

# Behavioral Food Subsidies\*

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August 8, 2019

We conduct a pre-registered field experiment with low-income grocery shoppers to study how behavioral interventions can be leveraged to improve the effectiveness of subsidies for healthy food purchases. Our unique design enables us to elicit choices between subsidies and deliver subsidies both *before* and *at* the point of purchase. We examine the effect of two non-restrictive changes to the choice environment: giving shoppers greater agency over the choice of subsidies and introducing a waiting period before the shopping trip to prompt deliberation about the subsidy and food purchasing decision. When combined, these changes substantially increase the effectiveness of subsidies, increasing healthy purchases by 61% relative to a restricted healthy food subsidy and 199% relative to an un-subsidized control group. Given the low cost and potential scalability of our interventions, our findings have significant implications for policy and intervention design.

KEYWORDS: agency, deliberation, nutrition, choice architecture, waiting periods, field experiment

JEL Classifications: D9, D12, C93

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\*We sincerely thank the Robert Wood Johnson Foundation for providing funding and valuable feedback. Pre-registration at AsPredicted.org (<http://aspredicted.org/blind.php?x=u4r8yp>). Many thanks to Marilyn Soukup and the team at Field Agent for their incredibly hard work on the program implementation. We also received excellent research assistance from Mohammed Ibrahim.

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# 1 Introduction

A growing literature has documented extensive socioeconomic inequality both in developing (Alvaredo, Assouad, and Piketty 2017) and developed countries such as the U.S. (Piketty and Saez 2014). Inequality in nutrition has received particular attention from both scientists and policy makers because dietary differences are viewed as both a downstream consequence of economic inequality (Drewnowski and Specter 2004), and as a contributor to its persistence (Wolf 2012). Poor diets are now 25% more likely for low-income than higher-income individuals (Rehm, Peñalvo, Afshin, and Mozaffarian 2016). Research suggests that this dietary inequality is due to differences in demand, so supply-side interventions may be limited in their ability to mitigate this gap (Allcott, Diamond, and Dubé 2017). Although government programs such as the Supplemental Nutrition Assistance Program (SNAP) have been shown to have beneficial long-run health consequences (Hoynes, Schanzenbach, and Almond 2016), the observed diet quality of participants remains low: fruit (vegetable) consumption among SNAP participants is 50% (58%) of the recommended intake, as compared to 74% (66%) for higher-income non-participants (Cole and Fox 2008).<sup>1</sup>

Recent work has examined the effectiveness of offering direct food subsidies on purchases of healthy food (Bartlett, Klerman, Wilde, Olsho, Logan, Blocklin, Beauregard, and Enver 2014; Harnack, Oakes, Elbel, Beatty, Rydell, and French 2016). Restricting subsidies to a limited set of foods such as fruits and vegetables is a natural extension of recent proposals to improve nutrition through more paternalistic changes in food assistance (Schwartz 2017).<sup>2</sup> Studies on such restricted subsidies have found positive effects. For example, the USDA conducted an experiment testing subsidies for fruits and vegetables during the winter of 2011-2012 (Bartlett et al. 2014) and found that restricted subsidies significantly increased purchases of fruits and vegetables. The goal

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<sup>1</sup>Data are from the 1999-2004 National Health and Nutrition Examination Survey.

<sup>2</sup>See, for example, recent proposals to offer in-kind SNAP benefits in the form of USDA Foods Packages (<https://www.npr.org/sections/thesalt/2018/02/12/585130274/trump-administration-wants-to-decide-what-food-snap-recipients-will-get>) or to restrict SNAP purchases to nutritious foods (<https://www.brookings.edu/testimonies/pros-and-cons-of-restricting-snap-purchases/>).

of the current paper is to study how non-restrictive behavioral interventions can be used to increase subsidy effectiveness. We explore two mechanisms meant to promote future-focused decision-making in food purchases: increased agency over subsidies and introducing a waiting period to prompt deliberation over food choices. We increased agency by allowing shoppers to choose between healthy and unhealthy subsidies (as opposed to restricting them to the healthy one). We introduce a waiting period by adding a delay between being reminded about the future subsidy and the shopping trip itself.<sup>3</sup> We find that behavioral subsidies that leverage our interventions *triple* purchases of healthy food relative to a control group. Importantly, the interventions increase healthy food spending by more than 60 percent relative to a subsidy that is *restricted* to being spent on healthy food.

We explore the effectiveness of behavioral food subsidies through field experiment with low-income grocery shoppers that utilizes a unique mobile platform (Field Agent). This platform allows us to push subsidies directly to shoppers’ smartphones. Importantly for our design, we are able to dispatch information both before shopping and at the point of purchase – in the aisle of the grocery store – and elicit choices between subsidies at both points in time. By implementing these choices, the platform allows us to test for the impact of increased agency. Moreover, by manipulating the timing of the information relative to the shopping trip, we can use the platform to introduce a waiting period between information about a prospective choice and the choice itself. After shoppers complete their grocery shopping, the Field Agent platform collects pictures of shopping receipts to track actual purchases and calculate subsidy payments.

We find that “healthy” subsidies for fruits and vegetables (“FV,” hereafter) are very effective at increasing FV spending. Relative to a control group that did not receive any subsidies, shoppers receiving FV subsidies spent 124% more on FV. Importantly, and in contrast to predictions of standard economic theory, the effectiveness of these subsidies does not decrease when shoppers are given a choice between a FV subsidy

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<sup>3</sup>We define a waiting period as a delay between information about a prospective choice and the choice itself. See [Imas, Kuhn, and Mironova \(2018\)](#) for further discussion of terminology and mechanism.

and an “unhealthy” subsidy for baked goods (“BG,” hereafter). In fact, the marginal impact of this agency intervention is a 21 percent *increase* in the effectiveness of the subsidy. The marginal effect of a waiting period is an additional 28 percent increase in FV expenditures. Combined, our interventions led to a more than 60% increase in healthy purchases over the restricted subsidies.<sup>4</sup> These “behavioral subsidies” increased FV spending by 199% (1.23 standard deviations (SD)) over the control group.

Our interventions build on recent theoretical and empirical advances in behavioral science. As we formally demonstrate in Section 3, standard economic theory fails to predict the observed increases in FV spending from agency and waiting periods. Expanding the subsidy choice set with increased agency should weakly increase the average prices of FV relative to BG and result in decreased FV spending. Introducing a waiting period should have no impact. They provide no new information to the shoppers, and there is no reason to expect that new information about shopping that arrives during the waiting period is systematic. Instead, they simply shift information across time while maintaining the timing of the shopping choice and consumption.

Work in psychology and behavioral economics suggests that agency may increase FV purchases by leveraging a demand for behavior that is consistent with prior choices. Conditional on the majority of shoppers choosing the FV subsidy (as is the case in our experiment), FV spending will increase through a preference for behavior that is consistent with the prior subsidy choice.<sup>5</sup> The “foot-in-the-door” paradigm of [Freedman and Fraser \(1966\)](#) illustrates this effect. The authors asked people to complete a relatively burdensome task. Prior to this request, one group was contacted with a simple request to which the vast majority consented. The other group experienced a similar setting without choice. The authors found that those who agreed in the first stage behaved consistently with their initial acquiescence and were more likely to agree to the larger subsequent request than those who were not asked to make a choice in the

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<sup>4</sup>The vast majority of shoppers choose the healthy subsidy when given the option, and this proportion is constant across treatments.

<sup>5</sup>78% of our shoppers chose the healthy subsidy. If the majority chose the unhealthy subsidy, these predictions would not hold.

first stage. Subsequent work has shown that the tendency to act consistently is driven by a change in attitude towards the target act (Bem 1967; Gneezy, Imas, Brown, Nelson, and Norton 2012). Falk and Zimmermann (2018) and Benabou and Tirole (2004) propose theoretical frameworks which aim to microfound this mechanism through differential information processing or self-signaling, respectively. Falk and Zimmermann (2018) argue that an initial active choice affects information processing such that new, challenging information is ignored, leading to behavior that is more in-line with the initial decision. Benabou and Tirole (2004) propose a self-signaling model where individuals are uncertain about their underlying preferences and infer them from their prior choices. Here, a shopper would increase FV spending if she had previously chosen to subsidize those items, inferring that she must be the type who benefits more from eating healthy (Benabou and Tirole 2011).

Pairing subsidies with waiting periods is motivated by recent empirical work showing that waiting periods lead to substantially more forward-looking choices (Dai and Fishbach 2013; DeJarnette 2018; Imas et al. 2018). In Imas et al. (2018), people were given an intertemporal choice either immediately after information about it or after a waiting period. Across multiple domains – effort over time and consumption goods – they made more patient, forward-looking decisions with a waiting period than without one. Similarly, Dai and Fishbach (2013) demonstrate that waiting periods increase willingness to wait for larger rewards and DeJarnette (2018) shows that they increase the likelihood of healthy snack choices. Importantly, we are the first to provide an experimental test of waiting periods as a policy tool in the field.<sup>6</sup>

In our experiment, waiting periods were introduced through the delivery of healthy subsidy information prior to the upcoming shopping trip. This information was not new to the shoppers – they were told about the healthy subsidies, which do not change, at the beginning of the program – and the intervention was repeated multiple times throughout the relevant treatment arm. We tested the efficacy of waiting periods both

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<sup>6</sup>Both Koenig and Schindler (2016) and Luca, Malhotra, and Poliquin (2017) use observational data to provide policy-tests of waiting periods for gun ownership.

when shoppers made the subsidy choice upon receiving the information at the start of the waiting period (“Early Choice”) and when shoppers made the subsidy choice after the waiting period directly before the purchase decision (“Delayed Choice”). Despite not providing new information, the framework of [Gabaix and Laibson \(2017\)](#) predicts that waiting periods should prompt deliberation and prospection about the utility consequences of future outcomes. This process should lead to choices that are based on less noisy forecasts of future utility that are more in-line with a person’s underlying goals such as healthier eating.<sup>7</sup> Moreover, choosing a subsidy early should allow shoppers to narrow the set of potential future outcomes, leading to even more goal-oriented choices.<sup>8</sup> Indeed, we find that despite observing the same proportions of healthy subsidy choices across all treatments, shoppers in the Early Choice waiting period condition spent the most on FV, over 60% more compared to the restricted FV subsidy and 20% more than those in the Delayed Choice waiting period condition.

Our findings contribute to the literature on using insights from psychology and behavioral economics to develop interventions in policy-relevant domains. In a recent paper, [Gosnell, List, and Metcalfe \(forthcoming\)](#) ran a field experiment testing the effectiveness of behaviorally motivated incentive schemes on the productivity of airline pilots, finding that they had significant positive impacts relative to standard practices. Similar approaches have been taken to improve outcomes in the domain of resource management ([Hahn, Metcalfe, Novgorodsky, and Price 2016](#)), education ([Brownback and Sadoff 2018](#); [Levitt, List, Neckermann, and Sadoff 2016](#)), health ([Volpp, John, Troxel, Norton, Fassbender, and Loewenstein 2008](#)), and tax collection ([Hallsworth, List, Metcalfe, and Vlaev 2017](#)). We add to this line of work by designing and implementing novel interventions in a policy-relevant domain: subsidizing healthy food

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<sup>7</sup>More than 83% of shoppers in our sample report a desire to increase their FV consumption.

<sup>8</sup>Note that the Early Choice treatment can also change purchase behavior by affecting the subsidy choice. Shoppers may be tempted to select the unhealthy subsidy if it immediately precedes the purchase decision as a result of hyperbolic time-preferences; by separating purchasing from subsidy choice, the Early Choice treatment allows these individuals to ‘pre-commit’ to the healthy subsidy. As discussed further in Section 4, we find no evidence for this type of dynamic inconsistency in subsidy choice: the proportion of shoppers selecting the healthy subsidy is essentially constant across treatments.

purchases. These interventions are also unique in that they do not saddle the provider with additional costs beyond the subsidy payments. Our findings also contribute to the literature on using non-paternalistic interventions to spur behavior change (Johnson, Shu, Dellaert, Fox, Goldstein, Häubl, Larrick, Payne, Peters, Schkade et al. 2012; Jung and Mellers 2016; Thaler and Sunstein 2009). We add to this work by demonstrating that giving people *more* choice and making seemingly irrelevant changes to the decision environment substantially increases the effectiveness of food subsidies.

The paper proceeds as follows. Section 2 describes the methods and experimental design, including details about the mobile platform used in the experiment. Section 3 outlines the hypothesis development in our setting. Section 4 presents the results. We discuss our findings in Section 5 and conclude.

## 2 Experimental Design

The details of our experimental design and analysis were pre-registered on AsPredicted.org.<sup>9</sup>

Our experiment was conducted on a mobile market-research platform, Field Agent. This platform is designed for consumer research and offers unique capabilities that facilitate the study of shopping behavior in a natural environment. Shoppers engage with the platform by completing jobs – typically consumer research or mystery shopping – that have been requested by retailers or suppliers across the country.

There were three capabilities of Field Agent that provided for a novel experimental design. First, Field Agent could geo-tag our survey responses and cross-reference these locations with the locations of grocery stores nationwide to guarantee that our shoppers were at the point of purchase while completing the survey. Second, Field Agent collected photographs through their mobile app. With these, we could capture images

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<sup>9</sup>We pre-registered the data collection and analysis for the primary treatments we focus on in this paper (Part 1). After conducting this experiment, we ran a follow up study to separately examine the impact of a waiting period without agency (Part 2). Treatments associated with Part 2 will be highlighted later in this section. We analyze these data in accordance with our pre-registered analysis plan with fixed effects for the data collection wave that capture differences between Part 1 and Part 2.

of all grocery shopping receipts. Using these receipts, we calculated subsidy payments, verified the timing of shopping trips, and measured treatment effects. Third, Field Agent had an established electronic payments protocol with their users. This gave our experimental procedures credibility with our shoppers and guaranteed prompt transfers of subsidy payments, participation payments, and payments earned from incentivized elicitation of time preferences.

