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Gifts and Goals: Behavioral Nudges to Improve Child Food Choice at School

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Abstract

The rising childhood obesity rate calls for interventions aimed at improving child food choice, and one recent innovation is the use of behavioral 'nudges.' We conducted a field experiment with over 1,400 children to measure the impact of interventions based on two behavioral theories: reciprocity and theories of self-control. The interventions were implemented in the classroom prior to observing choices between a healthy and less healthy milk choice in the cafeteria. We found that small, unconditional gifts (triggering reciprocity) increased the choice of the healthier milk by 15 percentage points relative to a control group. Giving the option to set a goal (an internal commitment device) was most effective for the younger children and increased the choice of the healthier milk by 10 percentage points. About two thirds of children made a goal to select the healthier milk, and almost 90 percent followed through with their goal. We also see an impact of health information delivered by teachers. Our results have implications for policy and practice, since low cost interventions implemented at school may have an impact on what kids choose to eat and in turn on obesity rates.

JEL Classifications: C72, C91
Keywords: field experiment, children, food choice, reciprocity, goal-setting

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1. Introduction

A major component of the obesity epidemic[1] is the decision by individuals to habitually consume high quantities of low-nutrient, high-calorie foods and beverages. Behavioral 'nudges' have emerged as a way to target food choices and habits, especially among children in the school lunchroom. Many nudges have shown great promise, including monetary and non-monetary conditional incentives (e.g., Belot et al., 2013; Just and Price, 2013a; List and Samek, 2015) and re-arranging the cafeteria as suggested by the 'Smarter Lunchroom' paradigm (see Hanks et al., 2012), have shown great promise.

Some of the most prominent behavioral theories remain underexplored in the health domain. We focus on two such theories. The first, the theory of reciprocity – rewarding kind acts with kind acts – is indisputable as a determinant of human behavior in the marketplace (Falk and Fischbacher, 2006). As Adam Smith postulated, "*kindness is the parent of kindness*." (Smith, 1759). Equally important is our second area of focus, self-control, which has received a great deal of attention in behavioral economics (e.g., Laibson, 1997; O'Donoghue and Rabin, 1999). In our study, we are interested in how an internal commitment device – goal-setting – can impact food choice.

Our contribution is a large-scale field experiment providing empirical evidence for the effectiveness of harnessing reciprocity and goal-setting as a way to improve food choice. Over 1,400 children in grades K-6 were randomized at the classroom level to one of three different treatments: the unconditional gift treatment (GIFT), the goal-setting treatment (GOAL), or the control treatment (CONTROL). We operationalized reciprocity

[1] Obesity is a major public health concern, leading to chronic conditions such as high blood pressure, diabetes, cardiovascular disease, and certain cancers (Pi-Sunyer, 1993). Child obesity is of particular concern – 17% of youths in the United States have body mass indices (BMIs) at or above the recommended 95th percentile (NHLBI Obesity Education Initiative Expert, 1998; Ogden et al., 2002, 2010).

in the GIFT treatment by having the teacher give all children a small, unconditional gift – a sticker – as a pre-emptive 'thank you' for making the healthy choice, prior to heading down to lunch (which children kept regardless of the final choice made). In the GOAL treatment, we focused on addressing children's self-control problems by having the teacher ask children to set a non-binding goal to choose the healthy option before lunchtime. While the goal is non-binding, it acts as an internal commitment device meant to overcome problems of self-control (Koch and Nafziger, 2011; Hsiaw, 2013). To date, empirical research is limited on internal commitment devices such as goal-setting.[2]

Our outcome measure was the choice of milk: white, or chocolate. We decided to use milk choice as our outcome variable of interest because white milk is superior to chocolate milk by virtue of sugar content[3], and because children have a clear preference for chocolate over white, creating an opportunity to nudge behavior through our interventions. Moreover, we were constrained by the fact that choice of milk is the only decision that students in our school district are allowed to make as they go through the lunch line. Nevertheless, we propose that the directional results can provide implications for the effect of our interventions on other types of food choices.

We found that small, unconditional gifts increased the choice of the healthier white milk by about 15 percentage points relative to the control group, suggesting a role for reciprocity in our context. Allowing children to set a goal increased the choice of the healthier white milk by about 10 percentage points relative to the control group, implying

[2] Researchers investigating self-control problems have most often studied demand for binding commitment devices (e.g., Beshears et al., 2011).

[3] According to the National Dairy Council, chocolate milk has about 4 teaspoons of added sugar per 8 oz. serving, compared to 6 teaspoons in a 8 oz. serving of Coca-Cola. Children in the National School Lunch Program in the US can only choose between different milk options (i.e., there is not a water or juice option). The types of milk served are decided on by the school district using USDA guidelines, meaning that both types of milk were low-fat versions.

a role for this internal commitment device in overcoming self-control problems. About two-thirds of children made a goal to select the healthier white milk, and almost ninety percent followed through with their goal. The goal-setting intervention was most effective for the younger participants in our sample, while the gift intervention seemed to be equally effective for all ages.

