Preventive Medicine 71 (2015) 27–30

Contents lists available at ScienceDirect

Preventive Medicine

journal homepage: www.elsevier.com/locate/ypmed

Lunch, recess and nutrition: Responding to time incentives in the cafeteria

Joseph Price [a,*], David R. Just [b]

[a] Brigham Young University, 162 FOB, Provo, UT 84602, United States
[b] Cornell University, 210C Warren Hall, Ithaca, NY 14853, United States

ARTICLE INFO

Available online 29 November 2014

Keywords:
Recess
Lunch
Fruits and vegetables
National School Lunch Program

ABSTRACT

Objectives. In this study, we evaluate if moving recess before lunch has an effect on the amount of fruits and vegetables elementary school students eat as part of their school-provided lunch.

Methods. Participants were 1st–6th grade students from three schools that switched recess from after to before lunch and four similar schools that continued to hold recess after lunch. We collected data for an average of 14 days at each school (4 days during spring 2011, May 3 through June 1, 2011 and 9 days during fall 2011, September 19 through November 11, 2011). All of the schools were in Orem, UT. Data was collected for all students receiving a school lunch and was based on observational plate waste data.

Results. We find that moving recess before lunch increased consumption of fruits and vegetables by 0.16 servings per child (a 54% increase) and increased the fraction of children eating at least one serving of fruits or vegetables by 10 percentage points (a 45% increase). In contrast, the schools in our control group actually experienced a small reduction in fruit and vegetable consumption during the same time period.

Conclusions. Our results show the benefits of holding recess before lunch and suggest that if more schools implement this policy, there would be significant increases in fruit and vegetable consumption among students who eat school lunch as part of the National School Lunch Program.

Introduction

There is a growing effort in the United States to encourage healthy eating among children, one that is increasingly targeted at elementary schools. This effort is largely being led by the U.S. Department of Agriculture (USDA), which under the Healthy, Hunger-Free Kids Act of 2010, was granted increased authority over the National School Lunch Program. The USDA initially set new nutrition standards for all food sold as part of the National School Lunch Program. Additional initiatives under the bill included protein and calorie requirements and targets for use of whole grain products.

Beginning in the fall of 2014, the Healthy, Hunger-Free Kids Act required that all students purchasing a national school lunch to take either a serving of fruit or vegetables with their lunch. These approaches have met with varying degrees of success, and in some cases result in substantial costs to the school (Just and Price, 2013). Stocking vending machines with healthier options or adding healthy foods outside of the regular lunch program costs money, although one study found that lowering the price on healthy options in school vending machines increased healthy food intake without significantly affecting the profits of the machines (French, 2003). Another study indicated that schools who complied with the current requirements for serving certain types of fruits and vegetables spend on average an additional fourteen cents per meal than those who do not (Kleinman et al., 2002). With over 31.7 million meals being served daily, this adds up to roughly $800 million per year in extra food costs.

Given the current policy regime, another alternative approach to increasing fruit and vegetable consumption that costs nothing in terms of extra labor or food expenses and that has been relatively underutilized is having recess occur just prior to lunch. In our study, we find that moving recess to before lunch is significantly more effective at encouraging fruit and vegetable consumption than simply requiring students to take a fruit or vegetable with their lunch.

When lunch occurs directly before recess, students are often allowed to leave for recess as soon as they are done eating; this scheduling can create an incentive for students who place a high value on recess time to eat their food—or rather, be "done" with lunch—as quickly as possible. This desire to minimize eating time can decrease the percentage of children that consume the recommended amounts of fruits and vegetables, thus leaving children feeling hungry for the rest of the day. This lagging hunger after lunch can decrease academic performance (Kleinman et al., 2002; Florence et al., 2008) and lead to excessive and unhealthy snacking when children return home from school (Cullen et al., 2000).

Previous studies have documented administrator, teacher, and parent concerns surrounding this change in schedules. Popular concerns are logistics of supervision, hand washing, cold weather clothing, tradition, scheduling, exercise, communication, nutrition beliefs, academic

* Corresponding author at: 162 FOB, Provo, UT 84602, United States. Fax: +61 2 9351 9566.
E-mail addresses: joseph_price@byu.edu (J. Price), foodandbrandlab@cornell.edu (D.R. Just).

http://dx.doi.org/10.1016/j.ypmed.2014.11.016
0091-7435/

priorities, and resistance by another party (Rainville et al., 2006). In a study conducted in Hawaii some teachers and administrators were skeptical before the implementation of the recess before lunch program, but afterwards reported highly positive experiences (Tanaka et al., 2005). An evaluation of the program in Montana found that moving recess before lunch resulted in many benefits, including more food being eaten, a calmer lunchroom atmosphere, and a dramatic decrease in disciplinary problems (Robinson, 2003).

Studies have also shown benefits from moving recess to before lunch, including less food wasted at lunch and better behavior during lunch, at recess and in the classroom (Ramstetter et al., 2010). Bergman et al. (2004) compared plate waste data for 1117 students at two schools, one with recess before lunch and one with recess after lunch and found that the school with recess before lunch had higher levels of consumption of many macro and micro nutrients including iron, calcium, and vitamin A, and lower levels of plate waste. Getlinger et al. (1996) compared plate waste data for the 67 students before and after a change that moved recess to occur before lunch and found that the change in recess times reduced plate waste from 34.0% down to 24.3% and increased vegetable consumption from 19 to 30 g (Getlinger et al., 1996). Our study combines the strengths of these two studies. We combine the large sample approach used by Bergman et al. with the comparison of the same set of students before and after the change in recess used by Getlinger et al.