## 2.1 Recruitment

Field Agent has over 1 million registered users on its smartphone-based shopping survey platform.<sup>10</sup> We restricted this population to the subset of recently active users and recruited shoppers with a household income less than 185% of the federal poverty line (FPL) to take part in our study.<sup>11</sup>

We conducted our study in two parts. In Part 1, we collect data from four treatments and a control group. In Part 2, we repeat one of the treatments from Part 1 and include a new treatment. In both Parts 1 and 2, we targeted approximately 150 shoppers per treatment at the baseline. Our analysis will include fixed effects for Parts 1 and 2 to account for potentially non-random variation in behavior between the two.

For Part 1, we recruited shoppers in eight separate waves beginning in March, 2018. The final endline surveys were completed by July, 2018. Shoppers were randomized within each wave and allowed to complete the study at their own pace. This randomization will be discussed in more detail in Section 2.3. For Part 2, we recruited all shoppers in one wave beginning in March, 2019. The final endline surveys were completed by April, 2019. The randomization occurred once at the beginning of March. All shoppers were given approximately eight weeks to complete the four shopping trips. Within those eight weeks, shoppers could complete the study at their own pace.

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<sup>10</sup>Smartphone ownership is a common pre-condition for studying behavior amongst low-income participants (e.g. [Smith, Morgan, Plotnikoff, Dally, Salmon, Okely, Finn, and Lubans \(2014\)](#)) since the majority meet the requirement. For example, over 67% of Americans with incomes less than \$30,000 own smartphones (Pew Research Center: <https://www.pewinternet.org/fact-sheet/mobile>).

<sup>11</sup>Below 185% of the FPL, shoppers will meet the income qualification for Women, Infants, and Children (WIC) subsidies. SNAP eligibility begins beneath 130% of the FPL.

To enroll in the study, all shoppers completed an income-screening survey and were then invited to complete our baseline survey. The baseline survey collected characteristics of each shopper’s food household including income, household size, SNAP participation, a picture of a recent shopping receipt, a 24-hour food diary, food security measures, and time preferences. Our food security measures included questions about the availability and affordability of the desired types of food. To measure time preferences, we asked all shoppers to choose the most desirable payment option from a menu of choices that grew in value as the time delay increased. Shoppers chose their preferred option from two such lists: one including the present and one not. This allows us to measure both discounting and present-bias – i.e. the conflict between short- and long-term interests.<sup>12</sup>

## 2.2 Treatments

We tested the effectiveness of our subsidy interventions in a natural shopping environment. To do this, we asked all shoppers to continue to shop for groceries at the time and place that accord with their normal shopping schedule. Our treatments then varied the delivery of food subsidies during these trips. We tested both subsidies offering 30% back on purchases of fruits and vegetables (“healthy subsidies,” hereafter) and subsidies offering 30% back on purchases of baked goods (“unhealthy subsidies,” hereafter). Both subsidies were capped at \$10 per trip.<sup>13</sup> According to Consumer Expenditure Survey (CES) data, these categories represent roughly equal percentages of food purchases by SNAP recipients and offer a clear valence to define the “healthy” and “unhealthy” option.<sup>14</sup>

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<sup>12</sup>See [Brownback, Imas, and Kuhn \(2019\)](#) for a consideration of the role time preferences play in shopping patterns and treatment effects in our data, as well as heterogeneity analysis along other dimensions.

<sup>13</sup>“Fruits and vegetables” include fresh, canned, or frozen fruits or vegetables without added salt or sugar. “Baked goods” include bread, biscuits and rolls, muffins, cakes and cupcakes, pies and tarts.

<sup>14</sup>CES data span 1994-2003, limited to households that self-report as SNAP participants. FV and BG represent 8% and 9% of total food expenditure, respectively, and are purchased on 76% and 82% of days with at least \$20 in food spending, respectively. In our control group, shoppers spend more on BG than FV, so *ex-ante*, the BG subsidy is more valuable.

Immediately after completing their grocery shopping, all shoppers submitted photographs of their receipts using their smartphone cameras. These receipts were used to calculate the subsidy payment owed to each shopper. This subsidy payment was transferred electronically to the shopper along with their participation payments in weekly intervals.

We leveraged Field Agent’s novel smartphone delivery method to present subsidy information and elicit subsidy choices at multiple points in time and at multiple locations. With this flexibility, we designed treatments that varied the timing of information about subsidies and subsidy choices: either 1) 4 to 48 hours prior to the shopping trip or 2) when the shopper was at the point of purchase. Field Agent cross-referenced the geo-tags from each completed survey with the locations of grocery stores nationwide to verify that choices intended to be made at the point of purchase were truly made in the grocery store.

All shoppers who completed the baseline in either Part 1 or Part 2 were assigned to a treatment that was fixed throughout the study. Thus, our analysis will be between-subjects. All shoppers who would be offered a subsidy were given details about it as part of the study introduction. Shoppers in Part 1 were randomly assigned to one of **C**, **T<sub>1</sub>**, **T<sub>2</sub>**, **T<sub>3</sub>**, **T<sub>4</sub>**. Shoppers in Part 2 were randomly assigned to either **T<sub>1</sub>** or **T<sub>5</sub>**. All treatment instructions can be found in Appendix Section [B](#). Our six treatments are:

- **C**: Control — Shoppers submitted photographs of their receipts, but received no subsidies.
- **T<sub>1</sub>**: Restricted — All shoppers received the healthy subsidy. They were notified about the subsidy in the store before completing their purchase.
- **T<sub>2</sub>**: Agency — Shoppers chose between the healthy and unhealthy subsidies. They were notified about the subsidies and made their choice in the store before completing their purchase.
- **T<sub>3</sub>**: Waiting Period (Delayed Choice) — Shoppers chose between the healthy and unhealthy subsidies. Information about the subsidies was delivered between 4 and 48 hours before shopping trip. The subsidy choice was made in the store before the purchase decision.

- **T<sub>4</sub>**: Waiting Period (Early Choice) — Shoppers chose between the healthy and unhealthy subsidies. As in the Waiting Period (Delayed Choice) treatment, information about the subsidies was delivered between 4 and 48 hours before shopping. The subsidy choice was made when the information was delivered. Shoppers were reminded of their subsidy choice before the purchase decision.
- **T<sub>5</sub>**: Waiting Period (No Agency) — All shoppers received the healthy subsidy. Information about the subsidy was delivered between 4 and 48 hours before shopping.

Shoppers had the opportunity to complete four separate “shopping trips” under the procedure of the assigned treatment. The Shopping Trips were designed to be as natural as possible with their timing and location decided by the shopper.<sup>15</sup> Our only requirement was that the Shopping Trips be at least five days apart. After completing all four Shopping Trips, shoppers concluded the study with an endline survey measuring the same characteristics as the baseline survey. In addition to any subsidy or time-preference elicitation payments, shoppers were paid a flat fee of \$1 per completed survey with a bonus payment that guaranteed \$30 total for completion of all surveys in the study.

Within each Shopping Trip, different treatments allocated tasks across three time periods. We clarify the expectations across these time periods in Table 1 below:

**Table 1.** Shopping Trip Timeline by Treatment

	4 to 48 hours before grocery shopping <i>“Pre-Shopping Task”</i>	While shopping (in-store before purchase) <i>“Shopping Task”</i>	In-store after purchase
Control			Submit receipt for participation payment
Restricted		Subsidy information delivered	Submit receipt for participation payment and shopping reimbursement
Agency		Subsidy information delivered and subsidy choice made	
Waiting Period (Delayed Choice)	Subsidy information delivered	Subsidy reminder and subsidy choice made	
Waiting Period (Early Choice)	Subsidy information delivered and subsidy choice made	Subsidy choice reminder	
Waiting Period (No Agency)	Subsidy information Delivered	Subsidy reminder	

<sup>15</sup>On the endline survey, we asked shoppers if they changed their shopping schedule to accommodate the study. 62% said they integrated the study into their normal routine, and none of the treatments had a significant impact on responses.

The Waiting Period treatments all involved two tasks, a “Pre-Shopping Task” and a “Shopping Task.” Our design required that these two tasks be separated by a gap of 4 to 48 hours. Shoppers assigned to the Agency and Waiting Period (Delayed Choice) treatments made their subsidy selection during the Shopping Task, and shoppers assigned to the Waiting Period (Early Choice) treatment made their selection during the Pre-Shopping Task. We encouraged shoppers to complete their Pre-Shopping Tasks at a time that allowed them to continue their normal shopping patterns within the specified 4- to 48-hour window. Shoppers who missed this window were not eligible for the subsidy. They were asked to complete their trip as usual, and were given one chance to complete a ‘make-up Pre-Shopping Task’ before a later shopping trip. In our analysis, per our pre-registration, we include all data collected during these make-up trips.

The natural shopping environments we explore leave open a few potential ways in which shoppers can “game” the incentives: 1) completing the tasks outside of the grocery store after shopping, 2) submitting a receipt from another shopping trip, or 3) mis-reporting adherence to the 4- to 48-hour window. Field Agent’s technology helped prevent this behavior and establish a tight link between our experiment and the hypotheses. The platform uses geo-tags to confirm that the Shopping Tasks were completed while the shopper was actually in the grocery store. They also used timestamps to confirm the tasks were started before the shopper had completed their transaction and during the appropriate time window. According to Field Agent’s internal protocol, shoppers who violated these procedures were first given a warning, and upon second-offense eliminated from the study.

### **2.3 Randomization**

As each recruitment wave was completed, we conducted a stratified randomization with separate strata for 1) SNAP participation and 2) a stated desire to improve fruit

and vegetable consumption.<sup>16</sup> The proportion of each recruitment wave assigned to each treatment was similar but not constant throughout the study, so our analysis will include fixed effects for each recruitment wave.<sup>17</sup>

Shoppers were informed of their randomly-assigned treatment along with the respective procedures when they opened their task for the first Shopping Trip after the baseline. Thus, while differential attrition is a concern after the first Shopping Trip, differential selection at the time of assignment is not.

## 2.4 Shopper Characteristics

In Part 1, 802 shoppers successfully completed the baseline survey. Treatment assignment was balanced on observables, which are reported in the left side of Table 2. In Part 2, 300 shoppers completed the baseline survey. Treatment assignment was again balanced on observables. This balance is recorded in the right side of Table 2.

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<sup>16</sup>We were unable to stratify based on baseline FV purchases as the receipts took time to be fully tabulated and we assigned treatments within one week of baseline survey completion.

<sup>17</sup>Specifically, we increased the weight on the Agency and Waiting Period treatments in order to improve our power to test the effect of our interventions.

**Table 2.** Balance of Shopper Characteristics by Treatment

	C	Part 1: Mar–Jul, 2018					F-Test	Part 2: Mar–Apr, 2019		
		T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>		T <sub>1</sub>	T <sub>5</sub>	F-Test	
		<i>Reported Dietary Satisfaction</i>								
Want more fruits & vegetables (1-3)	1.809	1.859	1.815	1.805	1.793	0.602	1.839	1.821	0.691	
Have enough food to eat (1-4)	2.319	2.303	2.265	2.216	2.310	0.642	2.195	2.159	0.667	
Can afford food (1-5)	2.908	2.923	2.741	2.719	2.841	0.374	2.879	2.715	0.206	
Can afford fruits and vegetables (1-5)	2.433	2.408	2.370	2.286	2.483	0.693	2.336	2.113	0.141	
		<i>Shopper Characteristics</i>								
SNAP participant	0.397	0.401	0.407	0.443	0.400	0.906	0.349	0.351	0.971	
Male	0.184	0.211	0.153	0.151	0.152	0.590	0.154	0.166	0.792	
Household Size	3.596	3.662	3.635	3.703	3.586	0.971	3.732	3.662	0.743	
Time discounting (standardized)	-0.081	-0.022	-0.101	-0.088	0.005	0.851	0.021	-0.096	0.308	
		<i>Baseline Grocery Receipts</i>								
Fruits and vegetable purchases (\$)	6.114	4.249	5.663	4.378	4.386	0.255	6.263	6.393	0.891	
Baked goods purchases (\$)	11.025	13.486	12.367	10.580	7.666	0.335	1.937	1.520	0.221	
Use EBT card for purchase	0.468	0.528	0.587	0.605	0.549	0.116	0.242	0.212	0.541	
Observations	141	142	189	185	145		149	151		

F-test conducted as a joint test of equality across all treatments (robust standard errors), with the  $p$ -values reported.

Our baseline data highlight the need for food assistance programs to alleviate problems with both food insecurity and poor dietary choices. 67% of our sample reported some measure of food insecurity. Additionally, 83% of our sample reported that they would like to consume additional fruits and vegetables.

Our shoppers were geographically diverse, coming from across the United States, and 40% of our sample reported participating in SNAP. The vast majority of our shoppers (83%) were female. While this is not representative of the overall population, it does seem to be representative of regular shoppers; specifically, the skew reflects a gender disparity in grocery shopping behavior (Bhattarai 2017). The majority of shoppers (53%) reported living in a city with fewer than 50,000 residents.

## 2.5 Attrition

Differential attrition is a potential concern for every field experiment involving multiple observations. Our particular concern is whether shoppers with low valuations of our subsidies are more likely to attrit across our treated groups. As previously mentioned, shoppers did not know their treatment assignment until opening the surveys for their first Shopping Trip. Thus, attrition between the baseline and the first Shopping Trip is difficult to attribute to the treatment assignment. However, differential attrition upon learning of the treatment procedures is a potential concern.