Though it is not our main research question, we also observed an impact of health information messages from teachers in driving student behavior. Since we needed to educate children about why the gifts and goals were being implemented, on the day of the intervention we included an informational message in all treatments. That is, merely having teachers educate children about the importance of reducing sugar intake substantially increased the selection of white milk. Prior work has found mixed results for the effectiveness of nutrition education on food choice.[4]

Relevant for policy and practice is the fact that interventions harnessing reciprocity and goal-setting can be implemented at a low cost by a teacher prior to lunchtime. Thus, rather than intervening in the lunchroom as some prior studies have done, we rely on teachers to carry out these scalable and cost-effective interventions in class. Moreover, no oversight is needed as would be the case with the conditional incentives studied in related work (e.g., Just and Price, 2013a; List and Samek, 2015). Since the interventions we study are relatively low cost, there is scope for carrying them out in the long term as well.

In what follows, Section 2 provides a background, including an overview of related work and a framework for interpreting the results. Section 3 describes the experimental design. Section 4 summarizes the results. Section 5 provides a discussion and concludes.

[4] For instance, while short educational messages from cafeteria workers increased fruit consumption in one study (Schwartz, 2007; Perry et al., 2004), short educational messages from research assistants did not have an effect on dessert choice in another study (List and Samek, 2015).

2. Background

2.1 Reciprocity

The theory of reciprocity – rewarding kind acts with kind acts – was formalized by Dufwenberg and Kirchsteiger (2004) and Falk and Fischbacher (2006).[5] While 'standard economic theories' of self-interest do not allow for reciprocal preferences, empirical evidence for reciprocity has been observed in laboratory games such as the ultimatum game (Guth et al., 1982) and the gift-exchange game (Fehr et al., 1993). In the field, positive reciprocity has played a role in disparate environments such as the labor market (e.g., Gneezy and List, 2009; Kube et al., 2012) and in charitable giving (Falk, 2005; Landry et al., 2008).

As formalized by Falk and Fischbacher (2006), sequential reciprocity hinges on two key terms: the kindness of an act by Player 1, as perceived by Player 2 (kindness term); and the perceived improvement of Player 1's payoff, given the reciprocal act by Player 2 (reciprocal term). Suppose that in the health domain we have two agents, an authority figure whom we'll call Player 1 and the consumer (the child in this case) whom we'll call Player 2. We propose that acts by Player 1 in an effort to promote healthy choices (such as a teacher handing out stickers as a 'thank you' for choosing the healthy option) are perceived as a kindness by Player 2. In turn, Player 2 reciprocates the perceived kindness by an act in line with player 1's wishes (in this case, choosing the healthy suggested option). This brings us to the following prediction:

Prediction 1: Unconditional gifts will increase the likelihood of following through

[5] For important discussions of reciprocity in economics, see also Fehr and Gachter (1998), Cox (2004) and Fehr and Schmidt (2006).

with the 'healthy' behavior due to reciprocity.

Prediction 1 has not been evaluated in related work in the health domain, and it could well be that 'standard self-interest,' rather than reciprocity, would prevail in this setting. Conditional incentives have been some of the most successful interventions in child food choice, yet these harness self-interest rather than reciprocity (Cooke et al. 2011; Belot et al., 2013; Just and Price, 2013a, 2013b; List and Samek, 2015).

In addition to the work by researchers, anecdotal evidence points to the successful use of conditional gifts in school settings and in parenting. For instance, 'sticker charts,' handing out stickers as rewards for good behavior, are popular.[6] However, according to the theory of reciprocity, conditional incentives may be perceived by Player 2 as 'less kind' than unconditional incentives, since conditional incentives induce a 'cost of control.' As noted by some authors (e.g., Falk and Kosfeld, 2006), conditional incentives may be less effective due to a decrease in the perception of autonomy on behalf of the agent.[7] From an implementation standpoint, unconditional incentives require less oversight, so if incentive cost is low and time cost is high, they may be more cost-effective than conditional incentives.

2.2 Self Control and Goal-Setting

Models incorporating self-control problems are among the most prominent in behavioral economics (Laibson, 1997; O'Donoghue and Rabin, 1999; Gul and Pesendorfer, 2001; Fudenberg and Levine, 2006). The dynamically inconsistent

[6] See article in Psychology Today on this topic, https://www.psychologytoday.com/blog/dont-worry-mom/201408/the-dos-and-donts-the-sticker-chart.

