thematic analysis (Braun, 2006) to identify the major responses for each question for both the interviews and questionnaires.

Formative Research Results

There were three cafeteria staff focus groups, attended by 19 females and one male. The main recommendation from each group was for more communications to students, parents, and teachers about school foods. All three groups recommended having the names of the foods in English and Spanish posted above the foods on the serving line, having staff encourage students to try foods, particularly fruit and vegetables, and providing posters advertising fruit and vegetables. Furthermore, the staff requested training to learn about encouraging students to try foods like fruit and vegetables on the cafeteria line.

The cafeteria staff also suggested that teachers receive information on foods like fruit and vegetables so they could talk with their students about them. Similar information was also recommended for parents. For example, they suggested food/nutrition articles could be published in the school newsletters.

Thirty parents were interviewed via phone and 49 parents completed anonymous surveys at three parent-teacher meetings. All agreed that communication and advertising about all foods was important, especially about new foods. The parents liked getting menus with nutrition information on them in their child's backpack. The school newsletters were suggested as being good vehicles for cafeteria information. Many thought that posting articles on the school district or Food Service website would be helpful. Many also thought receiving email messages ('e-news') was a good idea and would subscribe if they knew more about it.

Intervention Development

The research team met with the school district food service staff to develop the pilot intervention components based on the district's four-week menu cycle. Usually two vegetables and a fruit were served each day. Three environmental nudges were planned. For the cafeteria environment (nudge 1), the English and Spanish names of the fruit and vegetables were printed on labels that had the cafeteria mascot on them to be posted on the cafeteria line. Cafeteria staff received training to encourage children's food selections as they went through the serving line. For each week of the menu cycle, a sheet was developed that identified the fruit and vegetables and a

statement the cafeteria worker could use. For example: “This broccoli was grown in Texas and tastes great. Would you like to try some?” Finally, a Texas-grown fruit or vegetable was highlighted each month in the menus and in the cafeteria [Harvest of the Month].

The second set of nudges was for the school environment. The principals received a list of short messages about cafeteria foods for the schools’ public address system. To improve student writing skills, teachers have students write a short paragraph on specific topics each week. A set of Writing Prompts about cafeteria foods was created for teachers to use for this assignment.

For the home environment (nudge 3), a set of short articles (two per month) about the cafeteria foods for the school newsletter was given to the principals. A food service electronic mailing list (listserv) was established by the Food Service Department. Parents and teachers could sign up to receive two brief messages about cafeteria foods and nutrition information each month, plus the Harvest of the Month brochure.

Pilot Study

The pilot study was implemented during the spring semester of 2012. Six [two African-American; two Hispanic; two diverse] low income elementary schools were recruited by the Food Service Department dietitian to be the intervention schools. Parents and staff were invited to join the Food Service Department listserve via English/Spanish letters sent home to all students in the six intervention schools during November and December, 2011. Cafeteria staff were trained and received the food labels and Harvest of the Month signs. The intervention materials (PA announcements, Writing Prompts for the teachers) were delivered to principals for distribution. Two of the schools that participated in the formative research were used as the control schools.

Measurement

For each day during the 2012 spring semester, the number of fruit and vegetable servings selected and the number of reimbursable meals served at each school were obtained as electronic text files. Canned, fresh and frozen fruit and vegetables, including baked fries, were counted. In Texas, fried foods are prohibited and baked flash frozen potato products are only allowed to be

served one time per week in elementary schools (Texas Department of Agriculture, 2010). The major study outcome was the number of servings of fruit and vegetables served in each cafeteria per student per day, averaged over a week for the entire semester. This information was obtained from the Food Service Department.

Process outcome data were also collected. Eight unannounced observations over the semester were conducted in each intervention school by trained observers. Three observations occurred in each control school during the semester. Using a checklist, the observers noted cafeteria staff encouragement and the presence of the food labels and the Harvest of the Month posters. School newsletters were checked for the nutrition messages. The Food Service Department dietitian provided the number of participants who signed up for the listserv. An anonymous survey was created to query principal and teacher use of the intervention materials. The principal surveys were delivered to each principal with a stamped and addressed envelope. The teacher survey was web-based; the principals were sent the link and asked to send it to their faculty.

Data Analyses

The average number of fruit and vegetable servings selected per student per day was calculated and averaged for each week for each school. To examine the intervention effect, analyses of repeated measures analyses of variance (RM ANOVA) were conducted with weekly fruit and vegetable servings as the dependent variable and group membership (intervention, control) as the main effect. The covariance structures specified a first-order autoregressive moving-average (ARMA (1,1)) structure. Separate models were run for each dependent variable. Alpha was set at 0.05. All the analyses were performed using SAS (version 9.3, 2010, SAS Institute Inc., Cary, NC).