Table 3 quantifies the differences in attrition across the treatments. We first present the mean number of Shopping Trips completed by treatment. There are two treatments with significant differences. In Part 1, the control group completes significantly more Trips. This is perhaps not surprising because this group had to complete the least amount of tasks. Reassuringly, there were no significant differences in trips completed amongst shoppers in  $T_1$  through  $T_4$  in Part 1, which constitute the bulk of our analysis. In Part 2, the Restricted group completes significantly more shopping trips.

Our baseline survey allows us to test if shoppers are selectively leaving the study based on our outcome of interest – FV spending. Table 3 presents coefficient estimates of the interaction of FV spending and treatment from a Probit model with controls for

treatment status and baseline spending. We see that the attrition-on-entry decision does not appear to be related to FV spending across any of the treatments. We perform this analysis for attrition between the baseline survey and Trip 1 (top panel) and for total attrition between baseline and endline (bottom panel), and obtain similar results.

In the middle section of Table 3 we examine whether spending on FV affects attrition conditional on participating in Trip 1. We use an ordered Probit to model changes in participation from trip to trip.<sup>18</sup> Treatment status, lagged spending, and their interaction, are allowed to influence participation. We report coefficient estimates from the interaction of lagged FV spending and treatment, finding that low FV spending does not explain any differential attrition.

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<sup>18</sup>Changes in participation take on three values:  $-1$  is attrition,  $0$  is constant status, and  $1$  is re-joining following attrition (which is very rare).

**Table 3.** Shopping Trip Completion and Attrition by Treatment

	<b>C</b>	Part 1: Mar–Jul, 2018				F-Test	Part 2: Mar–Apr, 2019		
		<b>T<sub>1</sub></b>	<b>T<sub>2</sub></b>	<b>T<sub>3</sub></b>	<b>T<sub>4</sub></b>		<b>T<sub>1</sub></b>	<b>T<sub>5</sub></b>	F-Test
Shopping trips completed	2.752	2.486	2.503	2.178	2.497	0.077	3.040	2.563	0.014
<i>Panel A: Baseline to Trip 1</i>									
Coefficient: Treatment × Baseline FV purchases	-0.001	-0.001	-0.000	-0.003	0.002	0.983	0.001	-0.004	0.443
<i>Panel B: Trips 1 to 4</i>									
Coefficient: Treatment × Lagged FV purchases	0.000	0.001	0.001	0.001	-0.002	0.675	-0.001	0.001	0.379
<i>Panel C: Baseline to Endline</i>									
Coefficient: Treatment × Baseline FV purchases	0.004	-0.003	-0.002	0.002	0.001	0.803	0.001	-0.005	0.350

\*\*  $\Rightarrow p < 0.05$ . Panels A and C report results from probit estimates of dropping out of the sample from the baseline to Trip 1, and the baseline to the endline, respectively (robust standard errors). The coefficient estimates are the marginal effects of increasing baseline FV spending within each treatment. Panel B reports results from an ordered probit estimation (it is possible, though very rare, to miss a trip and come back) of changes in sample participation from trip to trip as a linear function of lagged FV spending (with standard errors clustered at the individual level). The coefficient estimates are the marginal effects of increasing lagged FV spending within each treatment. Wave fixed effects are included in all models. F-tests are conducted as a joint test of equality across all treatments, with the  $p$ -values reported.

### 3 Hypotheses

Our first hypothesis concerns how healthy food subsidies will affect FV purchases.

**Hypothesis 1:** *Healthy subsidies will increase purchases of fruits and vegetables.*

As with all ordinary economic goods, the law of demand states that demand for FV will increase as price falls.

**Hypothesis 2:** *Giving shoppers agency over the choice between healthy and unhealthy subsidies will not decrease FV purchases relative to the restricted subsidy.*

Our experiment allows us to compare shoppers who are restricted to FV subsidies to shoppers who have agency to choose between FV and BG subsidies. Standard economic theory suggests that the opportunity to choose between subsidies will effectively decrease the price of BG and increase the price of FV, which should decrease FV purchases.

To illustrate this, consider the consumer’s utility maximization problem. Suppose preferences over FV and BG spending are given by a Cobb-Douglas utility function:  $U(FV, BG) = FV^\alpha \cdot BG^{1-\alpha}$ . Demand for FV is given by  $FV^* = \alpha \cdot \frac{M}{p_F}$ , where  $p_F$  is the price of FV and  $M$  is the money dedicated to spending on the two goods. When we switch from subsidizing FV to offering a choice between FV and BG subsidies, one of two things will happen. Either the shopper selects the FV subsidy, and  $p_F$  and  $FV^*$  are unchanged, or the shopper selects the BG subsidy, which increases  $p_F$  (relative to when FV is subsidized), and thus decreases FV spending. This re-optimization process is demonstrated graphically in Appendix Section A.1. There, we consider a more general model, and the conditions where the option to select the BG subsidy would lead to an increase in FV spending. To summarize our findings, in order for standard theory to predict that FV spending will increase with a larger choice set, shoppers would have to hold seemingly contradictory preferences: 1) a strong preference for low – but nonzero – FV consumption relative to BG consumption and 2) an unrealistically high

complementarity between FV and BG consumption. Our data reject both conditions.

In contrast to the standard model, behavioral theories such as a demand for consistency (Falk and Zimmermann 2018) and self-signaling (Benabou and Tirole 2004, 2011) predict that giving shoppers the opportunity to actively select the FV subsidy from a larger choice set can actually increase FV spending. Falk and Zimmermann (2018) argue that an initial active choice impacts how information is processed such that information that runs counter to this choice is either downweighed or ignored. This asymmetry in information processing leads to behavior that is consistent with the initial choice. In the self-signaling framework proposed in Benabou and Tirole (2004) and Benabou and Tirole (2011), people are uncertain about their true underlying preferences and look back at prior choices as a guide to learning about them. In this framework, prior choices act as informative signals that spur individuals to act consistently.<sup>19</sup>

Applying this to our setting, both models predict that a shopper will increase FV spending if she had previously chosen to subsidize those items. These behavioral mechanisms generate the tendency to act consistently with prior choices, where the *act of choosing* a subsidy enhances its impact beyond the price effects of receiving it. This is in contrast to standard theory which predicts that the purchase behavior of shoppers should be unaffected by whether or not they are restricted to the FV subsidy or actively choose it. The consistency channel can counteract the price channel of increased agency, muting the impact of the latter or even overcoming it.

**Hypothesis 3:** *Waiting periods between the delivery of subsidy information and the shopping decision will increase FV purchases.*

Imas et al. (2018) demonstrates across three experiments that introducing waiting periods between information about a choice and the choice itself leads to more patient

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<sup>19</sup>Prior choices can also act as strategic forward-looking signals to motivate oneself to behave consistently later on. Andreoni, Kuhn, and Samuelson (2018) show that when subjects can select the parameters of a game they are about to play, they cooperate at higher rates than subjects placed into identically parameterized games without the choice.

and future-focused decisions. One possible psychological pathway for this effect is that waiting periods prompt deliberation and prospection of future utility outcomes (Gilbert and Wilson 2007; Wheeler, Stuss, and Tulving 1997). Gabaix and Laibson (2017) formalize this in a theoretical model where an individual who is uncertain about the future utility consequences of her choices (e.g. using the healthy subsidy to increase FV spending) can engage in prospection by generating forecasts through deliberate mental simulations of the potential outcomes. The utility consequences of a choice are estimated with noise that increases with time; outcomes that stretch farther into the future have noisier distributions of potential consequences and are thus more heavily discounted. Mentally simulating these consequences reduces the noise around the forecast and, under reasonable assumptions, leads to less myopic decision making.<sup>20</sup>

As with previous studies in behavioral economics, we consider the trade-off between present enjoyment and future health associated with food choices as an exercise in patience.<sup>21</sup> For this reason, we predict that introducing a waiting period between the delivery of subsidy information and the grocery shopping, as in the Waiting Period treatments, will lead shoppers to take greater advantage of their healthy subsidies and spend more on FV.

**Hypothesis 4:** *Making the subsidy choice before the start of the waiting period will increase FV spending compared to making the subsidy choice after the waiting period.*

Allowing shoppers to make a subsidy choice before the waiting period begins, as in our Waiting Period (Early Choice) condition, can increase FV spending through two channels. The standard behavioral mechanism by which an earlier subsidy choice would increase FV spending is by increasing FV subsidy choice rates. Present-biased

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<sup>20</sup>Waiting periods may also affect food choices by allowing time for shoppers to set goals for their purchases. Research has shown that goal-setting or endogeneously-established reference points can provide powerful motivation (Fishbach and Ferguson 2007; Hsiaw 2013; Koch and Nafziger 2011). Moreover, Heffetz (2018) shows that reference points require time in order to “sink in.” Our waiting period intervention may provide the needed time establish the goal and allow for it to sink in order to affect shopping behavior.

<sup>21</sup>E.g. Read and van Leeuwen (1998), Shapiro (2005).

preferences may lead shoppers who prefer the FV subsidy before entering the store to nonetheless choose the BG subsidy after being tempted by the unhealthy food. The Waiting Period (Early Choice) treatment offers these present-biased shoppers an opportunity to commit to the FV subsidy ex-ante, thereby mitigating the dynamic inconsistency (O’Donoghue and Rabin 1999). Increased healthy subsidy choice rates will increase FV spending by lowering average FV prices. However, conditional on the chosen subsidy, models of present-bias make no predictions about the impact of early choice on purchasing behavior.

As a second channel, selecting a subsidy earlier allows shoppers to narrow the set of potential future outcomes and reduce uncertainty around relative prices. Through the lens of Gabaix and Laibson (2017), this decreases the number of prospective states that the individual must consider when mentally simulating future utility consequences. By prompting the prospection process, waiting periods should therefore be even more effective in reducing noise around any given forecast, leading to greater FV spending.<sup>22</sup>

## 4 Results

We explore the impact of our treatments on FV spending during a given Shopping Trip. Specifically, we will use a random-effects linear regression with shopper-specific random effects and standard errors clustered at the shopper level. Our estimation equation is given by Equation 1.

$$FV_{i,t} = \alpha + \Gamma'Z_i + \beta \times FV_{i,0} + \delta_{w(i)} + u_i + \varepsilon_{i,t} \quad (1)$$

Here,  $FV_{i,t}$  is the FV spending for shopper  $i$  in time period  $t$ .<sup>23</sup>  $Z_i$  is a vector of indicator variables for either assigned treatments, or partitions of the treatment set.  $FV_{i,0}$  captures FV spending from the baseline survey to increase precision. Because the randomization weights changed slightly over the course of the study, we use assignment-wave fixed effects,  $\delta_{w(i)}$ , to ensure robustness. We do this both at a coarse level, with

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<sup>22</sup>As with Hypothesis 3, this prediction rests on the assumption that preference uncertainty leads shoppers to purchase less FV than they would if uncertainty was reduced.

<sup>23</sup>This corresponds to the pre-subsidy, gross spending rather than the post-subsidy net spending.

a Part 1/Part 2 fixed effect, and at a fine level for every randomization group –even within Part 1 (referred to as “Waved Fixed Effects”).  $u_i$  is the shopper-specific random effect. We present results with and without the baseline control and assignment-wave fixed effects to demonstrate that the treatment effects are unaffected by their inclusion.

#### 4.1 Effect of Subsidies

We first demonstrate the effectiveness of subsidies on increasing FV spending. Table 4 presents these effects, which are large and positive. Using the full specification in column (3), the average effects of all the subsidy treatments leads FV spending to increase by 164% – or 0.98 SD – relative to the Control group.

**Table 4.** Effect of Subsidy Treatments on FV Spending (\$)

Control Mean [SD]: 4.03 [6.71]	(1)	(2)	(3)
Subsidy	6.11*** (0.60)	6.33*** (0.60)	6.60*** (0.61)
Baseline Survey FV Spending (\$)		0.16*** (0.05)	0.15*** (0.05)
Part 1, Part 2 Fixed Effects	Y	Y	Y
Wave Fixed Effects	N	N	Y
Observations	2767	2767	2767
Clusters	805	805	805

\*\*\*  $\Rightarrow p < 0.01$ , \*  $\Rightarrow p < 0.10$ . Standard errors in parentheses are clustered at the shopper level. All specifications are linear random effects models.

Increases in FV spending can arise through a substitution effect that shifts purchases towards FV, through an income effect that increases spending across-the-board, or both. To show the effect of substitution towards FV, Table 5 presents the increase in the fraction of food spending on FV.<sup>24</sup> The subsidy treatments increase the share of food spending on FV by 15 percentage points from a mean of 13% in the control

<sup>24</sup>Our receipt tabulations include fields for the receipt total and non-food spending. When both these fields are present, we define total food spending as the difference. In the case that the non-food expenditure field is missing, if imputed total food spending is negative, or if total FV and BG spending exceeds imputed total food spending, we use the sum of FV and BG spending as total food spending.

group. Additionally, Appendix Table A.1 shows that the subsidy treatments have, if anything, a negative impact on BG spending.