[7] Note that some studies do not find a cost of control, notably Landry et al. (2011) who find a positive effect of conditional incentives relative to unconditional incentives in the charitable giving context.

preferences theorized by these models provide impetus for the observed divergence between planned and actualized decisions when it comes to health related behavior such as diet and exercise. A related paper investigating dynamic inconsistency of adults in the food purchasing domain shows that at least 20% of individuals are dynamically inconsistent, and 33% are willing to take up a binding commitment device to constrain themselves to future healthy purchases (Sadoff et al., 2015).

Allowing individuals to set a goal to eat healthy is akin to providing the opportunity to take up a commitment device, with the only difference being that goals are non-binding. According to the recent models of Koch and Nafziger (2011) and Hsiaw (2013), endogenously set goals provide a reference point for an agent, such that as long as there is sufficient commitment to the goal, goal-setting should mitigate dynamic inconsistency. Just like with the take up of binding commitment, we expect that some children will take up the goal-setting and others will not. Thus, we predict that:

Prediction 2: Allowing children to set goals will increase the likelihood of following through with the 'healthy activity.'

Prediction 2 holds in the aggregate as long as a positive number of children choose to set a goal. We evaluate the validity of Prediction 2 using 'intent-to-treat' analysis in which all children in the GOAL treatment are compared to all children in the control group, regardless of whether children chose to set a goal.

In related work, Raju et al. (2010) investigated the long-term impact of incentives and pledges on fruit and vegetable choices in schools. However, the authors did not test the impact of pledges separate from incentives, nor were pledges voluntary. Hanks et al. (2013) found positive impact of pre-ordering on food choice, though unlike goal-setting,

pre-ordering is a binding commitment and choosing to pre-order came with additional perks in their study (like a shorter lunch-line). To the best of our knowledge, this paper is the first to test goal-setting as a stand-alone intervention in child food choice.

2.3 The Role of Schools and Education on Healthy Eating

The school environment has been used in field experiments to investigate the effects of changing food presentation (Wansink and Just, 2011; Smith et al., 2013), taking advantage of marketing techniques by giving foods 'attractive names' (Wansink et al. 2012), point-of-sale prompts (Schwartz, 2007) and the effects of monetary incentives (Cooke et al. 2011; Belot et al., 2013; Just and Price, 2013a, 2013b; List and Samek, 2014). Researchers have also evaluated the 'Food Dude' program, which includes peer-modeling videos combined with rewards, and found it to be effective for kids ages 4-11 both in Europe and in the U.S. (Lowe et al., 2004; Horne et al., 2009; Wengreen et al., 2013).

Researchers have also investigated the use of educational interventions to affect food choice. Gortmaker et al. (1999) utilized a field experiment to investigate the impact on weight of a 2-year, school-wide educational intervention called Planet Health. Gortmaker et al. (1999) found that Planet Health decreased the prevalence of obesity among girls. Shorter messaging has also been explored. In some studies, simple verbal prompts have been successfully used to encourage children to choose healthier meals. When cafeteria workers asked children whether they would like a fruit, the number of children consuming fruit increased significantly (Schwartz, 2007; Perry et al., 2004). However, evidence is mixed as in another study, short educational prompts delivered by

research assistants had no effect on dessert choice (List and Samek, 2015). Educational messages were also ineffective in a study of adults' food shopping behaviors (List et al., 2015).

Most studies above, as well as our study, use the school lunchroom to evaluate child food choice. The meals provided by schools in the lunchroom are part of the United States Department of Agriculture (USDA) National School Lunch Program. The National School Lunch Program is an especially good place to reach low-income children, who are at higher risk of obesity than their higher income counterparts (Neumark-Sztainer et al., 1996; Cole and Fox, 2008). Many low-income children are eligible for Free and Reduced Lunch, and frequently eat the school-provided lunch.

3. Experimental Environment

3.1 Experimental Setup & Procedures

The field experiments were conducted in the school lunch program in Chicago Heights School District 170 with 8 schools, 90 classrooms and a total of 1,483 children grades K-6 participating. Chicago Heights has 31,000 residents with a mean household income of $14,963. Over 90% of students in these districts qualify for the National Free or Reduced School Lunch. We find that in these schools, about 50% of students are overweight and 23% are obese by WHO standards.[8] These districts have significant

[8] These statistics were gathered in the Fall of 2009 at the beginning of a nutritional pilot study in which the height and weight of a representative sample of over 140 children were measured.

populations of minority students, including African-American (37.5%) and Hispanic (23.8%) students.[9]

During a typical lunch period, children arrive by classroom and proceed to the cafeteria line. As children go through the cafeteria line, they receive the requisite main menu item, required side items, and then proceed to select milk. According to guidelines set by the USDA, schools are required to provide students with two milk options – while options are left to the district, many districts choose to provide a white and a chocolate milk option. We learned from the lunchroom administrator in the district that chocolate milk is often chosen as an option at schools despite its greater sugar content relative to white milk, because most children prefer it. However, the lunchroom administrator in our district was eager to learn how to encourage students to take the white milk rather than the chocolate milk.

