

# Behavioral Food Subsidies\*

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We examine the potential of healthy food subsidies for reducing nutritional inequality through demand-side interventions. Using a pre-registered field experiment with low-income grocery shoppers, we show that low-cost, scalable behavioral interventions make subsidies substantially more effective. Our unique design allows us to elicit choices and deliver subsidies both *before* and *during* a shopping trip. We examine two novel interventions: giving shoppers greater agency through a choice between subsidies and introducing waiting periods designed to prompt deliberation about food purchases. The interventions increase healthy purchases by 61% relative to choiceless healthy subsidies, and 199% relative to a control group.

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

**JEL Classifications:** D9, D12, C93

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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 individuals 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 aiming to increase access to healthy food may be limited in their ability to close 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 and vegetable consumption among SNAP participants is approximately half of the recommended intake, while higher-income non-participants consume over two-thirds of the recommendation (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

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

<sup>2</sup>This is motivated by the relatively low nutritional content of SNAP purchases. For example, soda takes up the largest share and approximately 20% of SNAP spending goes towards sweets and sugary drinks. Efforts to place restrictions on SNAP purchases include 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/>).

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 the restricted subsidies significantly increased purchases and consumption of fruits and vegetables.

A “restricted” healthy subsidy features strict limits on what is and is not subsidized. Research suggests that such paternalistic restrictions to food policy may backfire, for example through a “reactance effect” (Brehm 1966; Brehm and Brehm 2013). Our paper is the first to directly explore the effects of greater agency—allowing shoppers to choose either a healthy or an unhealthy subsidy—on purchase decisions. The introduction of agency builds on work in psychology and behavioral economics suggesting that active choice will generate a preference for consistency, thereby increasing the effectiveness of subsidies in encouraging healthy food spending. Importantly, this active choice is fundamentally distinct from standard self-commitment opportunities studied in behavioral economics because there is no dominance relationship between the subsidies. Our agency intervention is designed to give shoppers the opportunity to spur themselves towards consistent, healthy behavior in the form of more nutritious food purchases, but does not provide a chance to commit *against* purchasing unhealthy food.<sup>3</sup>

We also examine how the introduction of waiting periods impacts shopping behavior. Waiting periods enforce a delay between the arrival of information about the subsidy and the shopping trip when the subsidy will be used.<sup>4</sup> Waiting periods are designed to stimulate deliberation before food purchases; such deliberation-prompts

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<sup>3</sup>Self-commitment where individuals restrict their choices either by constraining future consumption (O’Donoghue and Rabin (1999a)) or through the choice of (weakly) dominated options has been evaluated in the domain of grocery choice (Schwartz, Mochon, Wyper, Maroba, Patel, and Ariely (2014), Sadoff, Samek, and Sprenger (2015)), exercise (DellaVigna and Malmendier 2006), and labor supply (Kaur, Kremer, and Mullainathan 2015), among others. Our agency intervention offers shoppers more subsidy options relative to the restricted subsidy, which decreases the scope for constraining consumption.

<sup>4</sup>Importantly, the subsidy information is not new and had been provided to participants prior to the beginning of the study. 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.

have been shown to encourage less myopic and more future-oriented decision-making (Imas et al. 2018).

We investigate these behavioral interventions through a field experiment with low-income grocery shoppers. To assess the impact of agency, we compare the purchase decisions of shoppers who are able to choose between healthy and unhealthy subsidies with those of shoppers who are restricted to a healthy subsidy. We make a similar comparison of food purchases for shoppers with and without the enforcement of a waiting period prior to shopping.

We find that coupling subsidies with these mechanisms *triples* purchases of healthy food relative to a control group. The interventions increase healthy food spending by more than 60 percent relative to a subsidy that is restricted to being spent on healthy food. Importantly, this increase comes at no additional cost apart from the subsidy itself.

To implement our study, we use a unique mobile platform (Field Agent) that gives us repeated access to shoppers across the United States before, during, and after grocery shopping. Through this platform, we can induce experimental variation into a shopper’s grocery shopping experience while allowing them to retain control over the timing and location of their shopping trips.

We elicit choices between subsidies through shoppers’ smartphones both before shopping trips and at the point of purchase—in the aisle of the grocery store. This choice allows us to measure the impact of increased agency relative to a restricted-subsidy condition. We are also able to push information to shoppers’ smartphones at both points in time. 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 effective at increasing spending on those food groups. Relative to an un-subsidized control

group, shoppers receiving FV subsidies spend 124% more on fruits and vegetables. 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 an FV subsidy 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 lead to a more than 60% increase in healthy purchases over the restricted subsidy.<sup>5</sup> These behavioral subsidies increase FV spending by 199% (1.23 standard deviations (SD)) over the un-subsidized control group.

