Default options, incentives and food choices

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Abstract

Objective: Examine whether requiring children to place fruits and vegetables on their lunch trays increases consumption of these items.

Design: Observational study that exploits naturally occurring variation between two school districts and a pre-post observational study at schools that changed their lunch policy mid-year.

Setting: 15 elementary schools from two school districts, one requiring students to place a fruit or vegetable on their tray and one that does not. In addition, 3 schools that implemented a default option part way through the school year.

Subjects: Students at 18 elementary schools (*n* 41,374 child-day observations) across the two experiments.

Results: Requiring that fruits and vegetables be placed on each child's tray increases the fraction of children who eat a serving of fruits or vegetables by 8 percentage points ($P < 0.01$) but leads to an extra 0.6 servings being thrown away per lunch served ($P < 0.01$). The default option approach costs $1.72 per additional serving of fruits or vegetables per day. However, when default options are combined with a small rewards program the efficacy of both interventions increases.

Conclusions: A default option, as a stand-alone program, has only a limited impact on fruit and vegetable consumption but is much less cost effective than other approaches. Schools requiring children to take fruits and vegetables with their lunch might consider adopting additional interventions to ensure that the additional items served don't just end up in the trash.

Default options have had a powerful influence on people's decisions to donate organs[1], invest in their retirement[2], and select certain health insurance plans[3]. Default options can influence behavior through either behavioral inertia[4], or by communicating social norms[5]. Successful applications of default options are often binary decisions that are unfamiliar, infrequently-made, and require no subsequent initiative. This is in stark contrast to food choice structure, where individuals have many options (all of which are very familiar), make repeated decisions throughout each day, and must play an active role in the decision (often preparing the food themselves, and always actively placing the food in their mouth).

The Healthy, Hunger-Free Kids Act of 2010 provides new guidelines for school lunches. As part of these guidelines, each reimbursable meal will need to include a serving of both fruits and vegetables and the child must take one or the other. Schools will need to ensure that these items are on each student's tray. Prior to the change, reimbursable meals were required to have three food groups represented, with one being protein. Under the previous guidelines schools chose whether they would use an "offer" or "serve" approach to providing fruits and vegetables as part of the school lunch[6]. The new guidelines will lead to a dramatic shift for schools that have historically allowed children to choose whether or not to place fruits and vegetables on their tray. This new policy represents a default option in which the items go on the child's tray by default, but the child can choose whether or not to discard the item.

We use data from two different settings to examine the role that using default options—in this case, requiring children to take a serving of fruits or vegetables—has on whether children actually consume more fruits and vegetables. First, we compare the consumption rates between two similar school districts that adopted different policies. One district required all students to take at least one serving of fruits or vegetables, and the other district allowed students to choose whether to place these items on their tray. Second, we examine a set of schools that switched from children choosing whether to place fruits and vegetables on their lunch tray to a policy where these items were automatically placed on the student's tray.

In both settings, we collect data by observing each student's tray at the end of lunch. At these schools most of the fruits and vegetables come in special pre-portioned cups, allowing us to observe how many fruits and vegetables each child takes, eats, and throws away. In other cases, certain fruits have a peel, core or residue that allows us to record the same information. A major advantage of this data collection approach is that the subjects are not aware of the information

being collected. If the observers are asked, they simply respond that they are doing a study about what kids eat at lunch with no reference to fruits or vegetables.

In one of the settings, we also implement an incentive program that provides cash or prizes to students who eat a serving of fruits or vegetables that day. Previous studies have found that awareness campaigns and incentives increase fruit and vegetable consumption among adults and children[7,8]. A study of price manipulation[9] found that relative price reductions of low-fat snacks compared to snacks with higher fat levels influenced both child and adult consumption patterns. In this study, we test the degree to which the presence of default options increased the efficacy of the incentive program and vice versa. We hypothesize that requiring that a fruit or vegetable be placed on the tray should lead the child who otherwise may have passed it up in line to have more time to contemplate whether or not to consume the fruit or vegetable. The added time may increase the number of children who eventually decide to eat it as they have time to reconsider their choice. This added time may also make incentives or other inducements more effective. It should be noted that our incentives program is just one of many possible complementary interventions that could be combined with default options. We include these results to provide insight into the degree to which default options can be coupled with other interventions to provide synergistic effects.