We visited schools two times. On Day 1, research assistants took a baseline measure of milk decisions for all children in the study. On Day 2, teachers implemented the intervention in their classrooms immediately prior to lunch, and research assistants again took measures of milk decisions for all children in the study.

Students were not told that they were in an experiment and made decisions in the lunch-line as they normally would. Since a point-of-sale system is not available at our schools, on each day research assistants were stationed at the lunch-line exit, where they tallied up milk choices by classroom. Research assistants were instructed to remain as unobtrusive as possible when counting milk.

[9] Source: U.S. Census Bureau – State and County QuickFacts. Data derived from Population Estimates, 2000 Census of Population and Housing.

3.2 Experimental Design

We randomized students at the classroom level to one of three different treatment groups – GIFT, GOAL and CONTROL. The procedures for the three groups were nearly identical, and differed only in the actions teachers took in classrooms prior to lunch. While no intervention was carried out in the classroom on Day 1, on Day 2 we instructed teachers to pass out a message written on a card, read it out loud (all treatments) and implement an action (GIFT and GOAL treatments only). Table 1 provides a summary of the experimental treatments, and the instructions are available in the appendix.

Table 1: Summary of Experiment

	Day	Description of Classroom Interventions		
Pre-Treatment	1	No intervention in classroom for any treatment.		
Treatment	2	**CONTROL** Educational message. 27 classrooms.	**GIFT** Educational message & 'thank you' sticker. 30 classrooms.	**GOAL** Educational message & option to set goal. 33 classrooms.

Note: This table provides a summary of each experimental treatment, including the number of classrooms randomized to each treatment.

Because the GIFT and GOAL treatments required children to have some health information in order to know what to do, all treatments including the CONTROL treatment came with an educational message. We did not expect the educational message to have a large effect on behavior (since no effect was not found in related work, e.g., List and Samek, 2015; List et al., 2015). The following message was read in the CONTROL treatment:

> *Every day in the lunchroom, you get a choice between chocolate milk and plain white milk. One way to stay healthy is to choose white milk instead of chocolate. It*

has less sugar, so it is better for you!

In addition to the educational message above, the GIFT treatment also included the message below, followed by teachers passing out smiley face stickers to each student:

Just as a thank you for choosing healthy today, you get a sticker!

The GOAL treatment included the educational message, followed by the message below:

> *I'm going to pass out these cards where you can write down your goal to drink white milk today. Please decide whether you will make a goal or not. You should mark it down with a pen or pencil BEFORE we go down for lunch*

The message was followed by passing out goal-setting cards, which looked like the following:

Please make a goal now:
[ ] Yes! I will choose healthier white milk today
[ ] No, I will not choose healthier white milk today

In the GOAL treatment, children could either make a goal to eat healthier or not, and were also given the option not to turn in their card at all or to turn in a blank card. Goals were to be made prior to going down to lunch. Since cards are anonymous, we do not link specific children to their goal; instead, we compare the total number of healthy goals and the number of white milk choices made in this treatment, by classroom.

4. Results

4.1 Summary of Data

Table 2 provides a summary of the children who participated in each treatment. A total of 90 classrooms (representing 1,469 students on Day 1 and 1,483 students on Day

2) participated in both days of the experiment.[10] Day 1 was the baseline day and the treatment was implemented on Day 2 (GIFT and GOAL).

Table 2: Number of Observations

Treatment	Day 1 # Students	Day 1 # Classes	Day 2 # Students	Day 2 # Classes	Average Grade
CONTROL	469	27	429	27	2.68
GIFT	498	30	524	30	2.83
GOAL	502	33	530	33	3.03

Note: Due to student absences and the absence of some classrooms from both days of the study, the number of students is not equal across days. The average grade is calculated by giving Kindergarten a 0 and averaging by classroom (not by number of students).

4.2 Milk Choice on Days 1 and 2

Our main outcome measure is the proportion of children choosing the healthier white milk, relative to the total number of children walking through the lunch-line and picking up any milk. Recall that children have only two choices in this school district: white milk, or chocolate milk. Children could also elect to take no milk, which we also document and include in our denominator. At baseline (Day 1, all treatments) 85.6% choose chocolate milk, 11.0% choose white milk and 3.4% choose no milk.