Our interventions build on recent theoretical and empirical advances in behavioral science. As we demonstrate in Section 3, standard economic theory fails to predict the observed increases in FV spending from agency and waiting periods. With agency, the expanded subsidy choice set 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 because it provides no new information to shoppers and maintains the timing of the shopping choice and consumption.

In contrast to standard economic models, work in psychology and behavioral economics suggests that agency may increase FV purchases. One channel is through a preference for consistency that prompts behavior to match prior choices. 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 this request. 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 first stage. Subsequent work has shown that the tendency to act consistently

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<sup>5</sup>The vast majority of shoppers choose the healthy subsidy when given the option, and this proportion is constant across treatments.

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 that aim to micro-found this mechanism through differential information processing and self-signaling, respectively. In our setting, 83% of shoppers report a desire to increase FV consumption and the majority of our sample (78%) choose the FV subsidy. As a result, these models predict that prompting an active subsidy choice through increased agency will lead to an increase in FV spending.

Importantly, an active subsidy choice allows shoppers to choose a healthy subsidy as a means of sending themselves a *costly* signal of their intended shopping behavior. In Section 4.3, we present evidence that shoppers pursue this strategy: 28% of shoppers leave money on the table by choosing the healthy subsidy. This behavioral pattern is consistent with the self-signaling framework of Benabou and Tirole (2004).

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 opportunity to make an intertemporal choice either immediately after receiving information about the choice or after a waiting period. Across multiple domains—decisions about effort over time and consumption goods—individuals 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.<sup>6</sup> Gabaix and Laibson (2017) develop a theoretical framework that explains these effects. In the model, waiting periods prompt deliberation and prospection (Gilbert and Wilson 2007) about the utility consequences of future outcomes. This process leads to choices that are more in-line with a person’s underlying goals such as healthier eating.<sup>7</sup>

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<sup>6</sup>Koenig and Schindler (2016) and Luca, Malhotra, and Poliquin (2017) use observational data to explore the effects of waiting periods for gun ownership.

<sup>7</sup>As noted above, more than 83% of shoppers in our sample report a desire to increase their FV

In our experiment, waiting periods were introduced through the delivery of healthy subsidy information prior to the upcoming shopping trip. Shoppers 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 when shoppers either made the subsidy choice at the start of the waiting period (“Early Choice”) or at the end of the waiting period directly before the purchase decision (“Delayed Choice”). The Early Choice treatment should have the added benefit of narrowing the set of potential future outcomes, leading to more focused deliberation and 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 spend 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 a growing literature that uses 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 im-

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consumption.

<sup>8</sup>Note that the Early Choice treatment can also change purchase behavior by affecting the subsidy choice. Present-bias may tempt shoppers to select the unhealthy subsidy if it immediately precedes the purchase decision. Early Choice allows shoppers to overcome this by separating the purchase decision from the subsidy choice, permitting them to “pre-commit” to the healthy subsidy. As discussed 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. Importantly, this Early Choice could not serve as a pre-commitment device to ensure healthier *groceries*, only healthier subsidies.

plementing novel interventions in a policy-relevant domain: subsidizing healthy food purchases. Our interventions are also unique in that they do not impose additional costs (relative to the restricted subsidy) and can be easily incorporated into existing delivery mechanisms. Our findings also contribute to the literature on using non-paternalistic interventions to spur behavior change (Grüne-Yanoff and Hertwig 2016; 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. As with a “nudge” Thaler and Sunstein (2009), our approach is non-paternalistic and reversible. By promoting deliberation and active choice, the interventions also contribute to the literature on “boosts” Grüne-Yanoff and Hertwig (2016).

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 crowd-sourced consumer research. Shoppers nationwide engage with the platform through their smartphones, allowing for unique experimental protocols that facilitate the study of shopping behavior in a natural environment.

There were three primary capabilities of Field Agent that provided for a novel exper-

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<sup>9</sup>We pre-registered the data collection and analysis for the primary treatments 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.

imental design. First, Field Agent geo-tagged our survey responses and cross-referenced these location tags with the locations of grocery stores nationwide to guarantee that our shoppers were at the point of purchase while completing in-store surveys. Second, Field Agent collected photographs of all grocery shopping receipts through their mobile app. 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 subsidies and experimental payments.

We tested the effectiveness of our subsidy interventions in a natural shopping environment. To do this, we asked all shoppers to maintain their normal shopping schedule – shopping at their regular time and place. Our treatments then varied the delivery of food subsidies to their smartphones during these trips. The study involved “healthy” subsidies offering 30% off purchases of fruits and vegetables and “unhealthy” subsidies offering 30% off purchases of baked goods. Both subsidies were capped at \$10 per trip.<sup>10</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 a “healthy” and “unhealthy” option.<sup>11</sup>

We leveraged Field Agent’s novel smartphone delivery method to present subsidy information and elicit subsidy choices at multiple places and times. Our treatments delivered information about the subsidies 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.

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<sup>10</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>11</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.