Methods

The analysis in this paper is based on two different experiments that we conducted. In both experiments, we collected the data the same way: trained observers visited school cafeterias, stood where the children discarded their trays at the end of lunch, and recorded the number of servings of fruit and vegetable items that each child eats and throws away. These items all come in pre-portioned cups or leave behind a peel or a core, thus our data collection is a simple measure of the number of full and empty items that remain on the tray at the end of lunch. We recorded all of this information in increments of half a serving. Other studies have successfully employed visual estimation of cafeteria consumption and waste[10,8] and we find an average inter-rater reliability of .781 using our data collection approach. One advantage of this data collection method is that it allowed us to get data on every student who ate a school lunch rather than relying on a sample of the student body.

First Experiment – Cross District

The first experiment was part of a larger project examining the effect of incentives on healthy eating during school lunch. For this experiment, we collected data from 15 elementary schools in Utah located in two adjacent and demographically similar school districts. One of these school districts had a policy that required every child to have at least one serving of fruits or vegetables on their tray; the other district's policy allowed children to choose whether to take these items or not.

At each of these schools, with the exception of two, we collected at least 5 days of baseline data and 5 days of data during which we gave a small reward (valued at 5 to 25 cents) to children who ate at least one serving of fruits or vegetables. The data from this first experiment include information on 175 school-days with 29,880 child-day observations during the baseline period and 17,534 observations during the treatment period in which schools were randomly assigned to receive a reward (valued at less than $0.25 per child) for fruit or vegetable consumption. We use both periods of data in our analysis. The baseline data provides information on the change in behavior when just the default option is in place. The combination of baseline and treatment data allows us to test if the effect of providing rewards is larger when a default option is already in place.

One drawback of this first experiment is that the comparison is based on naturally occurring variation in policies between two school districts. This comparison would be biased by any other differences that exist between these two districts. Of note are the difference in the proportion of minority students (29% vs. 16%) and the average size of the school (576 vs. 744), where the first number in each comparison corresponds to the schools in the district with the default option. Otherwise, the districts are very similar, especially in their policies directly impacting eating behaviors. The schools in our sample from the two districts have the same fraction of students receiving a free or reduced price lunch (about 54% on average). Neither district provides snacks for the children before lunch, nor do they have vending machines in their buildings. All the schools studied hold recess immediately following lunch. The main advantage of this setting is that we get to observe behavior after the default option has already been in place for a period of time providing insight into the long-run differences that result from this type of policy.

Second Experiment – Within School

The second experiment involves a set of schools that implemented a default option policy during the school year in preparation for future changes in the school-lunch guidelines. For this set of schools, we are able to observe the children's eating patterns both before and after the change in policy. Our data include 3 schools that change their policy. For each school, we have four to nine days of data when there was no default option and three to ten days where there was a default option. This allows us to control for all of the school and district-level characteristics that might bias the estimates we obtain from the first experiment. The one concern here is that we are only able to look at the effect at schools that were willing to implement the policy during the middle of the year and prior to any actual requirements to do so. If these schools happen to be the type of schools that expect the default option policy to be the most effective, then the estimates we obtain in this paper overestimate the changes in behavior that would occur at the average school.

Results

Experiment 1 (Comparison across districts)

Our first setting involves data from two school districts, one of which had a requirement that children take at least one serving of fruits or vegetables, and one which did not. In Panel 1 of Figure 1, we provide the difference in consumption patterns between the two school districts. We find almost no difference in the fraction of children who actually ate a serving of fruits or vegetables between the two districts (35% vs. 33% of children, not statistically different). However, the school district with the default option ended up with about three times as many of the fruits and vegetables being thrown in the trash (35% vs. 13%, significant at the 1% level).