The proportion of children choosing white milk rises considerably on Day 2 when the educational message is read – in the CONTROL treatment, the proportion choosing white milk goes up to 47.8% (the proportion choosing neither milk remains similar to Day 1 at 4.4%). This increase is most likely due to the educational message. The result is different from some previous work that found no effect of a message utilizing the USDA

[10] We identified 112 eligible classrooms in the district. However, some classroom data is missing due to data collection and implementation errors, such as the teacher not checking his/her mailbox to receive the materials to be read, or logistical issues in reaching all classrooms for the intervention within the same relatively short time period. On Day 1, we missed collecting data on 7 classrooms. On Day 2, 15 teachers did not receive the scripts to read on time and therefore these classrooms are excluded from the study.

Food Pyramid on the choice of cookies versus fruit (List and Samek, 2015). Of course, there are several differences between this work and the work of List and Samek (2015). While in List and Samek (2015), research assistants read the message, in our study we rely on the teacher to read the message during class. Since the teacher may be considered a trusted authority figure, the educational message may have greater credence when read by a teacher.[11] Note that since the effect of educational messaging was not the purpose of our study, we did not have a control group on Day 2 that received no messages. Therefore, our result should be interpreted with caution: other factors, such as the act of being observed on Day 1, could be driving the increase in white milk choice.

Since we randomized classrooms to treatment in advance of the intervention, we do not expect to find differences in proportion of children choosing white milk on Day 1. However, we do observe some differences, so care is taken in the next sub-section to control for this. In CONTROL, 8.3% of children select white milk, compared to 14.9% of children in GIFT and 9.8% of children in GOAL. While GOAL is not significantly different from CONTROL (Pr test $p>0.10$), GIFT is higher than CONTROL and GOAL, and the difference is statistically significant (Wilcoxon-Mann-Whitney $p<0.01$ and 0.02, respectively).[12]

4.3 Treatment Effects

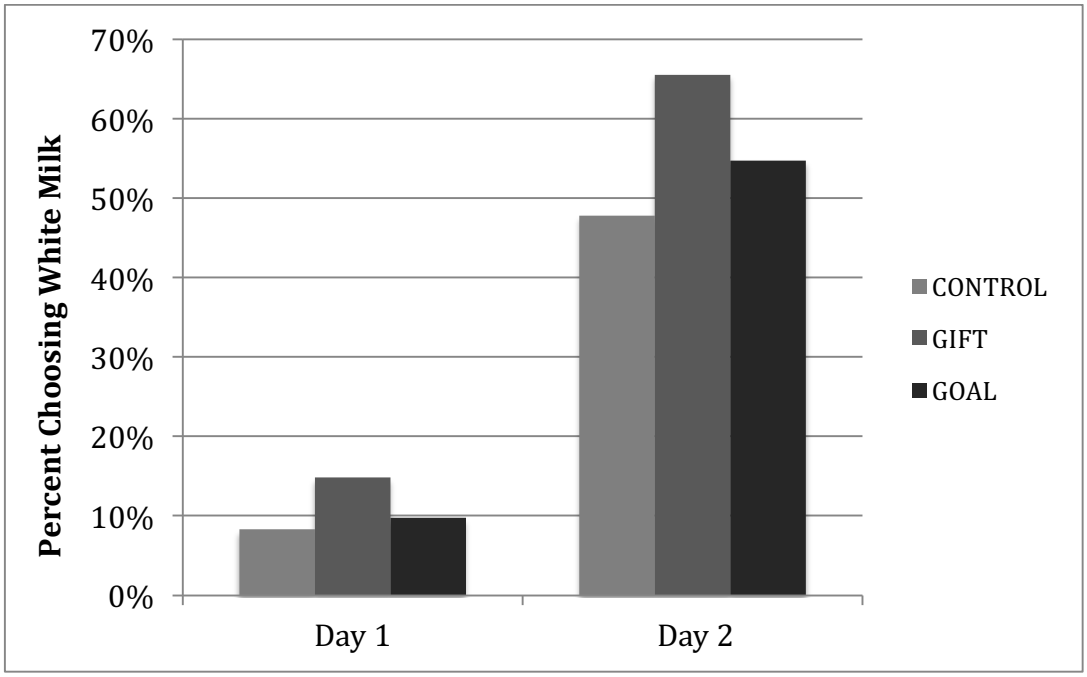
We now investigate the causal effect of GIFT and GOAL treatments on milk choice on Day 2. The proportion of CONTROL group children choosing white milk on

[11] Other differences between our work and that of List and Samek (2015) are the outcome measures (snacks versus milk choice) and the setting (after-school program versus classroom and school cafeteria).

[12] While ideally randomization should have been conducted after Day 1 data was collected to assure balance on observables at baseline, this was not feasible since the school asked us to give teachers their materials on Day 1 so they would be prepared to read their treatment script.