With a final analysis sample of eight schools with 22 weekly measures and $\alpha=0.05$, there was 80% power to detect large differences between group with correlations across weeks of 0.398 for fruit and 0.535 for vegetables.

Pilot Study Results

Fruit and vegetables served. Twenty-two weekly data points of fruit and vegetable servings data for eight elementary schools were analyzed (January-May, 2012). There was no significant group effect for fruit servings ($P=0.23$; Table 1). The plot of the weekly average daily fruit servings per student for six intervention and two control schools for the intervention period is shown in Figure 1.

There was no significant intervention effect for vegetable servings ($P=0.10$; Table 1). The plot of the weekly average daily vegetables servings per student for six intervention and two control schools for the intervention period is shown in Figure 2.

Table 1. Weekly Average of Daily Fruit and Vegetable Servings per Student for 6 Intervention and 2 Control Schools for January to May, 2012 (Spring semester)

	Control Schools		Intervention Schools	
	Mean	SE	Mean	SE
Fruit	0.56	0.10	0.71	0.03
Vegetable	0.66	0.17	1.02	0.10

Note. SE-Standard Error. Not significant at the level of 0.05.

Figure 1. Weekly plot of the average daily fruit servings per student for 6 intervention and 2 control schools for January to May, 2012 (Spring semester)

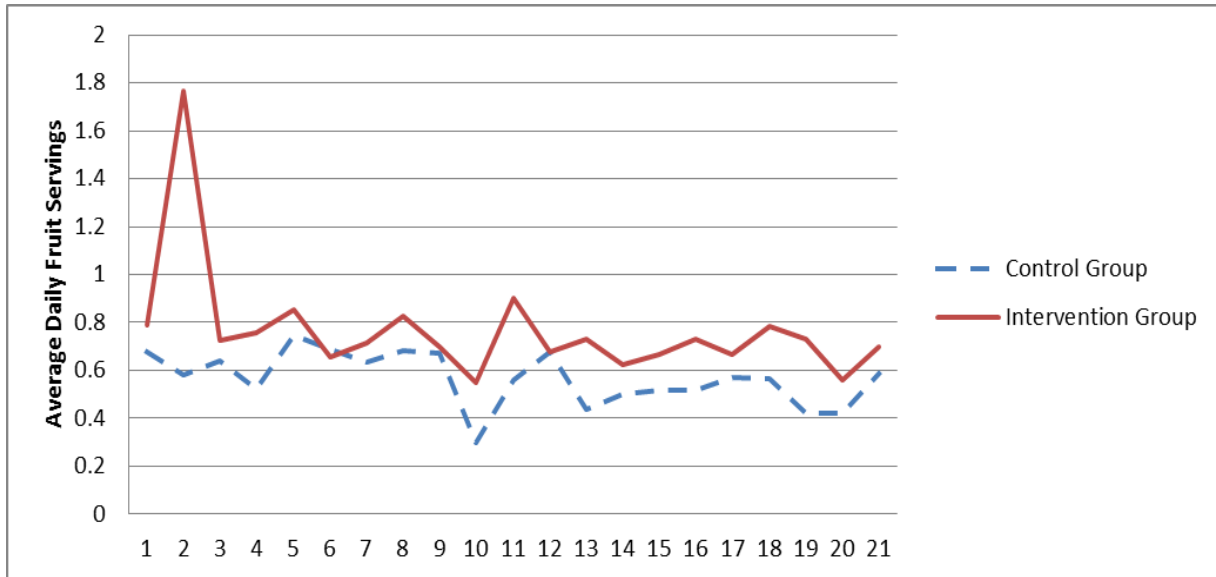
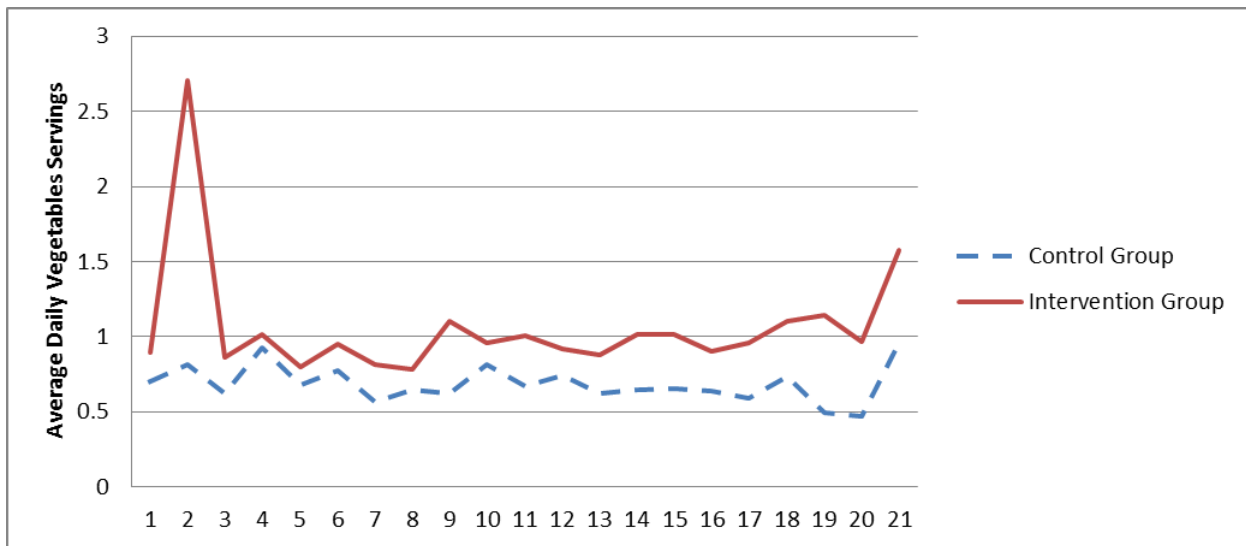