In Columns 1 and 2 of Table 1 we provide regression estimates of the comparisons in Figure 1. The regression estimates allow us to control for observable differences between the two school districts as well as information about each individual student and the fruits and vegetables being served that day. The coefficients in the first row correspond to the magnitudes presented in Figure 1. The second row includes controls for grade, sex, day of the week, month, school size, and the percentage of students who receive subsidized lunches. The final row includes a control for the popularity of the most popular fruit or vegetable being served that day. Originally employed by Just, Lund, and Price[11], this measure is based on observational data on which fruits and vegetables children are most likely to eat.

The results in the first row of Table 1 confirm the raw differences in Figure 1 and indicate that children in the district with the default option were 1.9 percentage points less likely to eat a serving of fruits or vegetables. However, once we control for the basic demographic information of the students and schools in each district we find that the school district with the default option has a fruit and vegetable consumption rate that was 1.8 percentage points higher.

Experiment 2 (*Within-school Analysis)*

Our second setting is a situation in which a set of schools decided to change their default option policy in preparation for changes in USDA guidelines about reimbursable meals. In the second graph in Figure 1, we provide two measures of the choices children make at lunch before and after the change in the policy. We find that the introduction of the default option increased the fraction of children who ate at least one serving of fruits or vegetables by 8 percentage points (from 20% to 28%, statistically significant at the 1% level). However, we also find that the default option requires the school to provide an additional 0.86 servings of fruits and vegetables per child, with an additional 0.6 servings per child ending up in the trash. Based on school records, we find that the average serving of fruits and vegetables costs about $0.20. This means that, although providing the default option to 10 children costs $1.72, only one more child eats a fruit or vegetable. While it is hard to find equivalent measures to compare this to other interventions, the small rewards program implemented by Just and Price[12], which gave children direct incentives for fruit and vegetable consumption, cost about $0.35 to produce a comparable short-run impact. This increase corresponds to the use of incentives in general, where the independent variable is an indicator for whether there was an incentive (of any type). For a discussion on the relative merits of different types of incentives, we refer the reader to Just and Price[12].

Combined Effect of Defaults and Incentives

The results presented in the two experiments reflect the effect of default options when no other programs are specifically in place to encourage children to consume fruits and vegetables. Our results suggest that in the absence of other interventions, the use of a default option is neither an effective nor cost-effective way of increasing fruit and vegetable consumption. However, we also collected similar data for the two school districts with different policies during

a separate five days period at each school in which we provided a small reward to children for eating at least one serving of fruits or vegetables. Past studies show that rewards programs can create large increases in fruit and vegetable consumption in schools[8,12]. In Table 2, we examine the interactive effect between the rewards program and the default option.

The unit of analysis in Table 2 is the child-day observation. This allows us to control for the grade and sex of the child, the day of the week, characteristics about the school, and the items being served that day. The sample combines data from the baseline and treatment days at each school, providing an overall sample of 47,414 child-day observations. The primary focus of Table 2 is the interaction terms between providing an incentive on that day and whether the school had the default option in place.

We find that at these schools, providing an incentive increased the fraction of children eating fruits and vegetables by 27 percentage points (an 84% increase). At the schools with the default option in place there was an even larger response to the incentives. There was an additional 3.6 percentage point increase in the fraction of children eating fruits and vegetables, indicating that the presence of the default option produced an even larger effect when using the incentives. Equivalently, these results suggest that default options can successfully increase fruit and vegetable consumption in children but only when coupled with another intervention such as a small rewards program. In this case, the reward program may lead the child to consider the fruit or vegetable on their tray prior to throwing it away, eventually leading to consumption.

