



# The effects of pre-ordering and behavioral nudges on National School Lunch Program participants' food item selection



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## ABSTRACT

This paper examines the effects of pre-ordering and pre-ordering with behavioral nudges on the selection of fruits, vegetables, and low-fat milk by National School Lunch Program (NSLP) participants in a Florida school. After collecting two weeks of baseline data, students in grades four and five were randomly assigned to one of two treatment groups: the first treatment group pre-ordered their lunches online using a unique software program; the second treatment group received behavioral nudges based on United States Department of Agriculture (USDA) MyPlate recommendations while pre-ordering. Student in grades four and seven served as the control group and continued to obtain their lunches through the normal lunch line. Using difference-in-difference regression analysis, we find that students in the first treatment group selected significantly more fruits, vegetables, and low-fat milk during the pre-ordering intervention phase of the study relative to students in the control group, 27.7%, 15.8%, and 16.3%, respectively, while students in the second treatment group selected significantly more fruits (51.4%), vegetables (29.7%) and low-fat milk (37.3%) than students in the control group. In addition, we find the nudge had a statistically significant positive effect in addition to the effect of pre-ordering; students who received the MyPlate nudge while pre-ordering selected statistically significantly more fruits, vegetables, and low-fat milk than students who pre-ordered without nudging.

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## 1. Introduction

To encourage healthy eating patterns aimed at the maintenance of healthy weight and prevention of chronic diseases, the United States Department of Agriculture (USDA) regularly releases *Dietary Guidelines for Americans* (DGA). The most recent

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guidelines were issued in 2010 (USDA, 2010).<sup>5</sup> To help make these guidelines easier to understand, First Lady Michelle Obama and USDA Secretary Tom Vilsack introduced the MyPlate food icon in June 2011, which shows that a balanced meal contains all five food groups: fruits, vegetable, dairy, grains and protein (USDA, 2012). The DGA recommends that children aged 9–13 consume 1.5 cups of fruits and 2–2.5 cups of vegetables (USDA, 2010).

While data from the 2003–2004 National Health and Nutrition Examination Survey (NHANES) show that 99.9% of adolescents between ages 12–18 consume fruits and vegetables daily, only 0.9% of these adolescents consume the USDA recommended amounts of fruits and vegetables (Kimmons, Gillespie, Seymour, Serdula, & Blanck, 2009). Thus, it is important to design interventions that help children and adolescents establish healthy eating patterns which include the consumption of fruits and vegetables. It has been shown that increased consumption of fruits and vegetables leads to increased satiety and reduced intake of more energy-dense foods which may be beneficial for weight management (Rolls, Ello-Martin, & Tohill, 2004). In addition, individuals whose eating patterns are high in fruits, vegetables, whole grains, and lean meats have lower risks of obesity and chronic diseases such as cardiovascular disease (CVD) than individuals consuming diets high in red meats, high-fat dairy products, and refined grains (Fung et al., 2001). Specifically, fruit and vegetable consumption has been linked to the prevention of a number of chronic, non-communicable diseases including CVD and some cancers (Maynard, Gunnell, Emmett, Frankel, & Smith, 2003). This is likely due to the high dietary fiber of fruits and vegetables. Consuming adequate dietary fiber has been associated with the prevention of several chronic diseases such as CVD, diverticulosis, some forms of cancer including colorectal, and diabetes (Kranz, Brauchla, Slavin, & Miller, 2012).

Most school-age children consume at least a third of their meals at school; about 91% of primary and secondary school students consume lunch at school, 40% consume snacks, and about 23% consume breakfast at school (Briefel, Wilson, & Gleason, 2009). Thus, school meals, particularly those provided through the National School Lunch Program (NSLP), provide potential opportunities to assist children and adolescents in the development of healthy food behaviors.

The NSLP is the second largest food assistance program in the United States (USDA, 2015a), providing free and reduced-price lunches for income-eligible students as well as minimally subsidizing paid lunches for students who are not eligible to receive free- or reduced-price lunches. In 2014, over five billion lunches were served to an average of 30.3 million students per day (USDA, 2014b).

A growing body of research suggests that subtle behavioral cues, or behavioral economic interventions, can promote healthful changes in eating habits (Hanks, Just, Smith, & Wansink, 2012a; Hanks, Just, & Wansink, 2013a, 2013b). Behavioral economic interventions frequently use “nudging” to influence choices made by individuals without taking away their freedom of choice (Thaler & Sunstein, 2009). A nudge can take different forms such as specific placement of items in the cafeteria, use of attractive grab-n-go packages to market healthier items, or the use of labels to influence choice.

Item placement and labels have been used to influence consumers’ choices in workplaces and schools, and by marketing companies (Hanks et al., 2012a, 2013a; Wansink, Just, & Smith, 2011). Hanks et al. (2012a) experimented with the creation of a “convenience line” to supplement the standard cafeteria lines in a New York high school. The convenience line only contained healthy items such as sandwiches and salad bar items, whole fruits, and vegetables. The addition of this line led to a 28% decrease in selection of unhealthy foods. In a study conducted at Massachusetts General Hospital, foods were labeled to indicate their level of healthiness with red (unhealthy), yellow (moderately healthy) or green (healthiest). The researchers found a decrease in the proportion of sales of red items and an increase in the proportion of sales of green items. The proportion of sales of red items decreased from 24% at baseline to 20% at 24 months after the implementation of the labeling, while the proportion of sales of green items increased from 41% to 46% (Thorndike, Riis, Sonnenberg, & Levy, 2014).

In addition to placement and labels, positive reinforcement after making healthy decisions can increase selection of fruits and vegetables. Faith, Rose, Matz, Pietrobelli, and Epstein (2006) enrolled five-year old twins and randomly assigned one twin of each pair to the control group and the other twin to the treatment group. During the baseline lunch, both twins chose items from a buffet, and consumption was recorded. During the second lunch, the twin in the treatment group was told prior to eating that he would be given a star on a chart for each serving of fruits and vegetables consumed, while the twin in the control group was told they would be given stars, but these stars were not contingent on consumption. The twins in the treatment group increased his/her consumption of fruits and vegetables by two servings on average, when compared to the twin who did not receive this treatment.

Nudges and positive reinforcement can increase selection of healthier food items but do not solve the issue of self-control. Empirical evidence suggests that individuals make unhealthy decisions when they are hungry (Mancino & Kinsey, 2004). Pre-commitment helps to circumvent this problem by eliciting responses for future behavior in the present, and forcing an individual to make a decision without future stimuli, such as hunger or visual cues. In an overview of behavioral economics methods that could be applied to the NSLP and other nutrition assistance programs, Just, Mancino, and Wansink (2007) hypothesized that allowing children to preselect their meals before mealtime may result in more nutritious selections. Hanks et al. (2013a) tested this empirically in a school that utilized pre-ordering prior to the introduction of the researchers’ intervention. To determine the effect of pre-ordering, they collected baseline information for two weeks, and then discontinued pre-ordering in weeks 3 or 4 depending on the classroom. They found that 29.4% of students who pre-ordered chose a “healthy” entrée (lowest caloric density) while only 15.2% of students who made their selections while

<sup>5</sup> New Dietary Guidelines for Americans are scheduled to be released in the fall of 2015 (USDA, 2014a).

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