## 2.1 Recruitment

Field Agent has over 1 million registered users on its smartphone-based shopping survey platform.<sup>12</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>13</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.

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 pref-

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<sup>12</sup>Smartphone ownership is a common pre-condition for studying behavior of 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>13</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.

erences, we asked all shoppers to choose their preferred payment option from a menu of choices that grew in value as the time delay increased. Shoppers encountered two such menus: one included the present and one did not. This allows us to measure both discounting and present-bias – i.e. the conflict between short- and long-term interests.

## 2.2 Treatments

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 analyses 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. Subsidy information was delivered in the store before the purchase decision.
- **T<sub>2</sub>**: Agency — Shoppers chose between the healthy and unhealthy subsidies. Subsidy information was delivered in the store, where shoppers made their choice, before the purchase decision.
- **T<sub>3</sub>**: Waiting Period (Delayed Choice) — Shoppers chose between the healthy and unhealthy subsidies. Subsidy information 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. Subsidy information 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 in the store before the purchase decision.
- **T<sub>5</sub>**: Waiting Period (No Agency) — All shoppers received the healthy subsidy. Subsidy information was delivered between 4 and 48 hours before shopping. They were reminded about the subsidy in the store before the purchase decision.

Shoppers had the opportunity to complete four separate “Shopping Trips” under their assigned treatment. The Shopping Trips were designed to be as natural as possible with their timing and location decided by the shopper.<sup>14</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 if they completed all of the 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	

All Waiting Period treatments 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 speci-

<sup>14</sup>In 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 this response was balanced across treatments.

fied 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.

Our experiment took place in a natural shopping environment. As a result, our design needed to address a number of ways in which shoppers may attempt to game the incentives: 1) completing the tasks outside of the grocery store after shopping, 2) submitting a receipt from a previous Shopping Trip, or 3) mis-reporting adherence to the 4- to 48-hour window. Field Agent’s technology allowed us to mitigate concerns about these behaviors 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>15</sup> The proportion of each treatment was similar but not constant for each recruitment wave, so our analysis will include fixed effects for the recruitment wave.<sup>16</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

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<sup>15</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>16</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.

baseline. Thus, while differential attrition is a potential 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.

**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 that the majority of our sample experiences both food insecurity and a desire to improve the nutritional quality of their diet: 67% reported some measure of food insecurity and 83% reported that they would like to consume more 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, the skew is representative of the gender disparity in grocery shopping that has been found by others (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 any field experiment involving multiple observations. Attrition could threaten our identification of treatment effects *if* shoppers with low valuations of our subsidies are more likely to attrit across our treated groups. Since shoppers did not know their treatment assignment until opening the first task for their first Shopping Trip, attrition between the baseline and the first Shopping Trip cannot be attributed 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—the group with the fewest assigned tasks—completes more Shopping Trips than the other four treatments. Reassuringly, there are no significant differences in Trips completed in  $T_1$  through  $T_4$  in Part 1, which constitute the bulk of our analysis. In Part 2, the Restricted group—the group with the fewest assigned tasks for this Part—completes more Shopping Trips.

Next, we test if shoppers are selectively leaving certain treatments based on our outcome of interest: FV spending. Table 3 presents coefficient estimates of the interaction of FV spending and treatment from an ordered Probit model with controls

for treatment assignment and lagged FV spending.<sup>17</sup> We find that low FV spending does not explain any differential attrition between the baseline survey and Trip 1 (Panel A), attrition-on-entry (Panel B), nor total attrition between baseline and endline (Panel C). This speaks against the primary concern regarding attrition—that participants are differentially leaving the treatments depending on their valuation of the FV subsidy.

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<sup>17</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 in choosing 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 in choosing between FV and BG subsidies. The opportunity to choose between subsidies will weakly increase the price of FV and decrease the price of BG relative to those restricted to FV subsidies. Standard economic theory predicts that this should decrease FV purchases.<sup>18</sup>

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 *active choice* between subsidies 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 downweighted 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 previous choices as a guide to learning about what they value. In this way, prior choices act as informative signals that spur individuals to act consistently.<sup>19</sup>

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<sup>18</sup>In Appendix Section A.1, we formally show why the standard model predicts that FV spending will be lower in the Agency treatment compared to the Restricted treatment under a broad set of conditions. We also show that the necessary conditions for a predicted increase in FV spending are rejected by our data.

<sup>19</sup>Prior choices can also act as strategic forward-looking signals to motivate oneself to behave consis-

Applying this to our setting, both models predict that a shopper will increase FV spending if she had previously chosen the FV subsidy. 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 FV subsidy should have the same effect on Shoppers whether it was actively chosen or passively received. The consistency channel can counteract the price channel of increased agency, muting the impact of the latter, or even dominating it. Note that the self-signaling framework makes an additional prediction: that shoppers will be willing to choose the healthy subsidy even if it means leaving money on the table, since this would generate a costly signal of their intention to eat healthier. We examine this prediction in Section 4.3.