**Table 5.** Effect of Subsidy Treatments on FV Spending as a Fraction of Food Spending

Control Mean [SD]: 0.13 [0.22]	(1)	(2)	(3)
Subsidy	0.15*** (0.02)	0.15*** (0.02)	0.15*** (0.02)
Baseline Survey FV Fraction		0.16*** (0.04)	0.16*** (0.04)
Part 1, Part 2 Fixed Effects	Y	Y	Y
Wave Fixed Effects	N	N	Y
Observations	2745	2710	2710
Clusters	804	793	793

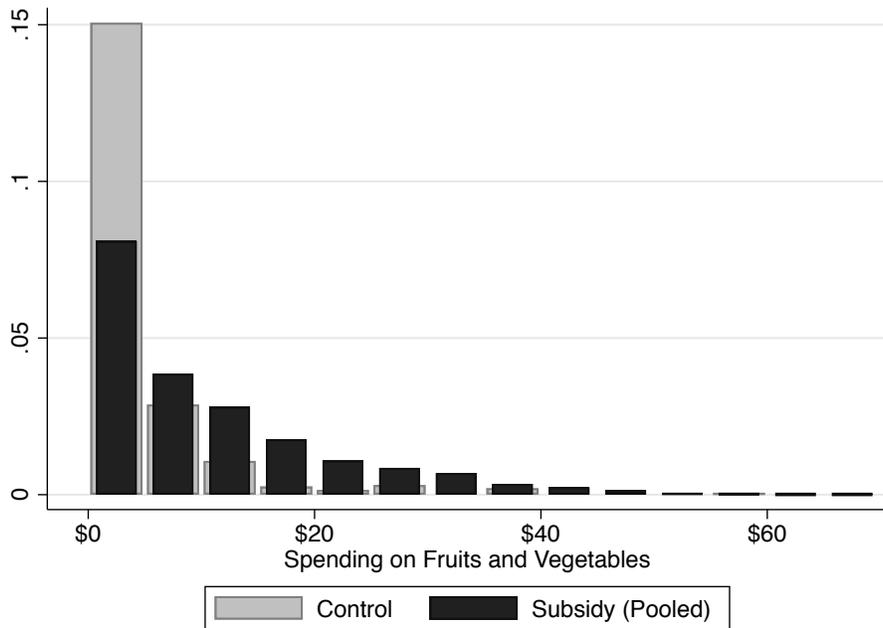
\*\*\*  $\Rightarrow p < 0.01$ , \*\*  $\Rightarrow p < 0.05$ . Standard errors in parentheses are clustered at the shopper level. All specifications are linear random effects models. We lose 22 observations and 1 shopper relative to the count in Table 4 because of receipts with no food items. We lose 35 observations and 11 shoppers in columns (2) and (3) relative to the count in column (1) due to baseline survey receipts with no food items.

Combined, Tables 4 and 5 show that, while subsidies cause large increases in FV spending, there are no corresponding increases in BG spending. Using our data from Part 1, we find that BG spending in the Restricted treatment is \$1.04 lower than in the Control treatment.<sup>25</sup> While this difference is not statistically significant ( $p = 0.31$ ), it refutes a possible complementary relationship between BG and FV.<sup>26</sup> Therefore, access to a BG subsidy in our Agency treatment should not increase FV consumption through any of the standard mechanisms outlined in Section 3.

Figure 1 shows that the subsidy treatments have the largest effect on the quasi-extensive margin. Subsidies move a large mass of people from spending \$0 to \$5 on FV to spending intermediate amounts.

<sup>25</sup>We restrict ourselves to data from Part 1, because Part 2 had no pure control group.

<sup>26</sup>P-values from a linear random effects regression. We can marginally reject that the Restricted treatment increases BG consumption ( $p = 0.09$ , one-sided test), and we can reject that it increases BG consumption by anything more than \$0.05 at the 5% level (one-sided test).



**Figure 1.** Histogram of fruit and vegetable spending.

## 4.2 Behavioral Food Subsidies

We now estimate the marginal impacts of agency and waiting periods on subsidy effectiveness. In order for the consistency channel to counteract the price effect of increased agency, the majority of shoppers must choose the FV subsidy from the larger choice set. Indeed, we find that 78% of shoppers under the agency intervention select the FV subsidy.<sup>27</sup>

Importantly, we find no treatment effects on the FV subsidy choice rate. The FV subsidy is selected 76% of the time in the Agency treatment, 79% of the time in the Waiting Period (Delayed Choice) treatment, and 79% of the time in the Waiting Period (Early Choice) treatment. We fail to reject the hypothesis that these rates are equal across all three treatments ( $p = 0.82$ ). This null effect means that any differences in behavior *conditional* on subsidy choice are not simply offsetting differential subsidy

<sup>27</sup>It is also important to note that the low rate of BG subsidy selection, combined with the overall decrease in BG spending, excludes the possibility that any observed increase in FV spending could be driven by a complementary relationship between FV and BG, such that an income effect that dominates the effect of higher FV prices.

selection rates, but indicate differences in mean behavior.

Table 6 displays our two primary interventions, agency and waiting periods. Column 1 presents the estimated effect of the subsidies and the added, marginal effect of agency. Column 2 repeats this specification looking at the marginal effect of waiting periods. Column 3 jointly estimates the marginal impact of each intervention.

**Table 6.** Effect of Agency and Waiting Periods on FV Spending (\$), Combined Data

	(1)	(2)	(3)
Subsidy	5.11*** (0.81)	5.77*** (0.65)	5.11*** (0.81)
Agency	1.97** (0.80)		1.06 (0.87)
Waiting Period		1.76*** (0.61)	1.46** (0.67)
Baseline Survey FV Spending (\$)	0.15*** (0.05)	0.16*** (0.05)	0.15*** (0.05)
Part 1, Part 2 Fixed Effects	Y	Y	Y
Wave Fixed Effects	Y	Y	Y
Observations	2767	2767	2767
Clusters	805	805	805

\*\*\*  $\Rightarrow p < 0.01$ , \*\*  $\Rightarrow p < 0.05$ , \*  $\Rightarrow p < 0.10$ . Standard errors in parentheses are clustered at the shopper level. All specifications are linear random effects models.

## Agency

Column 1 of Table 6 reveals the large and significant impact of agency on healthy spending. Estimated alone, agency accounts for \$1.97 in additional FV spending or a 39% increase in effectiveness over the restricted subsidy. Column 3 controls for the impact of waiting periods. Under this specification, agency leads to a marginal gain of \$1.06 in FV spending, 21% more effective than the restricted subsidy, though this effect is not statistically significant. This evidence is consistent with our second hypothesis that the consistency motive will counteract the price effect of introducing an unhealthy subsidy into the choice set. The lack of a decrease in FV spending – in fact,

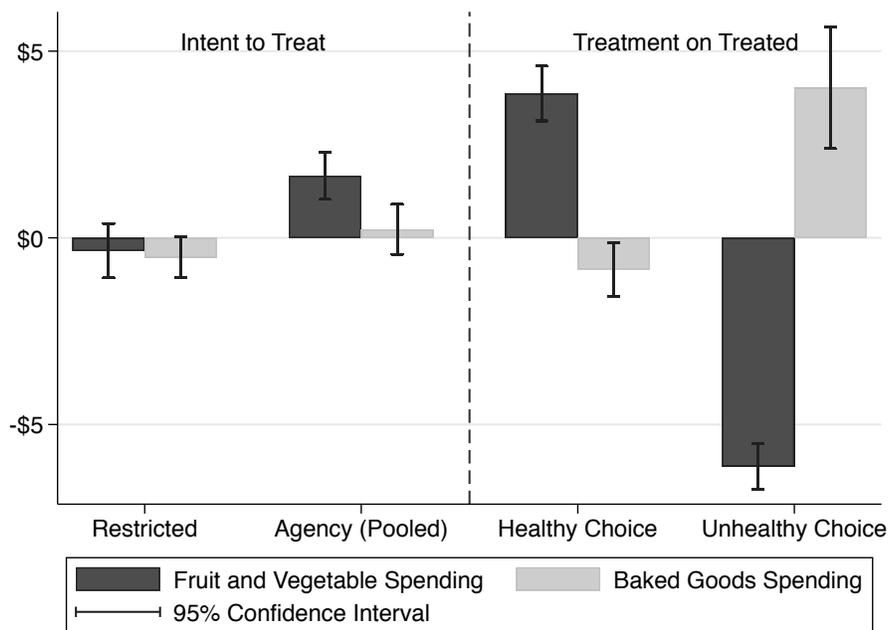
we document a directional increase – runs counter to the prediction of standard theory that restricting shoppers to the healthy subsidy should lead to greater FV spending than allowing them to choose from a larger choice set.

Figure 2 displays the residualized effect of treatments with agency on FV and BG spending after controlling for whether the data were collected in Part 1 or Part 2. On the left side, the impact of the restricted subsidies is compared to the impact of the subsidies with greater agency. On the right, Figure 2 splits shoppers in the agency treatments by which subsidy they chose. We borrow the language of “Intent to Treat” (ITT) and “Treatment on Treated” (TOT) to describe these two comparisons, respectively. The ITT corresponds to the regression results in Table 6. The TOT unsurprisingly shows that those who select the FV subsidy spend more on FV than the average shopper in the Restricted treatment, and that those who select the BG subsidy spend more on BG than the average shopper in the Restricted treatment. However, we can use the fact that 78% of shoppers in the agency treatments select the FV subsidy to construct a useful counterfactual. We assume, for the sake of contradiction, that the ITT results can be entirely explained by subsidy choice allowing for selection. Under this assumption, people who purchase more FV select the FV subsidy and receive the same subsidy payments compared to the restricted subsidy. Meanwhile, people who purchase more BG select the BG subsidy and increase their subsidy payments above what they would have received under the restricted subsidy. If this were the case, we would expect average FV spending in the Restricted treatment to be \$10.56, which is \$1.89 greater than the observed level, contradicting our assumption. This implies that increased agency does not simply sort shoppers based on preferences, but actually improves the effectiveness of the healthy subsidies among those who receive them. This is further evidence for our second hypothesis: greater agency does not decrease spending on FV – if anything, the impact is positive across the treatments.<sup>28</sup>

Lastly, one concern with repeatedly eliciting subsidy choices from shoppers is that

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<sup>28</sup>As a further robustness check, columns 1 and 3 of Appendix Table A.2 shows the impact of agency on the fraction of grocery spending on FV.



**Figure 2.** Residual effect of choice on fruit and vegetable spending.

they may engage in inter-temporal substitution, alternating between subsidized FV purchases one week and subsidized BG purchases in a later week. We see no evidence of this in the subsidy choices: 58% of shoppers never change their subsidy choice throughout the study and only 7% change *and* change back to their original subsidy choice. For all shoppers, the previous subsidy choice has a large, positive, and statistically significant correlation with the current subsidy choice. Additionally, there are no aggregate trends with respect to subsidy choice across time.

### Waiting Periods

Column 2 of Table 6 reports the estimated marginal impact of introducing a waiting period between delivery of subsidy information and the shopping decisions themselves. We find that a waiting period induces \$1.76 more FV spending, increasing the effectiveness of the restricted subsidies by 31%. After accounting for the impact of agency on FV spending, the impact becomes \$1.46 or a 28% increase over the restricted subsidy.

The impact is still significant at the 5% level.<sup>29</sup> The strong, positive effect of waiting periods provide evidence for our third hypothesis.<sup>30</sup>

We now separately consider the impact of providing shoppers to make their subsidy choice prior to the waiting period (Early Choice) compared to after the waiting period is over (Delayed Choice). We previously established that early choice has no impact on subsidy choice. Table 7 focuses on the impact on FV purchases, presenting the individual impacts of each of the two treatments above the mean impact of subsidies. First, we find that the waiting period with delayed choice has a significant and positive effect on FV spending. The \$2.34 increase represents a 47% increase in FV spending relative to the restricted subsidy. The waiting period with early choice has an even larger effect on FV spending, increasing it by \$3.16 or 63% more than the restricted subsidy. While the difference between treatments is directionally suggestive of early choice increasing FV spending relative to delayed choice, it is not significant.<sup>31</sup> Thus, we find only suggestive evidence for our fourth hypothesis.

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<sup>29</sup>Columns 2 and 3 of Appendix Table A.2 replicate the analysis looking at the fraction of spending on FV.

<sup>30</sup>Using our data from Part 2, we can conduct a lower-powered test of Waiting Periods (No Agency) vs Restricted to reveal the independent increase from waiting periods alone (1.14,  $p = 0.34$ ).

<sup>31</sup>Because we do not find any impact of the interventions on subsidy choices, any positive effect that exists appears to be driven by commitment making waiting periods more effective.

**Table 7.** Effect of Waiting Periods and Choice Timing on FV Spending (\$)

	(1)
Subsidy	5.00*** (0.79)
Waiting Period (Delayed Choice)	2.34** (1.03)
Waiting Period (Early Choice)	3.16*** (1.08)
Baseline Survey FV Spending (\$)	0.09* (0.05)
Early Choice - Delayed Choice: 0.81 ( $p = 0.489$ )	
Part 1, Part 2 Fixed Effects	N/A
Wave Fixed Effects	Y
Observations	1463
Clusters	432

\*\*\*  $\Rightarrow p < 0.01$ , \*\*  $\Rightarrow p < 0.05$ , \*  $\Rightarrow p < 0.10$ . Standard errors in parentheses are clustered at the shopper level. All specifications are linear random effects models. Sample is restricted to C: Control, T1: Restricted, T3: Waiting Periods (Delayed Choice), and T4: Waiting Periods (Early Choice).

### 4.3 Subsidy choice as a costly signal

All shoppers made their subsidy choices prior to finalizing their purchases. Given this structure, a money-maximizing shopper could ignore the subsidy, make their grocery shopping decisions, and then select the subsidy that would maximize the subsidy payment they would receive. Despite this available strategy, we find that many shoppers end up leaving money on the table.