Figure 2. Weekly plot of the average daily vegetable servings per student for 6 intervention and 2 control schools for January to May, 2012 (Spring semester)



Nudge 1: Cafeteria

Table 2 shows the overall percentages for the cafeteria observations of each intervention component out of 48 possible observations. There was poor compliance with posting the fruit

food labels and the Harvest of the Month posters. Little encouragement was provided for fruit items, and encouragement for vegetables items occurred on only 44% of the observed visits.

Table 2. The percentage of observations (out of 48 intervention and 6 control visits) for the intervention components from 6 intervention and 2 control schools during the spring 2012 semester

Measure	Intervention Schools (n=48 observations)	Control Schools (n=6 observations)
Food labels posted		
% fruit	27	0
% vegetable	55	0
Harvest of the Month poster in cafeteria	33	17
Encouragement by cafeteria staff		
% fruit	16	0
% vegetable	44	0

Nudge 2: School environment

Twenty-six teachers from three schools completed the anonymous teacher surveys (13% of total eligible in the six intervention schools). Only 31% reported seeing the monthly Harvest of the Month posters; 50% did not look. The results for seeing the cafeteria food articles in school newsletters were mixed. Thirty-one percent reported seeing one in every newsletter, 34% reported them in some, and 35% reported never seeing any food articles in their school newsletters. Forty-six percent never heard any food-related item in morning announcements, while 35% reported hearing one daily. Finally, 31% of the teachers reported never receiving the Writing Prompts about food with students, 42% never used them, and 15% reported using them a few times.

Only three of the six principals returned surveys; two were incomplete. One saw the five Harvest of the Month Posters. Two reported not using cafeteria food articles in school newsletters. Two reported using some of the cafeteria food messages in morning announcements and two heard that some teachers used the Writing Prompts about food with students.

Nudge 3: Home environment

Five of the six schools had a school newsletter. It was difficult to obtain copies of the newsletters. Only four food/nutrition articles from two schools were noted during the semester. Only six parents out of about 3500 signed up for the Food Services Department listserv.

Discussion

This study used formative research with the target populations to identify Behavioral Economics strategies for the cafeteria, the school, and the home to support children's selections of fruit and vegetables in school cafeterias. Despite providing an intervention that was responsive to the cafeteria staff and parent suggestions, there was no increase in the number of fruit and vegetables served in the intervention schools. One of the intervention components suggested by cafeteria staff was verbal encouragement to try fruit and vegetables by the cafeteria staff. This method was effective in three small studies (Perry et al., 2004). The current intervention added labels for the foods on the line and Harvest of the Month posters, as well as school support during morning announcements and via writing prompts for classroom use. To reach parents, school newsletter articles were given to principals, and parents could sign up to receive email messages about cafeteria foods and nutrition. Unfortunately, the pilot study of this intervention did not improve student fruit and vegetable selections in the cafeteria. Process evaluation did show poor fidelity with the intervention components.

Despite recommendations from the cafeteria staff, few encouraging remarks were observed in the school cafeterias during lunch. These results are similar to a previous study, where cafeteria staff endorsed suggesting healthful food selections to students going through the line, but none of the cafeteria staff made food choice recommendations during subsequent observations (Fulkerson et al., 2002). However, a majority of the cafeteria staff did report an interest in learning how to offer encouragement to students as they went through the lunch line (Fulkerson et al., 2002). The training for the cafeteria staff in this study might not have been sufficient to increase the staff's self-efficacy to talk with students. The cafeterias were also very busy and staff might not have perceived they had enough time for this component. Future research should try to identify the most appropriate training techniques that would enable staff to encourage student food selections. There might have been other barriers to providing encouragement. Qualitative research should explore this area to inform the future use of this technique.