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

Across three experiments, [Imas et al. \(2018\)](#) demonstrate that introducing waiting periods between information about a choice and the choice itself leads to more patient 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

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tently later on. For example, [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.

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:** *The early subsidy choice – before the waiting period – will increase FV spending compared to the delayed subsidy choice*

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 result in greater FV spending is by increasing FV subsidy choice rates. Present-biased preferences may lead shoppers who prefer the FV subsidy before entering the store to nonetheless choose the BG subsidy after entering due to the immediate temptation of 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 1999b). 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

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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 endogenously-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 to establish the goal and allow it to sink in, such that shopping behavior is affected.

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

the lens of [Gabaix and Laibson \(2017\)](#), this decreases the number of prospective states that the individual must consider when deliberating on 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>

We now proceed to test these hypotheses in our data.

## 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 below.

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

Here,  $\text{FV}_{i,t}$  is the FV spending for shopper  $i$  on Shopping Trip  $t$ .<sup>23</sup>  $Z_i$  is a vector of indicator variables for either assigned treatments, or partitions of the treatment set.  $\text{FV}_{i,0}$  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 a fixed effect for Part 1 or 2, and at a fine level, with a “wave fixed effect” for every randomization group within Part 1.  $u_i$  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

<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.

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

\*\*\*  $\Rightarrow p < 0.01$ . 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 group. Appendix Table A.1 provides further evidence of the prominence of the substitution effect, finding no significant increases in total food spending. Additionally, Appendix Table A.2 shows that the subsidy treatments have, if anything, a negative impact on BG spending.

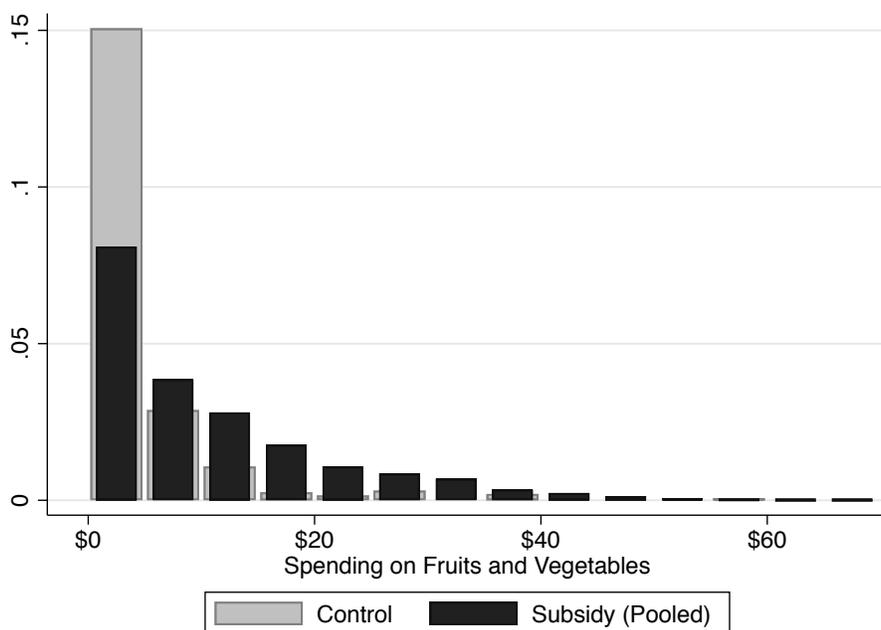
Figure 1 shows that the subsidy treatments have the largest effect on the quasi-extensive margin. Subsidies move a large mass of people who spend very little on FV (\$0 to \$5) toward spending intermediate amounts.

<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.

**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

\*\*\*  $\Rightarrow p < 0.01$ . 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.



**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. According to our hypothesis, a preference for consistency can only counteract the price effect of increased agency if the majority of shoppers choose the FV subsidy from the larger choice set. Indeed, we find that 78% of shoppers under the agency intervention select the FV subsidy.

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 offset by differential subsidy selection rates, but indicate differences in average 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.

### 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 a preference for consistency 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 and can rule out any decrease more than \$0.64

**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.

at the 5% level—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.

One concern with repeatedly eliciting subsidy choices from shoppers is that 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.

Despite the positive average effect, 22% of the shoppers in the agency treatments choose the unhealthy subsidies, effectively incentivizing BG purchases. Thus, an important concern is whether our intervention has a negative impact on the FV spending of some of our shoppers. Figure A.3 in the Appendix shows the CDFs of FV spending

in the control treatment and the pooled agency treatments. The CDF of the agency treatments dominates the CDF of the control treatment. That is, regardless of a shopper’s unsubsidized FV spending, our subsidy choice program does not decrease their FV spending, even if they do not choose the FV subsidy.<sup>25</sup>

## 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 decision. We find that a waiting period generates \$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 ( $p = 0.03$ ).<sup>26</sup> The strong, positive effect of waiting periods provide evidence for our third hypothesis.<sup>27</sup>

We now separately consider the impact of allowing 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 exhibits results 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.