Day 2 is 47.8%. The proportion is significantly higher in GIFT and GOAL, at 65.5% and 54.8%, respectively (Pr test $p<0.01$ for GIFT vs. CONTROL and $p=0.03$ for GOAL vs. CONTROL). In addition, the proportion is significantly higher in GIFT versus GOAL (Pr test $p<0.01$). Figure 1 displays the percentage of children choosing white milk in Day 1 and Day 2, by treatment. Note that the percentage point increase from Day 1 to Day 2 is 39.5% in CONTROL, 50.6% in GIFT, and 45.0% in GOAL. The proportion of children choosing neither milk on Day 2 is 4.4% in CONTROL, 2.7% in GIFT and 6.2% in GOAL, with GOAL being statistically significantly higher than GIFT (Pr test $p<0.01$) but not significantly different from CONTROL.

Figure 1: Percentage of Children Choosing White Milk, by Treatment



Note: This figure displays the percentage of children choosing white milk on Days 1 and 2 of the experiment, by treatment.

Recall that students are randomized to treatment at the classroom level, which is also the level at which data is collected. Treating the classroom as the independent unit of

observation, we conduct a series of regressions with proportion of children choosing white milk, relative to all children getting milk, as the dependent variable. As seen in Table 3, controlling for proportion choosing white milk at baseline, the GIFT treatment increases the proportion of children choosing white milk by about 15 percentage points ($p<0.05$). Interestingly, the unconditional gift is equally effective for all ages of children in the sample – the interaction coefficient on Grade*GIFT is small and insignificant in specification (3). We may have otherwise believed that stickers interest younger kids more than older ones. Finding that stickers work for all ages is promising from a policy standpoint as even older kids may benefit from a low-cost intervention like this one. It may even be the case that it is the act of receiving the sticker, rather than the sticker itself, that changed behavior. This brings us to the first result:

Result 1: In line with Prediction 1, unconditional gifts result in a significantly greater proportion of children choosing white milk.

The GOAL treatment also shows promise, since the GOAL dummy shows increases in the proportion of children choosing white milk by about 10 percentage points. This result is statistically significant at the 10% level. Introducing interaction effects, as in specification 3, strengthens the result and gives us more insight into the types of children affected by the GOAL treatment. As seen by the negative and marginally statistically significant coefficient on Grade*GOAL, it is the youngest kids who are most affected by the GOAL intervention. Introducing the Grade*GOAL interaction also increases the significance of the GOAL dummy ($p<0.01$). This brings us to the next result:

Result 2: In line with Prediction 2, allowing children to set goals significantly increases the proportion of children choosing white milk, and this effect is strongest for the younger children in our study.

Table 3: Treatment Effects on White Milk Choice, by Classroom

	(1) White Milk Choice	(2) White Milk Choice	(3) White Milk Choice
GIFT Dummy	0.158**	0.150**	0.255*
	(0.0555)	(0.0450)	(0.109)
GOAL Dummy	0.100*	0.105*	0.206***
	(0.0496)	(0.0530)	(0.0580)
Baseline Choice	0.518*	0.539*	0.561*
	(0.262)	(0.253)	(0.253)
Grade Level (0-6)		8.98e-05	0.0269*
		(0.0119)	(0.0139)
Grade*GIFT			-0.0392
			(0.0339)
Grade*GOAL			-0.0366*
			(0.0180)
Constant	0.442***	0.434***	0.361***
	(0.0407)	(0.0604)	(0.0601)
Observations	90	87	87
R-squared	0.166	0.164	0.182

Note: The table uses Ordinary Least Squares regressions of treatment effects on white milk choice, conditional on choosing any milk, classroom level with school clusters. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Note that the proportion of children choosing white milk in Day 1 is a strong predictor of the proportion choosing white milk on the intervention day (coefficient of around 0.5 and significant at the 10% level for all specifications). Finally, while the coefficient on GIFT is higher than GOAL, GIFT and GOAL are not significantly different (post-estimation test *p*-values > 0.10).

4.4 Goal Utilization

Thus far, we have looked only at the impact of the *opportunity* to set a goal on milk choice. Now, we consider which children choose to set goals. First, we see that 94.1% of children choose to set a goal. Out of those children making a goal, 64% set the white milk goal, while the remaining children did not set a goal. The number of children setting the goal of white milk is much higher than the number of children choosing white milk on Day 1 (9.75% in the GOAL treatment) and also higher than the number of children who choose white milk on Day 2 in the CONTROL group (47.8%).