In addition to the fixed effects model, we have included a multi-level regression analysis in Columns 3 and 4 in order control for school level variables (labeled GLLM). This analysis estimates the same equation as in the fixed effects model, but where the constant term is defined by the random effects relationship as $\beta_0 = \alpha_i + \alpha_{i2} FreeOrReduced + \alpha_{i3} SchoolSize$, where $FreeOrReduced$ is the percentage of students receiving a free or reduced price meal, $SchoolSize$ is the number of students attending the school, and i is an index for school, and where each of the coefficients is assumed to have a random distribution. This method allows us to better control for variation in school characteristics in our data. Despite the additional controls, we find results that are nearly identical to the fixed effects model.

When using the school fixed effects model we cannot estimate the main effect of the default option (since it is a fixed characteristic of each school), so we also estimate our main results using a random effects model. We find similar effects for providing incentives and also

find that the incentives are more effective when there is a default option in place. We now see though, that in the absence of any incentives, the default option was associated with a slightly lower consumption rate (4.4 percentage points) and a much higher waste rate (an additional .22 servings thrown away per child). Comparing the main effect of default options with the interaction term between the incentives and default options (.220 vs. -.135) indicates that most of the extra waste created by using a default option is prevented by providing a small incentive.

Discussion

Default options can have a powerful effect on decisions in a wide-range of settings. However, there are aspects of food choices that might make them less likely to be influenced by default options. The most successful applications of default options have been in settings involving decisions that are unfamiliar, infrequently-made, and require no subsequent initiative. In contrast, food choices generally involve familiar and frequent decisions in which the individual generally plays an active role in the decision.

The new school lunch guidelines represent one of the first major applications of default options to food choices in children. With the changes in the school lunch guidelines, schools will need to ensure that every child has a serving of fruit or serving of vegetables on their tray in order for it to count as a reimbursable meal. The results in this paper raise some potential concerns about requiring children to place fruits and vegetables on their tray in the absence of any other interventions designed to encourage them to eat those items. The National School Lunch Program provides lunch to roughly 31.6 million children each day. Our results suggest that across all these children the cost of providing the additional fruit and vegetable items will cost an additional $5.5 million each day, with roughly $4.9 million worth of these fruits and vegetables being discarded by students into the trash. Other policies may be much more cost effective. For example, a direct incentive program would produce a similar level of consumption for just $1.1 million a day[12].

One shortcoming with this research is that we can only make provisional statements on long-term benefits of the program. In analyses not included in this paper, we find weak evidence for a novelty effect from the introduction of the default; i.e. the default increases fruit and vegetable consumption initially but loses potency over time. If the default option increases

consumption through a novelty effect, then default options would actually be more costly over time as the novelty disappears.

Conclusion

Our results highlight the fact that default options can be effectively coupled with other interventions in order to increase the efficacy of both approaches. In this paper, we look specifically at the combination of a default option with a small rewards program and find that the combined effect of both approaches provides a larger effect than either one implemented individually and a significantly larger effect than default options alone. Other programs aimed at increasing fruit and vegetable consumption in schools, such as the 5-a-Day Power Plus program[13] or reducing unhealthy options at lunch[14], might also see an increased effect when combined with a default option. As schools begin to implement the new lunch guidelines, they should consider additional approaches to ensure that the potential effects of default options do not go to waste.