Peer influence and support around eating may be important in the school setting (Story, Neumark-Sztainer, & French, 2002; Thompson, Bachman, Watson, Baranowski, & Cullen, 2008; Thompson, Bachman, Baranowski, & Cullen, 2007). Pre-adolescent girls peers' intake

was a significant predictor of participants' snack consumption (Salvy, Romero, Paluch, & Epstein, 2007). Plus, 4th to 6th grade students reported negative peer responses when they ate vegetables (Cullen, Baranowski, Rittenberry, & Olvera, 2000). Providing teachers with information about healthy cafeteria food selections that they discuss in the classroom could foster positive peer support for healthy food choices at school. In the current study, few teachers reported using the Writing Prompts in their classrooms; 31% reported not receiving them. Few were aware of the materials in the cafeteria or the newsletter articles. This is an important area for further research.

Getting intervention messages to parents is difficult. Intervention newsletters sent home have been the most commonly used channel for disseminating messages, but evidence suggests this method, although common, may not be the most effective (Davis et al., 2000; Reynolds et al., 2000). In this study, parents and cafeteria staff suggested adding food and nutrition messages to the existing school newsletters that are distributed weekly or monthly. A series of messages about cafeteria foods and nutrition were prepared and given to the principals for use in the school newsletters. Few were used suggesting that more research into the use of existing school resources for reaching parents is needed. Plus, other potentially effective communication channels need to be tested.

Parent interview and questionnaire data revealed that the use of email messages from the Food Service Department was an acceptable method for sending them food and nutrition information. However, when this was made available in the six intervention schools, only six parents signed up to receive the two messages per month. The bilingual information letters were given to the six schools in packages for each homeroom teacher for distribution to students via their weekly news and information packet. There was no way to verify that these were distributed. Identifying the best method to provide parents with this information is an important area for further research. Measuring the outcome of these messages should also be undertaken in future research. This is especially relevant because internet use was reported by 85% of Americans in 2012; 86% for African-Americans and 80% for Hispanics (*Demographics of online users, 2012.*, 2012). In 2011, 65% of adult internet users reported using social network sites (Madden, 2011). Businesses have adopted online technology to reach consumers, such as social networking accounts like

Facebook (Chandler, 2009), blogs (Zahorsky, 2009), and Twitter ("Gartner Highlights Four Ways in Which Enterprises Are Using Twitter," 2009) which allows users to post short updates, news and ideas. School districts and Child Nutrition/Food Service Departments are adopting this communication channel (P. L. Fitzgerald, Maynard, L., Steines, A., 2012; P. L. Fitzgerald, Walters, C., September 2010). In fact, there are guides available to help school nutrition programs successfully utilize this media ("Social School Lunch: A How-To Guide on Social Media for School Nutrition Programs," October 2010).

The response from the principal questionnaire was low. It is not clear if the materials were sent to the teachers. Future studies should interview principals to identify strategies to deliver intervention materials to teachers. Directly delivery of intervention materials to the teachers might be more successful.

There are several limitations to consider. Participants in this pilot study attended eight schools in one school district in Houston, TX. The findings obtained may not be generalizable to all elementary school students. Cafeteria production records provided an objective measure of student food selections at school but there was no individual measure of food intake for the lunch meal or for the total day. Future studies should assess the impact of the intervention on diet. Sometimes a sweet fruit product like apple crisp was on the menu as a 'side dish' because this district used Nutrient Standard Menu Planning. Fruit crisps could not be counted as an acceptable fruit product in this study. The new NSLP meal guidelines implemented in the fall of 2102 eliminate this menu planning system and this problem. Finally, some materials did not reach the user, reducing the dose of the intervention.

Implications for Research and Practice

This simple, very low cost intervention complements the Team Nutrition program of the USDA (<http://teammnutrition.usda.gov/>). Team Nutrition promotes child nutrition within the total school environment, including the cafeteria. In the only published evaluation of the Team Nutrition program, there was a significant increase in the variety of foods consumed and in the amount of grains consumed in elementary school students in Team Nutrition schools (Lefebvre, Olander, & Levine, 1999). Team Nutrition schools are also encouraged to enroll in Healthier US School Challenge. The encouragement and communications tested in this pilot study will be very important with the new meal patterns implemented in fall, 2012. Each lunch meal will include 2 vegetable and 1 fruit serving; and two fruit servings for breakfast (Cullen, Watson, & Dave, 2011). Minimal cost interventions should be explored to help with successful implementation of new school meal guidelines.

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