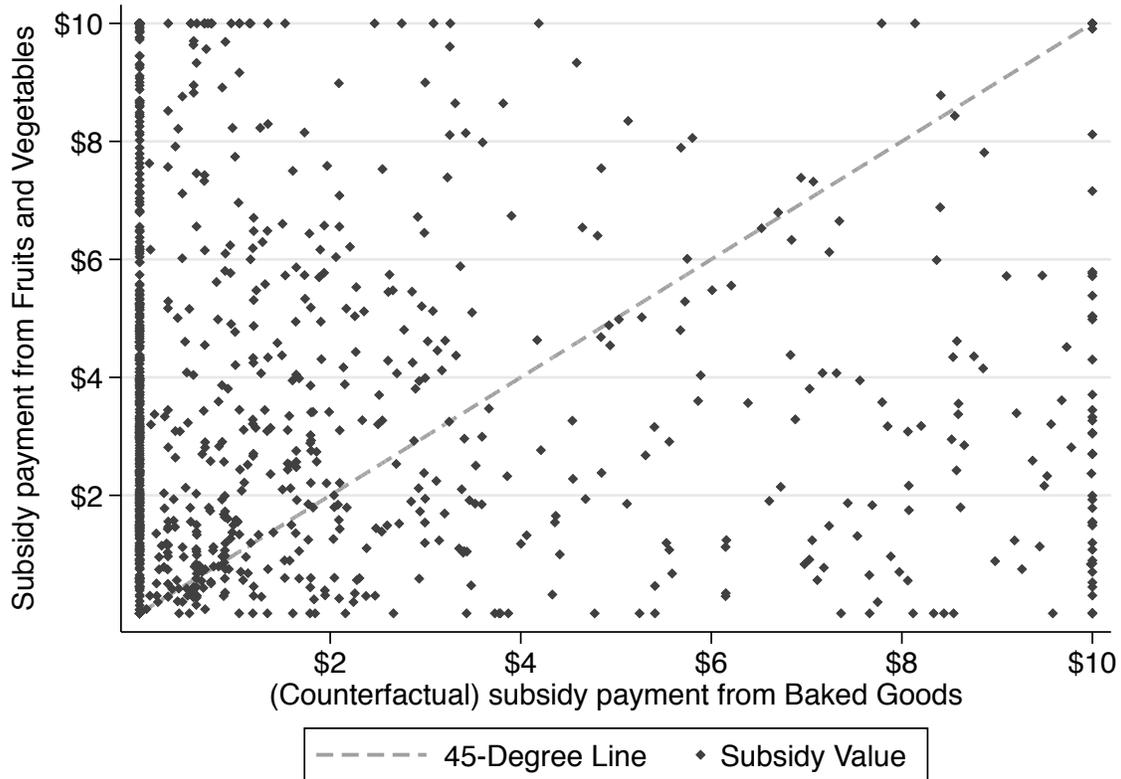
Importantly, we find systematic differences in the rate of sacrificing money. Specifically, shoppers tend to forgo subsidy payment more often in the direction of over-selecting healthy subsidies. We use two methods to demonstrate that this is a costly commitment to healthier purchases. First, it is not due to shoppers selecting the category of food that would maximize their subsidy payments. 62% of shoppers in the Control treatment spent at least as much on BG as FV. This is very different from the 22% of shoppers who select the BG subsidy under the agency intervention. This

gap is not due to close ties getting broken in favor of the FV subsidy: in the Control treatment, 47% of shoppers spend more than twice as much on BG as FV and 43% spend more than three times as much.

Second, these subsidy choices often fail to maximize subsidy payments even given the realized shopping behavior. We assume that the amount spent on FV (BG) after receiving the subsidy for FV (BG) is a very conservative upper-bound for spending on that category without the subsidy. In other words, without accounting for any changes in behavior that would arise from choosing the other subsidy, we evaluate if this shopper should have selected the other subsidy for purely financial reasons. For example, if Shopper A is observed spending \$9 on FV and \$10 on BG and selects the FV subsidy, we classify this choice as costly.

We find that a lower-bound of 28% of shoppers selecting the FV subsidy would have increased subsidy payments by choosing the BG subsidy, losing an average of \$3.37 each (101% of the mean subsidy). This is compared to a lower-bound of only 17% of those sub-optimally selecting the BG subsidy and losing an average of \$2.16 (64% of the mean subsidy). Both the difference in proportions and the difference in average gains from the subsidy selection are statistically significant at the 1% level.

One can interpret this behavior as a form of costly signaling to spur the purchase of healthy food. That is, consistent with the self-signaling framework of [Benabou and Tirole \(2004\)](#), shoppers select the FV subsidy with the understanding that it will shift their purchases towards FV even if they will still ultimately spend more on BG than FV. [Figure 3](#) captures the magnitude of this costly signaling for all shoppers who chose the FV subsidy. All shoppers below the 45-degree line would have earned more in subsidy payments had they chosen the BG subsidy, some foregoing a significant amount of money in order to lower FV prices for their shopping trip. This provides suggestive evidence that the positive effect of agency operates by allowing the shoppers to choose the healthy subsidy as a costly signal to motivate greater spending on FV.



**Figure 3.** Healthy subsidy payments and counterfactual unhealthy subsidy payments for subjects who select the FV subsidy.

## 5 Discussion and Conclusion

In this paper, we first corroborate earlier findings that subsidies for fruits and vegetables can be an effective tool to encourage healthy eating. The vast majority of our shoppers state a desire to consume more FV, and prices appear to be the reason why that desire is not satisfied. Relative to our Control group, offering a restricted subsidy that matches the targeting and rate of the USDA’s Healthy Incentives Pilot (HIP, [Bartlett et al. \(2014\)](#)) more than doubled FV spending (a 124% increase). Second, we show that the effectiveness of healthy food subsidies can be substantially increased through the introduction of increased agency and waiting periods. Combined, our interventions tripled FV spending (a 199% increase) relative to the Control group. Because these interventions have no direct costs to the provider, including them in a subsidy program

would have an outsized positive impact on the cost-benefit ratio of the program.

A substantial impediment to leveraging interventions in a subsidy program is operationalizing them in a market without the kind of user interface that we employed for this study. Our study featured substantial direct communication with shoppers, with treatments designed to test both theory and applications. These interventions are nonetheless feasible with existing infrastructure. As a part of the HIP, the USDA has already developed a model for modifying EBT software to identify an individual as a participant in the HIP, and assign them rebates based on spending in a particular food category. When a SNAP participant swipes their EBT card at the grocery store, eligible items are charged to the SNAP balance based on the item's code. If an HIP participant spends \$20 on FV, \$6 is credited to their remaining SNAP balance at the end of the transaction. Multiple subsidy options could thus be implemented using a similar model: EBT cards can link an individual to a fractional rebate for certain items. While we allowed for subsidy choices to change for each shopping trip, a simpler implementation could allow for SNAP participants to make a subsidy selection upon enrollment, with an opportunity to change it during recertification periods. In this way, early subsidy choice could be built in to the program. Alternatively, if policy-makers wanted to increase the frequency of choice, a subsidy selection system could be integrated into existing online portals that states use to allow recipients to check the EBT/SNAP balances. Future research may be needed to understand the relationship between agency and frequency of choice.

We found that increasing shopper agency over their subsidies did not decrease healthy food purchases as the classical model would predict. The behavioral mechanisms that appear to drive this impact do not necessarily imply that subsidy choices have to be between healthy and unhealthy options. We believe there would be substantial value in future research to understand the impact of a subsidy choice between two healthy options. Such a policy proposal could mitigate potential downside risk more than one with a wide array of subsidies. On the other hand, it could be that the opportunity to select a less healthy subsidy is what generates a larger buy-in to the healthy

subsidy. It may also be that allowing for a wide array of subsidies makes a SNAP incentive program an example of more politically palatable “libertarian paternalism.”

Our waiting periods intervention caused a large and significant increase in healthy spending. This intervention presents logistical challenges that may require new tools. The theory behind waiting periods is that they can be used to prompt deliberation prior to shopping in order to maximize the effectiveness of the subsidies. E-mail or text message communications with SNAP recipients in advance of their SNAP disbursement date should be a priority. According to [Castner and Henke \(2011\)](#), more than 20% of SNAP benefits are spent on the day they are disbursed, and more than half are spent by the end of the first week. Informing participants about their healthy-food subsidy the day before disbursement would prompt deliberation prior to this anticipated shopping.

It is worth emphasizing that the technology exists to allow SNAP recipients to be much more involved with the program than they are now. Banks compete for customers with their online and mobile tools for tracking spending over time and across categories. EBT technology could be leveraged in the same way to provide participants with information on their spending dynamics to assist with budgeting and grocery choices to help achieve nutritional goals. In that framework, agency and waiting periods can be used to make the program more effective.

## References

- ALLCOTT, H., R. DIAMOND, AND J.-P. DUBÉ (2017): “The Geography of Poverty and Nutrition: Food Deserts and Food Choices Across the United States,” Working Paper 24094, National Bureau of Economic Research.
- ALVAREDO, F., L. ASSOUD, AND T. PIKETTY (2017): “Measuring inequality in the Middle East 1990-2016: The World’s Most Unequal Region?” CEPR Discussion Papers 12405, C.E.P.R. Discussion Papers.
- ANDREONI, J., M. A. KUHN, AND L. SAMUELSON (2018): “Building Rational Cooperation on Their Own: Learning to Start Small,” *Journal of Public Economic Theory*, Forthcoming.
- BARTLETT, S., J. KLERMAN, P. WILDE, L. OLSHO, C. LOGAN, M. BLOCKLIN, M. BEAUREGARD, AND A. ENVER (2014): “Evaluation of the Healthy Incentives Pilot (HIP) Final Report,” Tech. rep., U.S. Department of Agriculture, Food and Nutrition Service.
- BEM, D. J. (1967): “Self-perception: An alternative interpretation of cognitive dissonance phenomena.” *Psychological review*, 74, 183.
- BENABOU, R. AND J. TIROLE (2004): “Willpower and personal rules,” *Journal of Political Economy*, 112, 848–886.
- (2011): “Identity, Morals, and Taboos: Beliefs as Assets \*,” *The Quarterly Journal of Economics*, 126, 805–855.
- BHATTARAI, A. (2017): “Grocery stores are adapting to more male shoppers - whom they treat like knuckleheads,” .
- BROWNBACK, A., A. IMAS, AND M. A. KUHN (2019): “Individual Discounting and Healthy Shopping Behavior: Evidence from the Field,” Working paper.
- BROWNBACK, A. AND S. SADOFF (2018): “Improving College Instruction through Incentives,” *Available at SSRN 3152028*.
- CASTNER, L. AND J. HENKE (2011): “Benefit Redemption Patterns in the Supplemental Nutrition Assistance Program,” Tech. rep., United States Department of Agriculture Food and Nutrition Service.
- COLE, N. AND M. FOX (2008): “Diet quality of Americans by Food Stamp participation status: Data from the National Health and Nutrition Examination Survey, 1999–2004,” Tech. rep., U.S. Department of Agriculture, Food and Nutrition Service, Office of Research, Nutrition and Analysis.
- DAI, X. AND A. FISHBACH (2013): “When waiting to choose increases patience,” *Organizational Behavior and Human Decision Processes*, 121, 256–266.

- DEJARNETTE, P. (2018): “Temptation Over Time: Delays Help,” Working paper.
- DREWNOWSKI, A. AND S. SPECTER (2004): “Poverty and obesity: the role of energy density and energy costs,” *The American Journal of Clinical Nutrition*, 79, 6–16.
- FALK, A. AND F. ZIMMERMANN (2018): “Information Processing and Commitment,” *The Economic Journal*, 128, 1983–2002.
- FISHBACH, A. AND M. J. FERGUSON (2007): “The goal construct in social psychology.” .
- FREEDMAN, J. L. AND S. C. FRASER (1966): “Compliance without pressure: the foot-in-the-door technique.” *Journal of personality and social psychology*, 4, 195.
- GABAIX, X. AND D. LAIBSON (2017): “Myopia and Discounting,” National Bureau of Economic Research Working paper No. 23254.
- GILBERT, D. T. AND T. D. WILSON (2007): “Prospection: Experiencing the Future,” *Science*, 317, 1351–1354.
- GNEEZY, A., A. IMAS, A. BROWN, L. D. NELSON, AND M. I. NORTON (2012): “Paying to Be Nice: Consistency and Costly Prosocial Behavior,” *Management Science*, 58, 179–187.
- GOSNELL, G. K., J. A. LIST, AND R. D. METCALFE (forthcoming): “The Impact of Management Practices on Employee Productivity: A Field Experiment with Airline Captains,” Tech. rep.
- HAHN, R., R. D. METCALFE, D. NOVGORODSKY, AND M. K. PRICE (2016): “The Behavioralist as Policy Designer: The Need to Test Multiple Treatments to Meet Multiple Targets,” Tech. rep., National Bureau of Economic Research.
- HALLSWORTH, M., J. A. LIST, R. D. METCALFE, AND I. VLAEV (2017): “The behavioralist as tax collector: Using natural field experiments to enhance tax compliance,” *Journal of Public Economics*, 148, 14–31.
- HARNACK, L., J. M. OAKES, B. ELBEL, T. BEATTY, S. RYDELL, AND S. FRENCH (2016): “Effects of Subsidies and Prohibitions on Nutrition in a Food Benefit Program: A Randomized Clinical Trial,” *JAMA internal medicine*, 176, 1610–1618.
- HEFFETZ, O. (2018): “Are reference points merely lagged beliefs over probabilities?” Tech. rep., National Bureau of Economic Research.
- HOYNES, H., D. W. SCHANZENBACH, AND D. ALMOND (2016): “Long-run impacts of childhood access to the safety net,” *American Economic Review*, 106, 903–934.
- HSIAW, A. (2013): “Goal-setting and self-control,” *Journal of Economic Theory*, 148, 601–626.