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<sup>25</sup>A related concern is that our impact is heterogeneous by wealth, leaving the poorest households unaffected. First, our entire sample is low-income (< 185% of the FPL). Second, Appendix Table A.4 shows that the subsidies do not have significantly different impacts by welfare-recipient status. We do find that welfare-recipient households are less likely to select the FV subsidy, but the difference in choice rates does not produce differential estimates of the treatment effects.

<sup>26</sup>Columns 2 and 3 of Appendix Table A.3 replicate the analysis looking at the fraction of spending on FV.

<sup>27</sup>Table 6 estimates the marginal impact of waiting periods across environments both with and without agency. We can estimate the marginal effect of waiting periods in the absence of agency by using a subsample of our data. This lower-powered test leads to larger standard errors, but the effect size falls only slightly to 1.14 – a 23% increase over the restricted subsidy.

Using the full sample from all treatments in Parts 1 and 2 increases the precision of our estimates. We find that Delayed Choice increases FV spending by 41% over the restricted subsidy. Early Choice causes a 61% increase in FV spending over the restricted subsidy and a combined increase of 199% over the control group.

While the difference between treatments is directionally suggestive of Early Choice further increasing FV spending, it is not significant.<sup>28</sup> Thus, we find only suggestive evidence for our fourth hypothesis.

**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)
Constant	4.34*** (0.74)
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

<sup>28</sup>Because we do not find any impact of the interventions on subsidy choice rates, any positive effect that exists appears to be driven by Early Choice making waiting periods more effective.

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.

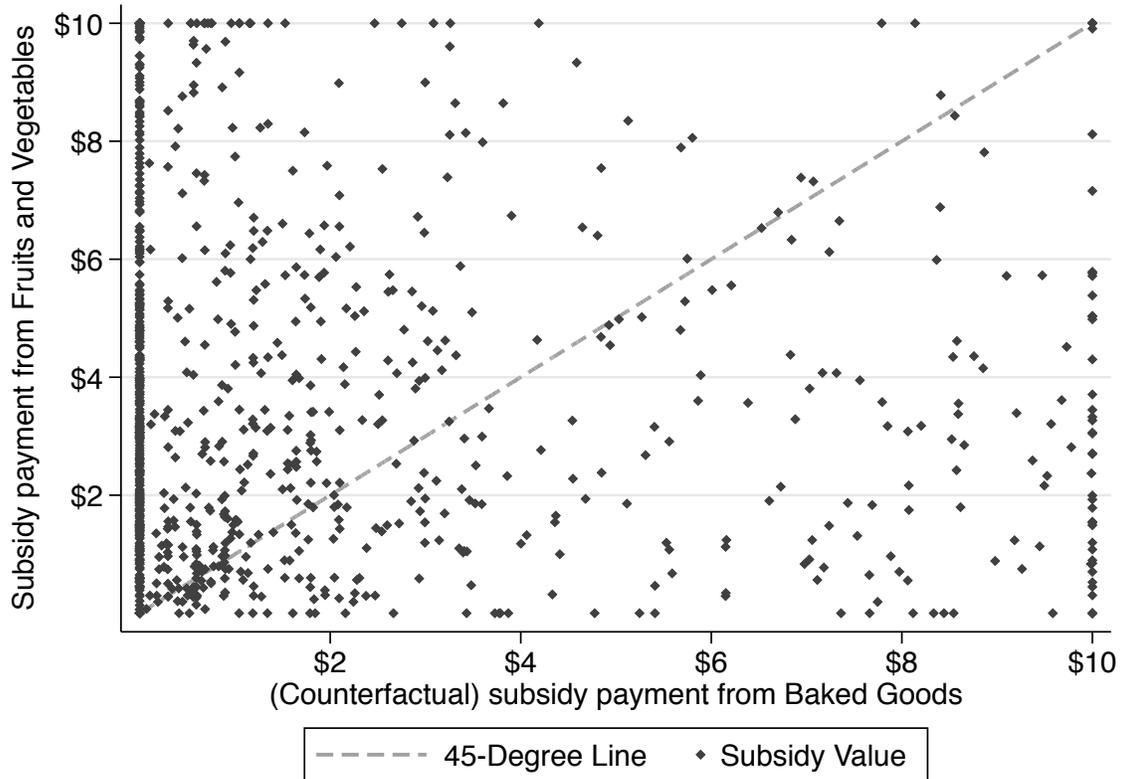
Importantly, we find systematic differences in the rate of sacrificing money in favor of choosing the healthy subsidy. This behavior is not due to shoppers selecting the category of food that would have maximized their subsidy payments absent any changes to shopping behavior. In the Control group, 62% of shoppers spend at least as much on BG as FV—significantly more than the 22% of shoppers who select the BG subsidy in the agency treatment. In fact, these subsidy choices often fail to maximize subsidy payments even without accounting for changes in behavior that would arise from choosing the other subsidy and facing different relative prices.<sup>29</sup> We find that 28% of shoppers selecting the FV subsidy would have walked away with more money had they chosen the BG subsidy, losing an average of \$3.37 each (101% of the mean subsidy). This compares to only 17% sub-optimally selecting the BG subsidy, 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, meaning that the costly over-selection of healthy subsidies cannot be attributed to confusion or misunderstanding.