Methods

Data were collected at seven elementary schools, all from the same school district in Utah. Three of these schools moved their recess to occur before lunch at the start of the 2011–2012 school year. The other four schools, which we used as our control group, continued to have recess occur after lunch. We collected data for an average of four days at each school in the spring of the 2010–2011 school year and an average of nine days at the same set of schools in the fall of the 2011–2012 school year after the recess policy had changed at the three treatment schools. Our data includes all children receiving a school lunch and our data is recorded each day at the child-level. Students' confidentiality was maintained throughout this study as we did not record their name or student identification number. Instead individual students were recorded based on just their grade and gender.

We have included comparable detailed summary statistics of the schools in the treatment group against those in the control treatment in Table 1. It should be evident that the schools are very similar in demographics across both groups. The racial makeup of the schools is predominantly White and Hispanic, with averages of about 68% and 25% respectively across all of the schools. Additionally school sizes ranged from 447 to 738 and free or reduced lunch participation was over 45% for 6 of the 7 schools. There is considerable variability between schools within the treatment and control groups, but little variability between the means across the groups themselves.

Table 1
Summary statistics comparing recess-before-lunch schools to recess-after-lunch schools.

Characteristic:	Moved recess to occur before lunch (3 schools)	Recess continued to occur after lunch (4 schools)
School size	602.3	566.3
Fraction male	50.4%	50.9%
Ethnicity		
White	68.7%	67.5%
Hispanic	24.5%	26.0%
Other	6.81%	6.54%
Fraction free/reduced price lunch	52.9%	55.6%
Spring 2011 (before change):		
Servings of FV consumed	0.291	0.309
Ate at least one serving of FV	22.0%	22.8%
Fall 2011 (after change):		
Servings of FV consumed	0.462	0.266
Ate at least one serving of FV	33.3%	17.7%

Notes: The sample includes 7 elementary schools, 3 of which moved their recess to occur before lunch. All three schools changed the recess policy immediately prior to the start of the 2011–2012 school year. The Spring Study occurred May 3 through June 1, 2011 and the Fall Study occurred September 19 through November 11, 2011. All of the schools were in Orem, UT.

Our data collection approach was developed by Just and Price (2013) and involved observers standing by the trash cans throughout the lunch period recording the number of servings of fruits and vegetables that each student consumed or threw away using a specially designed iPhone/iPod application. This app is called the vProject app and is currently available for free in the iTunes store. Specifically, our researchers examined each tray as students threw it away. From this examination researchers determined how many servings of fruits and/or vegetables the student had taken and how many they had eaten. This information is entered into the app along with the child's gender and grade.

All of these data were recorded in real time using the app. The fruits or vegetables offered from the cafeteria were served in pre-portioned cups or as whole fresh fruit items. This allowed us to accurately determine the number of servings taken and actually eaten by observing the empty cups or the remains of the fresh fruit or vegetable (such as an apple core). This method has been validated and found to be both reliable and relatively precise (Hanks et al., 2013).

Our analysis was based solely on students receiving a school provided lunch for two reasons. First, our data collection approach was based on a visual inspection of each student's tray and was designed to not create any significant disruption to the normal flow of traffic at the end of lunch or any verbal interaction with the students. Recording data on sack lunches would have required opening each bag and asking the student which fruit and vegetables had been included in their lunch. Second, we were able to measure the number of servings that each child ate because these items came in pre-portioned cups. This level of pre-portioned servings would not have been the case for items in sack lunches for any items packaged in baggies, including the most commonly included vegetables like baby carrots and celery. Since we only recorded the data at the end of lunch, we would have had no way of knowing how many of these items the student started the lunch with.

As part of our data collection, we did not count potatoes, corn, or fruit juices as fruits or vegetables. While these are considered to be in the fruit and vegetable category under USDA regulations, corn and potatoes are technically neither a fruit nor vegetable. While they do have nutritional value, corn is considered a grain and potatoes are classified as a starchy food by many nutritionists. Moreover, many potato sides are served in the form of French fries or other processed foods. Therefore we found the average nutritional gap between these foods and fruits and vegetables to warrant excluding them in the study. The same logic applies to fruit juices: many fruit juices served in schools are artificially sweetened, and while the juice does provide nutrients, research has shown that such sugar-sweetened beverages can lead to weight gain and increased risk of type 2 diabetes (Schulze et al., 2004; Wang et al., 2008; Dennison et al., 1997).

We used two measures of fruit and vegetable consumption for our analysis. First, we measured the number of servings of fruits or vegetables that each student ate (measured in increments of half a serving). Second, we measured whether each student ate at least one serving of fruits or vegetables. While it is likely that our measure of the number of servings that a student ate is measured with some error (since we made a conscious tradeoff between accuracy and the number of observations), measures of whether the student ate at least one serving are likely to be more accurate (an empty container is easily identified).

We used multivariate regression to estimate the impact of the change in the timing of when recess occurs. We regressed each of our measures on a "Post-period" variable, indicating that the date the observation was made was after any policy changes were implemented. We ran these regressions separately for the treatment and control schools. For our analysis, we used the student-day as the unit observation but clustered all of our standard errors at the school-day level. We included controls for the student's gender and grade as well as school and day of the week fixed effects.

The inclusion of school fixed effects was designed to capture any fixed characteristics of the school across the two school years that we included in our analysis. These characteristics might include the layout of the cafeteria, the demographics of the student body, and possibly even less quantifiable aspects of the lunch room such as the personality of the lunch-room workers. The day of the week fixed effects are similarly designed to control for any differences across days of the week that might have affected student consumption patterns during lunch.

In order to test whether the change in fruit and vegetable consumption differed between the treatment and control schools, we also pooled the data from the seven schools together and ran a regression in which we added in an