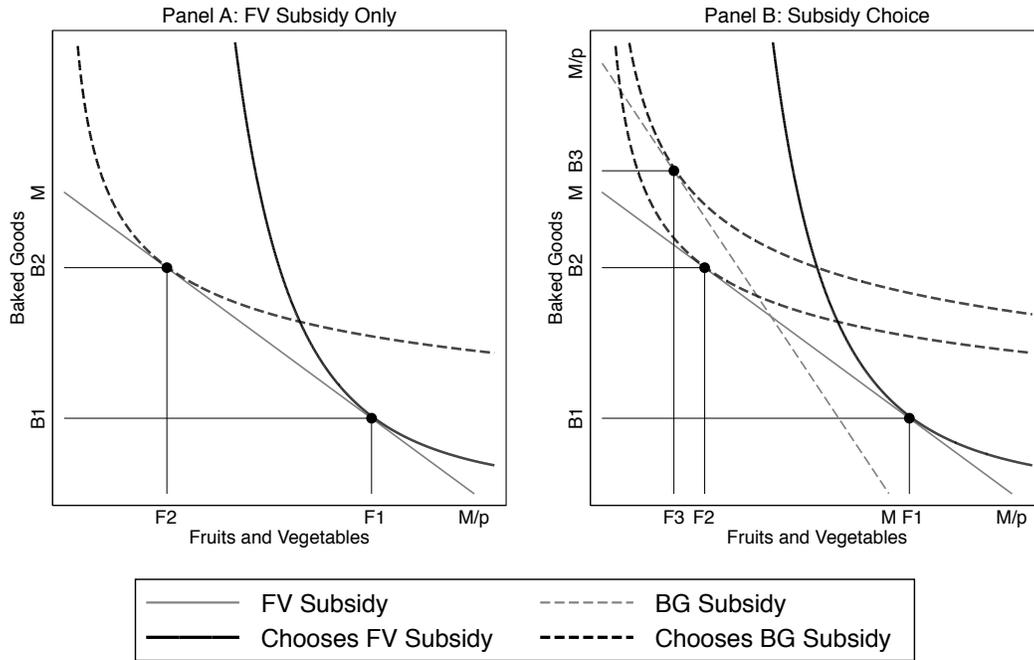
- IMAS, A., M. KUHN, AND V. MIRONOVA (2018): “Waiting to Choose,” Working Paper.
- JOHNSON, E. J., S. B. SHU, B. G. DELLAERT, C. FOX, D. G. GOLDSTEIN, G. HÄUBL, R. P. LARRICK, J. W. PAYNE, E. PETERS, D. SCHKADE, ET AL. (2012): “Beyond nudges: Tools of a choice architecture,” *Marketing Letters*, 23, 487–504.
- JUNG, J. Y. AND B. A. MELLERS (2016): “American attitudes toward nudges.” *Judgment & Decision Making*, 11.
- KOCH, A. K. AND J. NAFZIGER (2011): “Self-regulation through goal setting,” *Scandinavian Journal of Economics*, 113, 212–227.
- KOENIG, C. AND D. SCHINDLER (2016): “Dynamics in Gun Ownership and Crime -Evidence from the Aftermath of Sandy Hook,” Working paper.
- LEVITT, S. D., J. A. LIST, S. NECKERMAN, AND S. SADOFF (2016): “The behavioralist goes to school: Leveraging behavioral economics to improve educational performance,” *American Economic Journal: Economic Policy*, 8, 183–219.
- LUCA, M., D. MALHOTRA, AND C. POLIQUIN (2017): “Handgun waiting periods reduce gun deaths,” *Proceedings of the National Academy of Sciences*.
- O’DONOGHUE, T. AND M. RABIN (1999): “Doing it Now or Later,” *American Economic Review*, 89, 103–124.
- PIKETTY, T. AND E. SAEZ (2014): “Inequality in the long run,” *Science*, 344, 838–843.
- READ, D. AND B. VAN LEEUWEN (1998): “Predicting Hunger: The Effects of Appetite and Delay on Choice,” *Organizational Behavior and Human Decision Processes*, 76, 189–205.
- REHM, C., J. PEÑALVO, A. AFSHIN, AND D. MOZAFFARIAN (2016): “Dietary intake among us adults, 1999–2012,” *JAMA*, 315, 2542–2553.
- SCHWARTZ, M. B. (2017): “Moving Beyond the Debate Over Restricting Sugary Drinks in the Supplemental Nutrition Assistance Program,” *American Journal of Preventive Medicine*, 52, S199 – S205.
- SHAPIRO, J. M. (2005): “Is there a daily discount rate? Evidence from the food stamp nutrition cycle,” *Journal of Public Economics*, 89, 303–325.
- SMITH, J. J., P. J. MORGAN, R. C. PLOTNIKOFF, K. A. DALLY, J. SALMON, A. D. OKELY, T. L. FINN, AND D. R. LUBANS (2014): “Smart-phone obesity prevention trial for adolescent boys in low-income communities: the ATLAS RCT,” *Pediatrics*, 134, e723–e731.

- THALER, R. H. AND C. R. SUNSTEIN (2009): *Nudge: Improving decisions about health, wealth, and happiness*, Penguin.
- VOLPP, K. G., L. K. JOHN, A. B. TROXEL, L. NORTON, J. FASSBENDER, AND G. LOEWENSTEIN (2008): “Financial incentive-based approaches for weight loss: a randomized trial,” *Jama*, 300, 2631–2637.
- WHEELER, M. A., D. T. STUSS, AND E. TULVING (1997): “Toward a theory of episodic memory: The frontal lobes and autonoetic consciousness.” *Psychological Bulletin*, 121, 331–354.
- WOLF, A. M. (2012): “What Is the Economic Case for Treating Obesity?” *Obesity Research*, 6, 2S–7S.

# A Appendix

## A.1 Classical Utility Maximization

Consider the consumer's utility maximization problem. Suppose preferences over  $FV$  and  $BG$  spending are given by a Cobb-Douglas utility function:  $U(FV, BG) = FV^\alpha \cdot BG^{1-\alpha}$ . Demand for  $FV$  is given by  $FV^* = \alpha \cdot \frac{M}{p_F}$ , where  $p_F$  is the price of  $FV$  and  $\$M$  is the money dedicated to spending on the two goods. When we switch from subsidizing  $FV$  to offering a choice between  $FV$  and  $BG$  subsidies, one of two things will happen. Either the shopper selects the  $FV$  subsidy, and  $p_F$  and  $FV^*$  are unchanged, or the shopper selects the  $BG$  subsidy, which increases  $p_F$ , and thus decreases  $FV$  spending. This optimization process is demonstrated graphically in Appendix section Figure A.1 presents these budgets and the utility-maximizing indifference curves for two individuals: one with  $\alpha = 0.75$  who will choose the  $FV$  subsidy, and one with  $\alpha = 0.25$  who will choose the  $BG$  subsidy. In Panel A we show how both individuals behave when faced with the  $FV$  subsidy, and in Panel B, we show how they respond to the subsidy choice. The consumer with  $\alpha = 0.25$  selects the  $BG$  subsidy, and in doing so, substitutes to reduce  $FV$  spending from  $F2$  to  $F3$ .

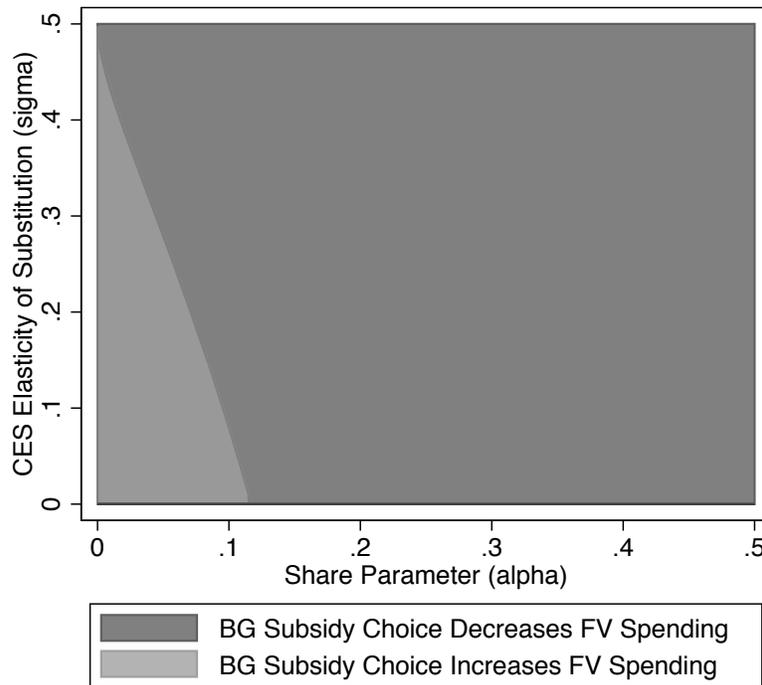


**Figure A.1.** Cobb-Douglas Utility Maximization Behavior from Subsidy Budgets

To consider a situation in which the consumer selecting the  $BG$  subsidy might increase their  $FV$  spending as a result, we need a utility function that allows for more complementarity. Consider the CES utility function:  $U(FV, BG) = (\alpha FV^\sigma + (1 - \alpha)BG^\sigma)^{\frac{1}{\sigma}}$ . Here,  $\sigma = \frac{1}{1-\gamma}$  is the elasticity of substitution and  $\alpha$  is the share parameter.

We use  $M = 12$ , which is roughly the average sum of FV and BG spending for shoppers that do not receive a subsidy, and the subsidy price of \$0.70 (as opposed to an unsubsidized price of \$1) that we use in the study.

The set of parameters that allows subsidy choice to result in increased FV spending is small and shown in Figure A.2. Shoppers will not select the BG subsidy unless  $\alpha < 0.5$ . However, there is no non-zero elasticity of substitution for which the selection of the BG subsidy will increase FV spending until the share parameter falls to about 0.1. Once the share parameter is in that range, low elasticities will permit this, although there is no non-zero share parameter for which this will happen if the elasticity of substitution is 0.5 or higher.



**Figure A.2.** Impact of Subsidy Choice on FV Spending by CES Parameters

## A.2 Impact of Treatments on BG Spending

One interesting result shown in Figure 2 is that the allowing subjects to select the BG subsidy increases BG spending by less than it increases FV spending. Appendix Table A.1 shows that the impact of allowing BG subsidy choice on BG spending ranges from \$1.07 to \$1.51 across specifications. While the difference-in-differences is not statistically significant, a natural prior here would be that allowing for the BG subsidy increases BG spending by more than it increase FV spending. We find no evidence for this with a very similar impact of agency on FV and BG depending on the specification.

**Table A.1.** Effect of Treatments on BG Spending (\$), Combined Data

	(1)	(2)	(3)	(4)
Subsidy	-1.06 (1.02)	-0.25 (0.94)	-1.05 (1.02)	-1.05 (1.02)
Agency	1.07** (0.66)		1.30* (0.68)	1.51** (0.71)
Waiting Period		1.02** (0.43)	0.65 (0.45)	1.06** (0.50)
Commitment				-1.52* (0.92)
Baseline Survey FV Spending (\$)	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)
Part 1, Part 2 Fixed Effects	Y	Y	Y	Y
Wave Fixed Effects	Y	Y	Y	Y
Observations	2767	2767	2767	2767
Clusters	805	805	805	805

\*\*  $\Rightarrow p < 0.05$ . Standard errors in parentheses are clustered at the subject level. All specifications are linear random effects models.

### A.3 Impact of Treatments on the Fraction of Spending on FV

A consequence of the increases in both FV and BG spending that result from agency and waiting periods is that there is a muted effect of these interventions on the fraction of food spending devoted to FV. Table A.2 shows these estimates. Indeed, to the extent that agency or waiting periods increase the fraction of spending on FV, it appears to occur through the inclusion of the Commitment treatment, which has a positive and significant effect on the fraction of food spending on FV.

Interestingly, while the level of FV spending does not significantly increase when subjects commit to a subsidy, the fraction of food spending dedicated to FV does increase significantly – by between 6 and 7 percentage points. This is because the positive and insignificant effect on FV spending combines with a negative and marginally significant effect on BG spending (see Appendix Table A.1) to produce a food bundle with more FV.

**Table A.2.** Effect of Interventions on the Fraction of FV Spending (\$), Combined Data

	(1)	(2)	(3)	(4)
Subsidy	0.150*** (0.023)	0.152*** (0.018)	0.150*** (0.023)	0.150*** (0.023)
Agency	0.007 (0.022)		0.004 (0.024)	-0.005 (0.025)
Waiting Period		0.006 (0.016)	0.005 (0.018)	-0.012 (0.019)
Commitment				0.062** (0.026)
Baseline Survey FV Spending (\$)	0.157*** (0.043)	0.158*** (0.044)	0.158*** (0.044)	0.156*** (0.043)
Part 1, Part 2 Fixed Effects	Y	Y	Y	Y
Wave Fixed Effects	Y	Y	Y	Y
Observations	2710	2710	2710	2710
Clusters	793	793	793	793

\*\*  $\Rightarrow p < 0.05$ . Standard errors in parentheses are clustered at the subject level. All specifications are linear random effects models. We lose 22 observations and 1 subject relative to the count in Table ?? because of receipts with no food items. We lose another 35 observations and 11 subjects due to baseline survey receipts with no food items.

## B Instructions

In this section, we include the instructions and protocols for each of the surveys that the shoppers may have seen. For the baseline survey, that protocol includes the elicitation of time preferences. Assignment occurred after the baseline survey. The first instructions shoppers received for their assigned treatment were given at the beginning of their survey for Shopping Trip 1.

All shoppers saw an introduction identical to the control group. The instructions for submitting pictures of receipts was also identical across treatments. Where the individual treatments differed from the control group, we will indicate in their subsection.