One can interpret this behavior as shoppers taking advantage of agency to engage in costly signaling to spur increased purchases 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 2](#) 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

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<sup>29</sup>To show this, we assume that the amount spent on the subsidized category is a very conservative upper-bound for spending on that category without the subsidy. 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.

for their Shopping Trip.



**Figure 2.** Healthy subsidy payments and counterfactual unhealthy subsidy payments for subjects who select the FV subsidy.

## 5 Conclusion

In this paper, we test the effectiveness of behavioral food subsidies in encouraging healthy eating. The vast majority of our shoppers state a desire to consume more FV, and prices appear to be an important reason why that desire is not satisfied. Relative to our control group, offering a restricted healthy subsidy more than doubles FV spending (a 124% increase). Next, we show that the effectiveness of healthy food subsidies can be substantially improved by increasing agency over those subsidies and introducing waiting periods. Combined, our interventions tripled FV spending (a 199% increase) relative to the control group. Because the behavioral interventions have no

direct costs to the provider relative to the restricted subsidy, incorporating them into a food assistance program can potentially have an outsized positive impact on the cost-benefit ratio of the program.

We implement agency and waiting periods in the context of food choice, a complex decision with many temptations that may cause a well-intentioned shopper to stray from their goals. Our interventions help shoppers overcome these short-run temptations and encourage more future-focused food choices. In the case of agency, we find evidence that expanding the choice set allows shoppers to signal their intentions through a (potentially costly) active decision in favor of the healthy subsidy, which generates consistent shopping behavior. For waiting periods, we propose that they prompt shoppers to deliberate over their upcoming choices and adopt a more future-focused mindset, an approach that is consistent with prior theoretical work. These non-restrictive interventions should not be thought of as limited to promoting healthy subsidies, but rather considered as tools to promote more goal-oriented decision-making.

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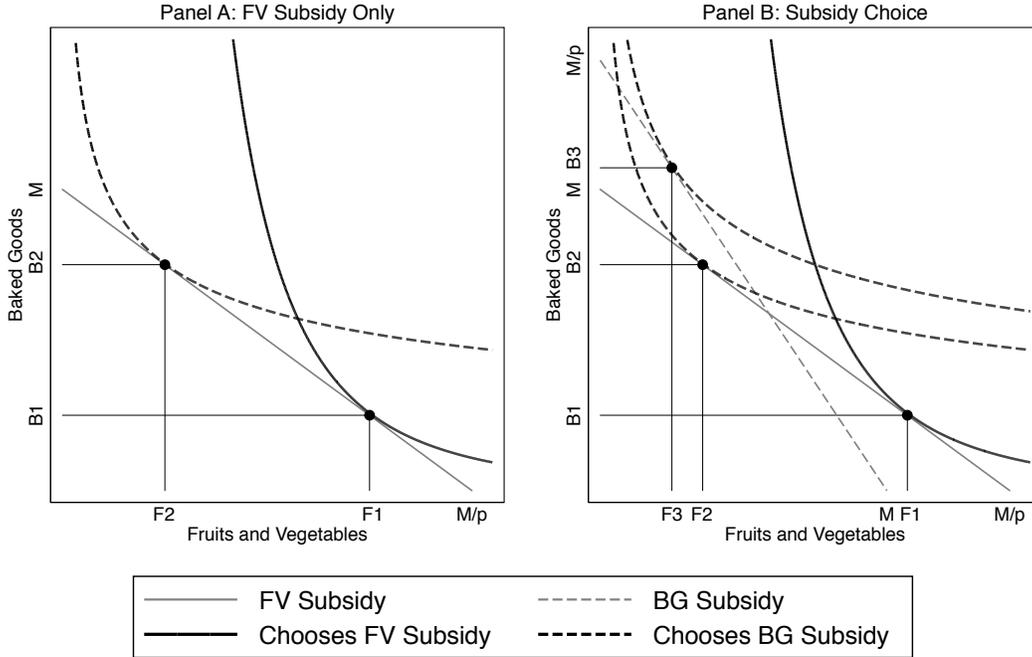
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# A Appendix

## A.1 Classical Utility Maximization

Consider the consumers 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 Figure A.1. Here, we show 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  $F3$ .