The number of children setting a white milk goal is also higher than the number of children actually choosing white milk in the GOAL treatment on Day 2 (54.8%), suggesting that not all children who set the white milk goal follow through. In the GOAL treatment, our data allow us to link the goals that children set to their milk choice; therefore, we are able to report that 88.7% of children making the goal to choose white milk follow through. On the other hand, 88.9% of children who marked that they did not want to set a goal chose the alternative beverage, the chocolate milk.[13] The result that not every child who chose a goal followed through could be interpreted as evidence of dynamic inconsistency, since the choices children want to make for their future self (as evidenced by the goals they set) are sometimes different than the choices that children actually make (as evidenced by their choice of milk in the cafeteria), even when those choices are separated in time by only a few minutes. On the other hand, the result can also be interpreted as evidence for the effectiveness of simple, non-binding self-control mechanisms such as goal-setting, since only 11% of children did not follow through with

[13] Of those children who left the goal sheets blank, 22.7% choose white milk, 27.3% choose chocolate milk, and the remainder (50%) do not pick up any milk.

their goals. Future work could consider the effectiveness of goal setting when the goal and choice are further separated in time, such as hours or days apart.

Table 4: Relation of Goals and Follow-Through (GOAL treatment only)

	(1) Follow-Through
Grade (0-6)	0.0558**
	(0.0209)
% White Milk Goal	0.425**
	(0.132)
% White Milk Goal * Grade	-0.0902***
	(0.0240)
Constant	-0.233**
	(0.0974)
Observations	34
R-squared	0.263

Note: The table uses Ordinary Least Squares regression. The dependent variable is the difference in the proportion of children setting a white milk goal and those actually choosing white milk. This regression uses classroom as a unit of observation and clusters errors at the school level. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Next, we consider whether various factors, such as grade level and choices at baseline, affect the willingness to set a goal to choose white milk. As may be expected, classrooms with a higher proportion of children choosing white milk at baseline also have a higher proportion of children setting the goal to choose white milk on Day 2, and the result is marginally statistically significant (Spearman coefficient = 0.33, $p = 0.06$). There is no impact of grade level on the choice to select white milk (coefficient = -0.09, $p>0.10$), and there is no impact of grade or milk choice at baseline on the willingness to set any goal (Spearman coefficient -0.00 and 0.03, p-values > 0.10, respectively). This result is interesting in light of the earlier finding that the GOAL treatment is more likely to affect younger kids (see Table 3, Specification 3).

To investigate the correlation between goal setting and follow-through, Table 4 provides a regression where the dependent variable is the difference between the proportion of children who set the goal of white milk and the proportion of children who eventually choose white milk.

5. Discussion & Conclusion

We set out to investigate the impact on child food choice of two of the most prominent behavioral theories in the economics literature – reciprocity and theories of self-control problems, which to date remained unexplored in our setting. For academics, our results highlight the presence of reciprocal preferences in a health domain, as children responded to our unconditional incentives by being about 15 percentage points more likely to choose white milk. Our results also provide evidence for the dynamic inconsistency in food choice among children (what kids want to do as evidenced by the goal is not what they actually do in the cafeteria) and for the power of non-binding commitment devices to help children follow through. Children were about 10 percentage points more likely to choose white milk when given the option to set a goal to do so, and the younger children were most affected by this treatment. The goal was also utilized by the children: about 60% set a goal to choose the healthier white milk, and 88% followed through with their goal to do so.

While one could simply dictate what foods go on a child's plate in this setting, research finds that children who choose healthy foods on their own consume more of those foods and waste less than if they were required to take the foods (Hakim and

Messein, 2013; Hanks et al., 2013).[14] For practitioners, our results provide new directions for potentially cost-effective and scalable behaviorally motivated interventions. Implementation of either one of these interventions, either through giving children small, unconditional gifts – stickers – or by allowing children to set goals prior to lunch, could be scalable and cost-effective for schools. For instance, the only cost of goals is the paper the goal is written on, whereas the stickers we used in the experiment cost us less than $0.03 each.

Also important for policy and practice is the impact of educational messages delivered by teachers on decision-making in our setting. Educational messages seem to have increased the likelihood of choosing white milk four-fold. This result is surprising in light of some related work showing that education has little effect (e.g., List and Samek, 2015), yet plausible since education delivered by an authority figure such as a teacher may be more effective than education delivered by a cafeteria worker or research assistant. However, the effect should be interpreted with caution, since it may be confounded by experimenter demand (Zizzo, 2010), as children could have altered their behavior on Day 2, upon being observed by researchers on Day 1. We cautiously conclude that schools wishing to improve food choice would do well to engage teachers in promoting healthy behaviors at lunch. Given the mixed results in the literature, the impact of educational messaging on child food choice should be further explored.

A natural question is whether the gifts and goals would be effective if implemented in the long-term: we leave this question to future research. Considering the ease with which the intervention is implemented, schools that utilize a point-of-sale

[14] Conversely, Zeinstra et al. (2010) conducted a study on choice using a sample of Dutch children and did not find an overall effect, but did find an effect for children who are more sensitive to pressure.

system that automates data collection would be particularly well-suited for such an experiment. Given the success of this intervention for milk choice, future work could also consider the role of goal-setting and unconditional incentives on other health-related decisions made by children in a school setting, such as the choice of side items at lunch or the choice to spend time exercising during recess. It is possible that gifts and goals would lose their value and become less effective over time – which would suggest that short term or periodic utilization is best. On the other hand, these interventions may also be habit forming, leading to persistent positive effects – which would suggest that daily utilization of the interventions is the key to improving child food choice in this setting.