### B.1 Baseline

Hi Agents! This is the first survey of the 4-6-week grocery shopping study. You can take this survey anywhere. You are required to have the following BEFORE accepting this survey:

- A recent itemized receipt from a recent grocery shopping trip you took to a store with a produce section.

- A blank piece of paper and pencil/pen.

When you have both required items available, you can begin the survey. There are 10 questions and 2 photos.

Have fun!

Thank you for your interest in our study. Our study seeks to investigate grocery choices. The study will cover 6 weeks and will require that you submit receipts from your grocery purchases over that timeframe. You will submit these receipts in the form of a photo attached to a Field Agent Job. This Job may involve answering a series of questions both during your shopping trip and in between shopping trips.

The payment for participation is \$30 total (\$1 per survey with the balance paid at the end with the successful completion of all study requirements.

In addition to the participation payments, the majority of participants will have the opportunity to receive up to \$40 in free groceries.

It is very important that all participants complete all 6 weeks of the study, so please don't agree to participate unless you have time to finish the entire study.

As a bonus for completing this study, we have included three "Bonus Questions" that offer you a chance to earn additional money. We will randomly choose agents to receive this bonus money, so payment for this question is NOT guaranteed.

For these Bonus Questions, we are going to show you 3 different scenarios (2 now, and 1 at the end of this survey) and ask you to select your preferred option in each scenario.

For each Bonus Question you answer today, you will have about a 1 in 50 chance of winning the amount determined by your selection. So, treat each Bonus Question as if it will determine your actual bonus payment.

Additional money earned from any Bonus Question will be deposited directly into your Field Agent account. However, you will have a choice about when to receive this bonus.

As a reminder, you will be paid the full \$30 for successfully completing the full study no matter your answers to the bonus questions and whether or not you are selected for bonus payment.

1. **Bonus Question #1:** In this question, your bonus grows larger the longer you wait for it.

The earliest you can choose to receive your bonus is 1 week from today. If you choose to receive it 1 week from today, it will be \$50. If you choose to wait longer to receive your bonus—up to a maximum of 27 weeks from today—it will grow by some amount.

Below, there are a number of combinations of waiting times and bonus amounts that you can choose.

Which is your preferred option?

- (a) Receive \$50 in 1 week

- (b) Wait 2 weeks, receive \$53
- (c) Wait 3 weeks, receive \$54
- (d) Wait 5 weeks, receive \$55
- (e) Wait 7 weeks, receive \$56
- (f) Wait 9 weeks, receive \$57
- (g) Wait 11 weeks, receive \$58
- (h) Wait 13 weeks, receive \$59
- (i) Wait 16 weeks, receive \$60
- (j) Wait 19 weeks, receive \$61
- (k) Wait 23 weeks, receive \$62
- (l) Wait 27 weeks, receive \$63

2. **Bonus Question #2:** This question is similar to Bonus Question #1, except shifted by a week.

Here, you have the option of receiving the bonus today. Below are the combinations of waiting times and bonus amounts that you can choose from.

Which is your preferred option?

- (a) Receive \$50 right away
- (b) Wait 1 week, receive \$53
- (c) Wait 2 weeks, receive \$54
- (d) Wait 4 weeks, receive \$55
- (e) Wait 6 weeks, receive \$56
- (f) Wait 8 weeks, receive \$57
- (g) Wait 10 weeks, receive \$58
- (h) Wait 12 weeks, receive \$59
- (i) Wait 15 weeks, receive \$60
- (j) Wait 18 weeks, receive \$61
- (k) Wait 22 weeks, receive \$62
- (l) Wait 26 weeks, receive \$63

Great! For the next few questions, we want you to think about the group of people with whom you share a budget for food.

If you are a member of a family living together, this is probably the entire household. If you live with roommates and don't pool money together for food, this would mean just you.

In general, think of the entire group you plan for when you go grocery shopping. We will refer to this group as your food household from now on. We are now going to ask some questions about your food situation. Please provide an answer as it relates to your food household.

3. Which of these statements best describes the food eaten in your food household in the last 30 days?
  - (a) Enough of the kinds of food we want to eat
  - (b) Enough, but not always the kinds of food we want to eat
  - (c) Sometimes not enough to eat
  - (d) Often not enough to eat
  
4. In the last 30 days, how often did you worry about whether your food would run out before you got money to buy more?
  - (a) Almost always
  - (b) Most of the time
  - (c) About half of the time
  - (d) Some of the time
  - (e) Almost never
  
5. In the last 30 days, how often did you feel like your food household couldn't afford to eat well-balanced (healthy) meals because you couldn't afford it?
  - (a) Almost always
  - (b) Most of the time
  - (c) About half of the time
  - (d) Some of the time
  - (e) Almost never
  
6. Do you think your food household eats the right amount of fruits and vegetables?
  - (a) Yes, we eat the right amount
  - (b) No, we should eat more
  - (c) No, we should eat less

We are now going to ask some questions about your health situation.

7. How would you rate your physical health status?
  - (a) Excellent
  - (b) Very good
  - (c) Good
  - (d) Fair
  - (e) Poor

8. Thinking about the past couple weeks, how often do you find that you have difficulty maintaining energy, focus, or attention?
- (a) Almost always
  - (b) Most of the time
  - (c) About half of the time
  - (d) Some of the time
  - (e) Almost never

**Food Diary:** You will need a piece of paper and a pencil for this activity. We would like to know what a typical day of food consumption is like for you. If there are any children in your food household, then we would also like to know what a typical day of consumption is like for one child. To make this easy, just think about the food you ate yesterday.

On a piece of paper, create four sections for yesterday’s food: breakfast, lunch, dinner, and snacks. In each section, try to remember and list everything you ate. If you know the quantity you ate, please include it. If you do not remember the quantity, please still list the item.

If there are any children in your food household, please make a separate chart for one child.

See the example below, of what a food diary might look like. Once you complete your food diary, please take a readable photo of it. Make sure your photo is clear and in focus. Make sure that we can read your food diary entries.

My Food Diary

Breakfast	Lunch	Dinner	Snacks
Cheerios and milk	Pizza (2 slices)	Grilled chicken	Banana
Apple	Breadsticks	Baked potato	Popcorn (1 bag)
Coffee	Coke (1 can)	Mac and Cheese	
		Side salad with Ranch	
		Iced Tea	

**Figure B.3.** Example Food Diary

**Shopping Receipt:** In your study confirmation email, we asked you to begin saving your receipts from your grocery shopping trips. Please take a photo of an itemized receipt from your most recent Stock-Up grocery-shopping trip.

As a reminder, a “Stock-Up” shopping trip is a trip to a grocery store—somewhere that has a produce section with multiple aisles—where you purchased food or ingredients to prepare multiple meals at home.

Some additional requests:

- If your receipt is too long to fit into a readable photo, please neatly tear it into two or more sections to put next to one another for the photo.
- Make sure your photo is clear and in focus. Make sure that we can read the items listed on the receipt.

- Please take your picture with a vertical (portrait) orientation.
9. **Bonus Question #3:** Now that you’ve had a little more time to think about Bonus Question #2, you have another chance to make a selection from the same set of options in Bonus Question #2. This will not replace your answer to Bonus Question #2: it is a different question and your choice from it may count separately from Bonus Question #2.

Recall that, for this question, a \$50 bonus is available today. Also recall that if you wait to receive your bonus—up to a maximum of 26 weeks from today—it will increase as you wait longer.

Below are your options with different waiting times and bonus amounts that you can choose.

Taking time to think about it, which is your preferred option?

- (a) Receive \$50 right away
- (b) Wait 1 weeks, receive \$53
- (c) Wait 2 weeks, receive \$54
- (d) Wait 4 weeks, receive \$55
- (e) Wait 6 weeks, receive \$56
- (f) Wait 8 weeks, receive \$57
- (g) Wait 10 weeks, receive \$58
- (h) Wait 12 weeks, receive \$59
- (i) Wait 15 weeks, receive \$60
- (j) Wait 18 weeks, receive \$61
- (k) Wait 22 weeks, receive \$62
- (l) Wait 26 weeks, receive \$63

That is all the questions we have for you today. In the next few days, you will see the first grocery-shopping survey of the study in your Field Agent app under the heading “Just For You.” This survey will contain all of the instructions you will need to complete the study.

Make sure to OPEN AND READ THE INSTRUCTIONS for your next survey BEFORE your next grocery-shopping trip. This survey will include all instructions for the study. You do not have to alter your shopping schedule for this survey, just remember to begin your next survey before your next usual grocery shopping trip.

Remember that the store you go to MUST:

- Have a produce section with multiple aisles of fruits and vegetables.
- Provide itemized receipts.

If you have any questions or concerns about this study please email us at Support@Fieldagent.net. Put “Grocery Shopping Study” in the subject line.

See you soon!

## B.2 Control

### B.2.1 Common Introduction

Hi Agents!

Take this survey the next time you go on a grocery-shopping trip.

Remember that the store you go to must:

- Have a produce section with multiple aisles of fresh fruits & vegetables
- Provide an itemized receipt

WAIT until you arrive at the store to do this survey. If you are not at the grocery store right now, close the survey and re-open it when you arrive. If you are at the grocery store right now, please continue with the survey.

You cannot go backwards in the study, so read and answer all questions carefully.

Have fun!

### B.2.2 Common Receipt Submission

Now, go ahead and complete your shopping trip. The next screen will ask for a picture of your itemized grocery receipt. Take a picture of the receipt before going home from the store (it's fine to be in your car or the parking lot)

When you have finished shopping and have paid for your purchases continue to the next screen.

PHOTO 1: Take a photo of your itemized grocery shopping receipt while still at the store. You can be in your car, but **DO NOT LEAVE THE LOT**.

- The receipt must be clear and in focus – Your reimbursement is dependent upon the receipt being clear and in focus.
- We must be able to read all of the items that you purchased today.
- Make sure we can see the name of the store you shopped at.
- Make sure we can see the date and time of your purchase.
- Please take the picture with a vertical orientation.
- If the receipt is too big to capture in one photo, carefully tear the receipt and arrange it so that it can all fit into 1 picture.

Take a picture of your itemized grocery receipt.

That is all the questions we have for you today.

You must wait at least 5 days to complete your next grocery shopping trip survey.

If you have any questions, email us at [Support@fieldagent.net](mailto:Support@fieldagent.net) before you submit this survey. Put “Grocery Shopping Study” in the subject line.

## B.3 Restricted

*[Begin with Common Introduction]*

### B.3.1 Common Restricted Subsidy

For this grocery-shopping trip, we will reimburse you for some of your groceries. Please read the instructions carefully.

Any item in the fruits and vegetables category will qualify for the partial reimbursement. Fruits and vegetables are defined below:

- Fresh fruits and vegetables
- Canned fruits and vegetables
- Frozen fruits and vegetables
- Processed or prepared products that simply contain some fruits and vegetables do not qualify. For example, frozen fruit qualifies, but frozen juice concentrate does not because of the added sugar. Cabbage qualifies, but prepared coleslaw does not because of the added mayonnaise. Canned tomatoes qualify but canned pasta sauce does not because of the added salt.

You will be reimbursed 30% of the price on all items on your receipt in the fruits and vegetables category, up to a maximum reimbursement of \$10.

For example:

- If you spend \$30 on fruits and vegetables, you will receive a reimbursement of  $(30\% \text{ of } \$30) = \$9$ .
- If you spend \$25 on fruits and vegetables, you will receive a reimbursement of  $(30\% \text{ of } \$25) = \$7.50$ .
- If you spend \$33.33 or on fruits and vegetables, you will receive the maximum reimbursement of \$10.

Your reimbursement will be credited to your Field Agent account within 7 days of this shopping trip. We will use the receipt you submit at the end of this survey to calculate your reimbursement.

Do you understand?

- Yes [Proceed to next question]
- No

*[Continue with Common Receipt Submission]*

### B.4 Agency

*[Begin with Common Introduction]*

### B.4.1 Common Choice Procedure

For this grocery-shopping trip, we will reimburse you for some of your groceries. You will need to choose which types of foods to be reimbursed for.

Please read the instructions carefully.

There are two food categories for you to choose from:

1. Fruits and vegetables
2. Baked goods

Here's a list of what falls into each category:

Fruits and Vegetables:

- Fresh fruits and vegetables
- Canned fruits and vegetables
- Frozen fruits and vegetables
- Processed or prepared products that simply contain some fruits and vegetables do not qualify. For example, frozen fruit qualifies, but frozen juice concentrate does not because of the added sugar. Cabbage qualifies, but prepared coleslaw does not because of the added mayonnaise. Canned tomatoes qualify but canned pasta sauce does not because of the added salt.

Baked Goods:

- Bread, biscuits and rolls
- Muffins, cakes and cupcakes
- Pies and tarts
- Crackers, chips, pretzels and other snacks do not qualify.
- In general, if you can buy it at a bakery, it counts. For example, sandwich bread qualifies, but a prepared sandwich does not. Muffins, English muffins and bagels qualify but a package of crackers does not.

For whichever category you choose, you will be reimbursed 30% of the price on all items on your receipt in that category, up to a maximum reimbursement of \$10.

For example:

- If you choose Fruits and Vegetables and spend \$30 on items in that category, you will receive a reimbursement of  $(30\% \text{ of } \$30) = \$9$ .
- If you choose Baked Goods and spend \$25 on items in that category, you will receive a reimbursement of  $(30\% \text{ of } \$25) = \$7.50$ .
- If you spend \$33.33 or more on items in your chosen category, you will receive the maximum reimbursement of \$10.

Your reimbursement will be credited to your Field Agent account within 7 days of this shopping trip. We will use the receipt you submit at the end of this survey to calculate your reimbursement.