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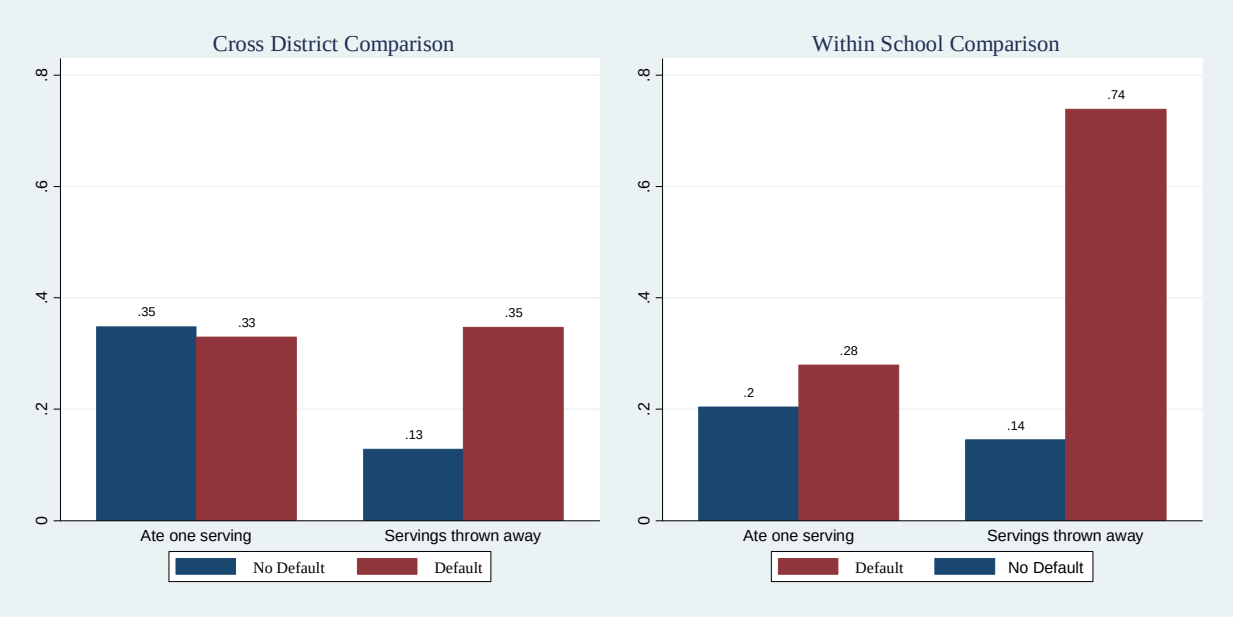
Figure 1. Default options and consumption and waste of fruits and vegetables.



Notes: "Ate one serving" indicates the fraction of children at the school who ate at least one serving of fruits or vegetables.

Table 1. Default options and consumption and waste of fruits and vegetables.

	Cross District Comparison		Within School Comparison	
	Ate a serving	Servings wasted	Ate a serving	Servings wasted
No controls	-0.019**	0.219**	0.078**	0.588**
	[0.006]	[0.005]	[0.019]	[0.019]
Controls	0.018**	0.228**	0.079**	0.593**
	[0.007]	[0.006]	[0.019]	[0.018]
Controls + item rank	0.018**	0.228**	0.077**	0.594**
	[0.007]	[0.006]	[0.018]	[0.017]
Observations	29,880	29,880	11,494	11,494

Notes: Each cell is a separate regression and reports the coefficient and standard error on the default option indicator variable. The column headings indicate the dependent variable and the row labels indicate the covariates included in the regression. The second row includes controls for grade, sex, size of school, and fraction of children at the school on free or reduced price lunch as well as month and day of the week fixed effects. The third row includes an additional control for the popularity of the most popular item being offered that day. **, and * indicate statistical significance at the 1% and 5% levels respectively.

Table 2. Effect of incentives on children's fruit and vegetable consumption.

	Fixed Effects		GLLM		Random Effects	
	Ate a serving	Servings Wasted	Ate a serving	Servings Wasted	Ate a serving	Servings Wasted
Incentive	0.273**	0.007	0.272**	-0.019**	0.265**	0.004
	[0.009]	[0.007]	[0.008]	[0.006]	[0.009]	[0.007]
Incentive * Default	0.036**	-0.152**	0.042**	-0.126**	0.042**	-0.135**
	[0.010]	[0.008]	[0.009]	[0.008]	[0.010]	[0.008]
Default Option	-	-	-	-	-0.044**	0.220**
	-	-	-	-	[0.013]	[0.007]
Mean (pre-period)	0.335	0.272	0.335	0.272	0.335	0.272

Notes: The unit of analysis is the student-day observation (N=47,414). Each regression includes controls for grade, sex, the popularity of the most popular item being offered that day, and day of the week fixed effects. The random effects model includes controls for size of school and fraction of children at the school on free or reduced price lunch **, and * indicate statistical significance at the 1% and 5% levels respectively.