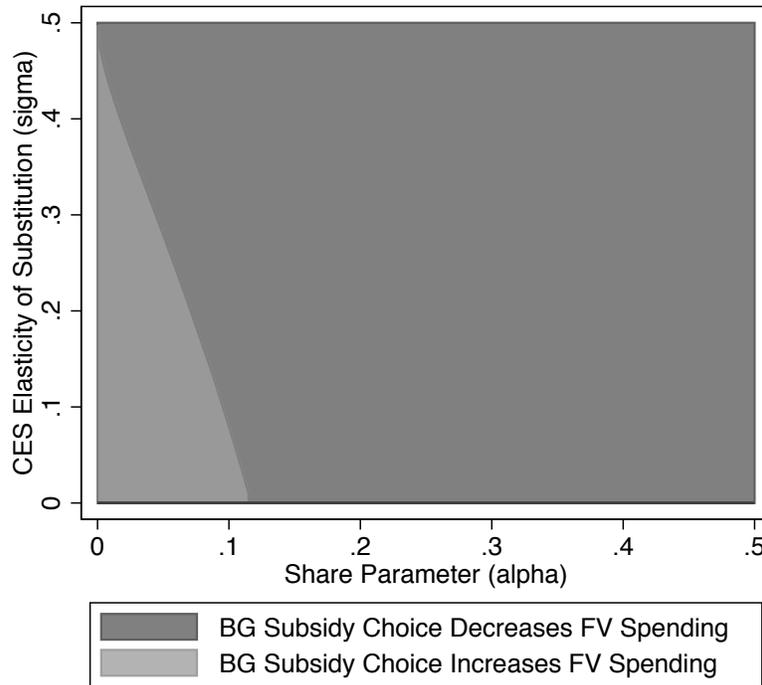


**Figure A.1.** Cobb-Douglas Utility Maximization Behavior from Subsidy Budgets

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 Total Food Spending

To calculate income effects, we look at the total spending on food items in the pooled subsidy groups. We find little evidence that overall spending increased, meaning that our effects are largely driven by substitution towards FV.

## A.3 Impact of Treatments on BG Spending

One interesting result of the agency intervention is that the allowing subjects to select the BG subsidy increases BG spending by less than it increases FV spending. Appendix Table A.2 shows that the impact of allowing BG subsidy choice on BG spending ranges

**Table A.1.** Effect of Subsidy Treatments on Total Food Spending (\$)

	(1)	(2)	(3)
Control Mean [SD]: 51.37 [50.21]			
Subsidy	0.99 (3.83)	0.99 (3.87)	1.50 (3.98)
Baseline Survey FV Spending (\$)		0.12*** (0.03)	0.12*** (0.03)
Part 1, Part 2 Fixed Effects	Y	Y	Y
Wave Fixed Effects	N	N	Y
Observations	2767	2767	2767
Clusters	805	805	805

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

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.2.** 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)
Waiting Period (Early Choice)				-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.4 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.3 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.2) to produce a food bundle with more FV.

**Table A.3.** Effect of Interventions on the Fraction of FV Spending (\$), Combined Data

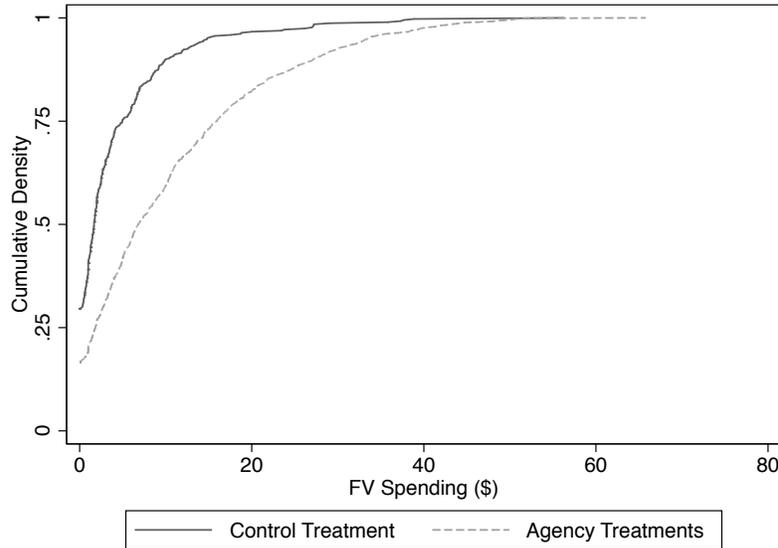
	(1)	(2)	(3)	(4)
Subsidy	0.150*** (0.023)	0.152*** (0.018)	0.150*** (0.023)	0.150*** (0.023)
Agency	0.007 (0.022)		0.004 (0.024)	-0.005 (0.025)
Waiting Period		0.006 (0.016)	0.005 (0.018)	-0.012 (0.019)
Waiting Period (Early Choice)				0.062** (0.026)
Baseline Survey FV Spending (\$)	0.157*** (0.043)	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 6 because of receipts with no food items. We lose another 35 observations and 11 subjects due to baseline survey receipts with no food items.