Which category would you like to get the 30% reimbursement on? [*Randomized list*]

- Fruits and Vegetables
- Baked Goods

Now, go ahead and complete your shopping trip. The next screen will ask for a picture of your itemized grocery receipt. Take a picture of the receipt before going home from the store (it's fine to be in your car or the parking lot)

When you have finished shopping and have paid for your purchases continue to the next screen.

*[Continue with Common Receipt Submission]*

## **B.5 Waiting Period**

### **B.5.1 Pre-Shopping Survey**

Hi Agents! We have 2 short surveys for you for your next grocery-shopping trip of over \$25. We'll call these surveys 1) your "Planning Survey" and 2) your "Shopping Survey."

This is the Planning Survey (1 of 2).

- You MUST complete this survey 4 to 48 hours BEFORE you go grocery shopping.
- If you are already at the store, or will shop sooner than 4 hours from now, just wait to do this survey until the next grocery-shopping trip. We will wait for you.
- If you aren't going on a grocery shopping trip in the next 48 hours, close the survey and re-open it 4-48 hours before your next grocery trip.

DO NOT:

- Do not complete this survey in the parking lot of the store. Complete this survey at home. When you are at the store, you will complete the Shopping Survey.

WE WILL:

- Verify that you have completed this survey between 4 and 48-hours before your shopping trip, we'll compare the time you submit this Planning Survey to the timestamp on your shopping receipt.

NEXT:

- If you will complete a grocery-shopping trip in the next 4-48 hours, please continue with the survey.
- Remember that the store you go to must:
  - Have a produce section with multiple aisles of fruits and vegetables.
  - Provide itemized receipts.

You cannot go backwards in the study, so read and answer all questions carefully. Have fun!

For your upcoming grocery-shopping trip, we will reimburse you for some of your groceries. Any item in the fruits and vegetables category will qualify for the partial reimbursement. Fruits and vegetables are defined below:

Fruits and Vegetables:

- Fresh fruits and vegetables
- Canned fruits and vegetables
- Frozen fruits and vegetables
- Processed or prepared products that simply contain some fruits and vegetables do not qualify. For example, frozen fruit qualifies, but frozen juice concentrate does not because of the added sugar. Cabbage qualifies, but prepared coleslaw does not because of the added mayonnaise. Canned tomatoes qualify but canned pasta sauce does not because of the added salt.

You will be reimbursed 30% of the price on all items on your receipt in the fruits and vegetables category, up to a maximum reimbursement of \$10.

For example:

- If you spend \$30 on fruits and vegetables, you will receive a reimbursement of  $(30\% \text{ of } \$30) = \$9$ .
- If you spend \$25 on fruits and vegetables, you will receive a reimbursement of  $(30\% \text{ of } \$25) = \$7.50$ .
- If you spend \$33.33 or more on fruits and vegetables, you will receive the maximum reimbursement of \$10.

Your reimbursement will be credited to your Field Agent account within 7 days of this shopping trip. We will use the receipt you submit at the end of your Shopping Survey to calculate your reimbursement.

On your upcoming Shopping Survey:

You will be required to answer the first survey question BEFORE you finish shopping. Then, you can check out and take a photo of your receipt.

(NOTE: If you miss the 4-48-hour window, your Shopping Survey will direct you to a “Make-Up Planning Survey.” You will be required to re-take this Planning Survey and wait another 4-48 hours before shopping.)

Select “I understand” to indicate that you have read the instructions and understand the reimbursement offer.

### **B.5.2 Shopping Survey**

Hi Agents! This is survey 2 of 2, your “Shopping Survey.”

COMPLETE THIS JOB IF:

- If it has been between 4-48 hours since submitting the Planning Survey (1 of 2), and you are at the grocery store. Accept this job and answer the first 2 questions BEFORE you shop for groceries and check out.
- If you missed the 4-48 hour time window – Life happens. We get it. Accept this survey and let us know. You will be directed on how to take the Make Up Surveys.
- If you still need to get your groceries now, that is perfectly fine. You will need to wait until your next grocery-shopping trip to complete the Make-Up surveys. We will wait for you.

WE WILL:

- Verify that you have answered the first two questions before purchasing your groceries.

NEXT:

- Remember that the store you go to must:
  - Have a produce section with multiple aisles of fresh fruits and vegetables
  - Provide an itemized receipt

You cannot go backwards in the survey, so read and answer all questions carefully. Have fun!

We asked you in the Planning Survey to wait a minimum of 4 hours and a maximum of 48 hours before shopping and completing this Shopping Survey. Tell us about how long it has been since you completed your Planning Survey for this week. An estimate is OK. We’ll double check for you.

If it has not been 4 hours, please wait to complete this Shopping Survey until it has been at least 4 hours.

If it has been longer than 48 hours (2 days), we need you to complete a Make Up Planning Survey. Don’t worry, we’ll direct you there.

About how long has it been since you completed your Planning Survey for this grocery shopping trip?

- 4-48 hours

- 48 hours or more

Great! Let's get shopping.

*[Continue with Common Restricted Subsidy]*

*[Continue with Common Receipt Submission]*

## **B.6 Waiting Period with Agency**

### **B.6.1 Pre-Shopping Survey**

Hi Agents! We have 2 short surveys for you for your next grocery-shopping trip of over \$25. We'll call these surveys 1) your "Planning Survey" and 2) your "Shopping Survey." This is survey 1 of 2: your Planning Survey.

Each week you will take this Planning Survey at least 4 hours, and no more than 48 hours BEFORE you head to the grocery store for a grocery shopping trip to purchase food. Remember that the store you go to must:

- Have a produce section with multiple aisles of fruits and vegetables.
- Provide itemized receipts.

You MUST complete this Planning Survey at least 4 hours BEFORE you go to the store for your shopping trip. Do not wait to complete this survey in the parking lot of the store. When you are at the store, you will complete the Shopping Survey. If you are already at the store, or will shop sooner than 4 hours from now, close the survey and re-open it 4-48 hours before your next Stock Up grocery trip. If you aren't going on a Stock Up grocery shopping trip in the next 48 hours, close the survey and re-open it 4-48 hours before your next Stock Up grocery trip.

To verify that you have completed this survey between 4 and 48-hours before your shopping trip, we'll compare the timestamp on your shopping receipt to the time you submit this Planning Survey. If you will complete a grocery shopping trip in the next 4-48 hours, please continue with the survey.

You cannot go backwards in the study, so read and answer all questions carefully.

Have fun!

For your upcoming grocery-shopping trip, we will reimburse you for some of your groceries. When you begin your Shopping Survey this week, you will need to choose which types of foods to be reimbursed for. Please read the instructions carefully.

There are two food categories for you to choose from:

1. Fruits and vegetables
2. Baked goods

Here's a list of what falls into each category:

Fruits and Vegetables:

- Fresh fruits and vegetables
- Canned fruits and vegetables
- Frozen fruits and vegetables
- Processed or prepared products that simply contain some fruits and vegetables do not qualify. For example, frozen fruit qualifies, but frozen juice concentrate does not because of the added sugar. Cabbage qualifies, but prepared coleslaw does not because of the added mayonnaise. Canned tomatoes qualify but canned pasta sauce does not because of the added salt.

Baked Goods:

- Bread, biscuits and rolls
- Muffins, cakes and cupcakes
- Pies and tarts
- Crackers, chips, pretzels and other snacks do not qualify.
- In general, if you can buy it at a bakery, it counts. For example, sandwich bread qualifies, but a prepared sandwich does not. Muffins, English muffins and bagels qualify but a package of crackers does not.

For whichever category you choose, you will be reimbursed 30% of the price on all items on your receipt in that category, up to a maximum reimbursement of \$10.

For example:

- If you choose Fruits and Vegetables and spend \$30 on items in that category, you will receive a reimbursement of (30% of \$30) = \$9.
- If you choose Baked Goods and spend \$25 on items in that category, you will receive a reimbursement of (30% of \$25) = \$7.50.
- If you spend \$33.33 or more on items in your chosen category, you will receive the maximum reimbursement of \$10.

Your reimbursement will be credited to your Field Agent account within 7 days of this shopping trip. We will use the receipt you submit at the end of your Shopping Survey to calculate your reimbursement.

We will ask you at the store which category you would like to receive the 30% reimbursement for (Baked goods or Fruits & Vegetables).

You will be required to answer that question BEFORE you finish shopping. Then, you can check out and take a photo of your receipt.

(NOTE: If you miss the 4-48-hour window, your Shopping Survey will direct you to a “Make-Up Planning Survey.” You will be required to re-take this Planning Survey and wait another 4-48 hours before shopping.)

Select “I understand” to indicate that you have read the instructions and understand the reimbursement offer.

## B.6.2 Shopping Survey

Hi Agents! This is survey 2 of 2, your “Shopping Survey.” Take this survey once you are at the grocery store for your grocery shopping trip. You can go to any grocery store you typically shop at as long as it has a produce section and provides itemized receipts.

Remember that the grocery store you go to must:

- Have a produce section with multiple aisles of fruits and vegetables.
- Provide itemized receipts.

WAIT until you arrive at the store to do this survey. If you are not at the grocery store right now, close the survey and re-open it when you arrive. If you are at the grocery store right now, please continue with the survey and answer the questions BEFORE you finish shopping.

If you have missed your 4-48 hour window, you will be directed on how to take a Make Up Planning Survey 4-48 hours before a Make-Up Shopping Survey. If you still need to complete this shopping trip, that is perfectly fine, but wait until your next grocery shopping trip to complete the Make-Up surveys. Accept the Make-Up survey for further directions.

You cannot go backwards in the study, so read and answer all questions carefully. Have fun!

We asked you in the Planning Survey to wait a minimum of 4 hours and a maximum of 48 hours before shopping and completing this Shopping Survey. Tell us about how long it has been since you completed your Planning Survey for this week. An estimate is OK. We’ll double check for you.

If it has not been 4 hours, please wait to complete this Shopping Survey until it has been at least 4 hours.

If it has been longer than 48 hours (2 days), we need you to complete a Make Up Planning Survey. Don’t worry, we’ll direct you there.

About how long has it been since you completed your Planning Survey for this grocery shopping trip?

- 4-48 hours
- 48 hours or more

Great! Let’s get shopping.

*[Continue with Common Choice Procedure]*

*[Continue with Common Receipt Submission]*

## B.7 Commitment

### B.7.1 Pre-Shopping Survey

Hi Agents! We have 2 short surveys for you for your next grocery-shopping trip of over \$25. We'll call these surveys 1) your "Planning Survey" and 2) your "Shopping Survey." This is survey 1 of 2: your Planning Survey.

Each week you will take this Planning Survey at least 4 hours, and no more than 48 hours BEFORE you head to the grocery store for a grocery shopping trip to purchase food. Remember that the store you go to must:

- Have a produce section with multiple aisles of fruits and vegetables.
- Provide itemized receipts.

You MUST complete this Planning Survey at least 4 hours BEFORE you go to the store for your shopping trip. Do not wait to complete this survey in the parking lot of the store. When you are at the store, you will complete the Shopping Survey. If you are already at the store, or will shop sooner than 4 hours from now, close the survey and re-open it 4-48 hours before your next grocery trip. If you aren't going on a grocery shopping trip in the next 48 hours, close the survey and re-open it 4-48 hours before your next grocery trip.

To verify that you have completed this survey between 4 and 48-hours before your shopping trip, we'll compare the timestamp on your shopping receipt to the time you submit this Planning Survey. If you will complete a grocery shopping trip in the next 4-48 hours, please continue with the survey.

You cannot go backwards in the study, so read and answer all questions carefully. Have fun!

For your upcoming grocery-shopping trip, we will reimburse you for some of your groceries. In this survey, you will need to choose which types of foods to be reimbursed for.

*[Continue with Common Choice Procedure]*

### B.7.2 Shopping Survey

We asked you in the Planning Survey to wait a minimum of 4 hours before shopping and completing this Shopping Survey. Tell us about how long it has been since you completed your Planning Survey for this week. An estimate is OK. We'll double check for you.

If it has not been 4 hours, please wait to complete this Shopping Survey until it has been at least 4 hours.

If it has been longer than 48 hours (2 days), we need you to complete a Make Up Planning Survey. Don't worry; we'll direct you there.

About how long has it been since you completed your Planning Survey for this grocery shopping trip?

- 4-48 hours
- 48 hours or more

Great! Let's get shopping.

For this grocery-shopping trip, we will reimburse you for some of your groceries. You previously chose which types of foods to be reimbursed for. It is important that you remember this correctly for us to reimburse you.

Which of the two categories did you choose to be reimbursed for?

1. Fruits and vegetables
2. Baked goods

Here's a list reminding you of what falls into each category:

Fruits and Vegetables:

- Fresh fruits and vegetables
- Canned fruits and vegetables
- Frozen fruits and vegetables
- Processed or prepared products that simply contain some fruits and vegetables do not qualify. For example, frozen fruit qualifies, but frozen juice concentrate does not because of the added sugar. Cabbage qualifies, but prepared coleslaw does not because of the added mayonnaise. Canned tomatoes qualify but canned pasta sauce does not because of the added salt.

Baked Goods:

- Bread, biscuits and rolls
- Muffins, cakes and cupcakes
- Pies and tarts
- Crackers, chips, pretzels and other snacks do not qualify.
- In general, if you can buy it at a bakery, it counts. For example, sandwich bread qualifies, but a prepared sandwich does not. Muffins, English muffins and bagels qualify but a package of crackers does not.

For whichever category you chose, you will be reimbursed 30% of the price on all items on your receipt in that category, up to a maximum reimbursement of \$10.

Your reimbursement will be credited to your Field Agent account within 7 days of this shopping trip. We will use the receipt you submit at the end of this Shopping Survey to calculate your reimbursement.

*[Continue with Common Receipt Submission]*