Recent years have seen an increase and interest in using behavioral insights to inform policy and practice. For example, the powerful effect of conditional incentives has been well-documented. Researchers have also incorporated marketing strategies in their aim to increase healthy eating behaviors. Here, we documented the impact of two behavioral interventions based in reciprocity and goal-setting. Our sample consisted of over 1,400 children from low-income households in the Chicago Heights, Illinois school district, who may be at highest risk for poor nutrition. The results provide insights for academics, suggesting that young children exhibit reciprocity and demand for commitment. The results also provide practical implications, since such interventions could be readily scaled up in classrooms.

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Appendix A – Experiment Scripts/Hand-outs

1. Verbal Messages (read by teacher)

Education

Before we go for lunch today, I want to share with you a fact about healthy eating. Every day in the lunchroom, you get a choice between chocolate milk and plain white milk. One way to stay healthy is to choose white milk instead of chocolate. It has less sugar, which is better for you!

I'm going to pass out these cards that tell you about the benefits of lowering the sugar in your drinks.

Please return these cards in the lunchroom after you go through the lunch line.

If you do not want to participate, you do not have to.

Ok lets go.

Gift

Before we go for lunch today, I want to share with you a fact about healthy eating. Every day in the lunchroom, you get a choice between chocolate milk and plain white milk. One way to stay healthy is to choose white milk instead of chocolate. It has less sugar, which is better for you!

I'm going to pass out these cards that tell you about the benefits of lowering the sugar in your drinks. Also, just as a thank you for choosing healthy today, everyone will get a sticker (pass out stickers).

Please return these cards in the lunchroom after you go through the lunch line.

If you do not want to participate, you do not have to.

Ok lets go.

Goal

Before we go for lunch today, I want to share with you a fact about healthy eating. Every day in the lunchroom, you get a choice between chocolate milk and plain white milk. One way to stay healthy is to choose white milk instead of chocolate. It has less sugar, which is better for you!

I'm going to pass out these cards where you can write down your goal to drink white milk today. Please decide whether you will make a goal or not. You should mark it down with a pen or pencil BEFORE we go down for lunch.

Please return these cards in the lunchroom after you go through the lunchline.

If you do not want to participate, you do not have to.

Ok lets go.

2. Hand-outs (passed out to each child)

Education

Did you know?

Every day in the lunchroom, you get a choice between chocolate milk and plain white milk. One way to stay healthy is to **choose white milk instead of chocolate**. It has less sugar, so it is better for you!

Gift

Did you know?

Every day in the lunchroom, you get a choice between chocolate milk and plain white milk. One way to stay healthy is to **choose white milk instead of chocolate**. It has less sugar, which is better for you!

Just as a thank you for choosing healthy today, you get a sticker! ☺

Goal

Did you know?

Every day in the lunchroom, you get a choice between chocolate milk and plain white milk. One way to stay healthy is to **choose white milk instead of chocolate**. It has less sugar, which is better for you!

Please make a goal now ☺

☐ Yes! I will choose healthier white milk today

☐ No, I will not choose healthier white milk today

3. Note to teachers (all treatments)

Note to teachers: Be sure that all participating children take their cards with them. Please do not tell children that this is a study. We want to see what children actually do – children behave differently if they know we are checking on them! If any children leave their cards in the classroom, please leave them in your room on your desk and we will come collect them at the end of the day today. IMPORTANT: Children can choose not to participate if they do not want to. If they do not want to participate, they should not take a card.

Appendix B – Additional Data Analysis

Table B1: Proportion of Children Choosing White Milk, Unconditional

	(1) White Milk Choice	(2) White Milk Choice	(3) White Milk Choice
GIFT Dummy	0.140*	0.131**	0.200*
	(0.0644)	(0.0544)	(0.0960)
GOAL Dummy	0.0885	0.0936	0.216***
	(0.0498)	(0.0512)	(0.0508)
Baseline Choice	0.573*	0.603**	0.596*
	(0.270)	(0.246)	(0.258)
Grade Level (0-6)		-0.00195	0.0243
		(0.0124)	(0.0138)
Grade*GIFT			-0.0255
			(0.0264)
Grade*GOAL			-0.0434*
			(0.0210)
Constant	0.417***	0.415***	0.345***
	(0.0367)	(0.0596)	(0.0553)
Observations	91	88	88
R-squared	0.151	0.149	0.168

Note: Regressions of treatment effects on white milk choice, denominator is total number of kids, classroom level with school clusters. Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1