### A.5 FV Spending of Shoppers Choosing BG Subsidy

We find that the average shopper in the agency treatment –pooled across those choosing the FV and BG subsidies– spends more on FV than without the subsidy or subsidy choice. While we focus on this pooled group for identification purposes, it is important to consider the 22% of households that select the less healthy BG subsidy; are they worse off in terms of FV spending than they were without the subsidy? If so, a subsidy choice program might not be desirable even if it has a positive average effect. In Figure A.3, we show the CDFs of FV spending in the control treatment and the agency treatments.

The agency treatments distribution dominates the control treatment distribution, indicating that the BG subsidy does not lead to lower FV spending than would prevail otherwise. In other words, if the BG subsidy lead to a substitution effect that lowered FV spending relative to control, and we assume that selection into the BG subsidy is monotonic in the FV spending level, the CDFs should cross at a density of 0.22: the fraction of the sample in the agency treatments selecting the BG subsidy. However, this is not the case.



**Figure A.3.** Cumulative Distribution of FV Spending

## A.6 Differential Effects by Welfare Recipient Status

While all shoppers in our study are from households with income under 185% of the FPL, that range still permits considerable variation across households in terms of wealth. If the subsidies and behavioral interventions are ineffective for the neediest households, especially those already receiving food assistance, then the scope for using these subsidies is smaller. While we do not have income information for many shoppers in the sample, we can measure whether the shopper is a participant in a welfare program. There are two ways we can do this. First, shoppers are asked if they receive SNAP funds in the initial screening. Second, we can observe whether any transaction was paid for using Electronic Benefit Transfer (EBT) in our study. SNAP recipients may not use EBT every time they shop, and EBT can be used to access funds from programs other than SNAP. Therefore, we define a welfare recipient as someone who falls into either category. 55% of shoppers in our sample are identified as welfare recipients.

We find that welfare recipients are roughly 8% less likely to select the FV subsidy in the agency treatments ( $p = 0.020$ ).<sup>30</sup> To evaluate whether this difference in choice rates is substantial enough to make our interventions less effective at increasing FV spending, in Table A.4 we re-estimate a number of important treatment effects in the paper, allowing for a heterogeneous impact by welfare recipient status.

First, we note that when we split the sample in half, we lose power to identify strong, statistically significant effects of agency and waiting periods for just the non-welfare recipients, even though the effects remain sizeable. However, for welfare recipients, the

<sup>30</sup>Estimate is from a linear regression of a shopper’s mean subsidy choice on their welfare-recipient status with study part and randomization wave fixed effects, and a control for baseline FV spending, with robust standard errors.

**Table A.4.** Heterogeneous Effect of Interventions on FV Spending by Welfare Status

Sample:	All	Subsidy	
	(1)	(2)	(3)
Welfare Recipient	0.023 (1.058)	-1.037 (0.979)	-1.020 (0.835)
Subsidy	7.178*** (0.023)		
Subsidy $\times$ Welfare	-0.927 (1.254)		
Agency		1.693 (1.189)	
Agency $\times$ Welfare		0.420 (1.303)	
Waiting Period			1.522* (0.914)
Waiting Period $\times$ Welfare			0.409 (1.245)
Baseline DV	0.146*** (0.051)	0.160*** (0.059)	0.162*** (0.057)
Observations	2767	2379	2379
Clusters	805	700	700

\*\*\*  $\Rightarrow p < 0.01$ , \*  $\Rightarrow p < 0.10$ . Standard errors in parentheses are clustered at the subject level. All specifications are linear random effects models that feature fixed effects for the parts of the study and randomization wave.

effects are slightly larger, and statistically significant; agency increases FV spending by \$2.11 ( $p = 0.019$ , column (2)) on average, and a waiting period increases FV spending by \$1.93 ( $p = 0.020$ , column (3)). Without agency or a waiting period, welfare-recipients households spend roughly \$1 less on FV than non-recipients per trip, but this difference is not statistically significant. The subsidy effect remains very large and statistically significant in column (1), and while it is slightly less effective for welfare recipients, the difference in effects is not significant. Overall, there is no significant evidence of differential effects by welfare-recipient status.

## 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 yesterdays 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.

**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.

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.4.** Example Food Diary

As a reminder, a “Stock-Up” shopping trip is a trip to a grocery storesomewhere that has a produce section with multiple aisleswhere 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 youve 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 bonusup to a maximum of 26 weeks from todayit 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 (its 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% 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 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 (its 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% 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  $(30\% \text{ of } \$30) = \$9$ .
- 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 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! Lets 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! Lets 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

Heres 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]*