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Can interventions affect commitment demand? A field experiment on food choice☆

Sally Sadoff[a,*], Anya Samek[b]

[a] University of California at San Diego, Rady School of Management, 9500 Gilman Drive, La Jolla, CA 92093, United States
[b] University of Southern California, Dana and David Dornsife College of Letters, Arts and Sciences, 635 Downey Way, Los Angeles, CA 90089, United States

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ABSTRACT

Despite a growing literature examining the use of commitment devices to address self-control problems, little is known about the mechanisms driving commitment demand. In a field experiment among participants of a food delivery program, we test the impact of two interventions on food choice and commitment demand: 1) providing information and 2) additionally providing experience with a commitment device that restricts participants to choosing healthy foods. We find that both interventions significantly increase short-term healthy food choices compared to a no intervention control group. A month after we implement the interventions, we offer all participants the opportunity to take up the commitment device restricting themselves to healthy foods. Both interventions double Post-Treatment commitment demand, with larger and more robust effects in the experience treatment. To address concerns about the welfare impacts of our interventions, we examine participants' satisfaction with their food selections, and find no evidence that restricting choice decreases participants' welfare. Our work suggests that a substantial fraction of people are naive about the benefits of commitment devices, and there is scope for policy interventions to increase commitment demand.

1. Introduction

A large literature examines dynamic inconsistency and self-control problems in which people would like to engage in behaviors with long term benefits but fail to do so because they give into short term temptation (DellaVigna, 2009; Gul and Pesendorfer, 2004, provide reviews). Prior work demonstrates that self-control problems decrease savings and investment, worker effort, and healthy behaviors (see e.g., Sadoff et al., 2015, for discussion). A canonical example is overconsumption of unhealthy food that is enjoyable to consume but worsens future health (O'Donoghue and Rabin, 2006). A commonly proposed policy for addressing dynamic inconsistencies is to offer people commitment devices that restrict choice by making tempting choices (e.g., unhealthy food) either unavailable or more costly.

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* Corresponding author.
E-mail address: ssadoff@ucsd.edu (S. Sadoff).

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However, a puzzle has emerged that if self-control problems are prominent, then why is there little observed demand for commitment? Laibson (2015) highlights the lack of commitment contracts in naturally occurring markets. Even when explicitly offered by researchers and policymakers, only about 10–30% of people are willing to take up a commitment device to save for the future, work hard, eat healthy, exercise or stop smoking (see e.g., Bryan et al., 2010; Royer et al., 2015, for discussion). A potential reason for this low take-up is that people have self-control problems, but they lack sufficient self-awareness to demand commitment.[1] Recent work finds that a substantial fraction of people are naive about their dynamic inconsistencies (Augenblick and Rabin, 2018) and that those with the largest self-control problems may be the least aware of them (Sadoff et al., 2015). If people lack self-awareness, there may be a policy role for interventions that educate people and thereby increase commitment demand (Frederick et al., 2002).

In this study, we use a field experiment to test two such interventions: providing people with information and giving people experience with a commitment device. We expect our intervention to be effective if people have self-control problems but are not fully aware of them. Our context is a food delivery program for low income families in which 175 participants choose a basket of foods from one of two menus. The first is a full menu that includes both healthy options (fresh fruits and vegetables) and unhealthy options (processed salty and sugar-sweetened snacks). The second is a restricted menu that includes only the healthy options. Prior work demonstrates self-control problems for the kinds of foods we offer: people intend to eat fruits and vegetables but succumb to the temptation of snacks and candy in the presence of these options (Houser et al., 2008; Milkman et al., 2010; Read and Van Leeuwen, 1998; Sadoff et al., 2015).

The menu restricted to healthy foods serves as a commitment device that makes these potentially tempting foods unavailable. Restricting the choice set serves two purposes. First, it removes the possibility of giving into temptation and choosing unhealthy foods. Second, in line with models of temptation (e.g., Gul and Pesendorfer, 2001; 2004), it eliminates the need for costly self-control to resist tempting options and instead choose healthy foods. That is, for people with self-control problems, having cookies on the menu makes it more difficult to choose an apple even if that is their preferred choice. Under this framework, people prefer a restricted menu in which they do not have to face tempting choices. However, if people are not sufficiently aware, they may fail to recognize the benefits of the restricted menu and will not take up commitment.

We conducted our experiment in two sessions: Treatment and Post-Treatment. In the Treatment session, we randomly assigned participants to one of three groups: Control, Information or Experience. In the Control group, participants chose foods from the full menu. In the Information treatment, participants also chose from the full menu, but prior to making their selections they received information about the importance of eating healthy food. In the Experience treatment, participants received the same information about healthy eating, and in addition chose their foods from the restricted menu rather than the full menu. That is, we gave participants experience with the commitment device of a restricted menu. Following the Treatment session, about sixty percent of the participants received weekly delivery of their selected foods for four weeks (the remaining participants did not receive delivery).[2]

A little over a month after we implemented the initial treatments, participants took part in the Post-Treatment session. They again selected foods for delivery but this time without any intervention. Instead, we allowed all participants to choose whether they wanted to make their selections from the full menu or the restricted menu. That is, we offered all participants the commitment device restricting themselves to the healthy menu (i.e., the same device we imposed on the Experience treatment group in the initial session).[3]

We find that both the Information and Experience treatments increase short-term healthy food choice in the initial Treatment session. Critically, our interventions also have a large impact on Post-Treatment commitment demand, more than doubling take-up rates from 20% in the control group to 40–50% in the treatment groups. The effects on food choice also persist. For all outcomes, the impacts of the Experience intervention are generally larger and more robust than for the Information intervention.

We also study the impact of our interventions on welfare. A long-standing concern with policy interventions in the context of self-control is that they may push people to make choices they do not actually like. Participants might respond to our interventions by choosing healthier foods but actually prefer the less healthy options. For example, the information we provide may exert social pressure on participants to choose healthy foods when they would rather not do so. Stronger interventions that restrict choices are of even more concern as they may impose higher welfare costs related to decreased flexibility (Karlan and Linden, 2014). We therefore examine whether our interventions decrease participants' satisfaction with their choices.

[1] An alternative explanation is that people are sufficiently aware of their self-control problems but find the features of the commitment device unattractive (Laibson, 2015). Along these lines, several recent studies examine how various characteristics of commitment contracts affect take-up (Bai et al., 2017; Beshears et al., 2015; Goldhaber-Fiebert et al., 2010).

[2] As described in more detail in Section 2, participants received weekly deliveries if they were willing to pay a randomly chosen price for the program. We calibrated the distribution of prices – which included $0 – so that a little over half of participants would receive delivery.

[3] In the framework of temptation models, we assume people experience temptation when they are making their menu selections but not when choosing which menu to make their selections from. Related studies use restricted menus to measure commitment demand in the context of task completion in a laboratory experiment (Toussaert, 2018) and food choice in a weight loss challenge (Toussaert, 2016). Although the two decisions – choice of menu and selection of foods – are made close together in time, previous work has shown that dynamic inconsistency can occur between decisions made minutes apart, including in the context of food (e.g., Brown et al., 2009; McClure et al., 2007).

To measure welfare costs, we elicit participants' willingness to pay (WTP) for their selected foods in both the treatment and Post-Treatment sessions.[4] We find no evidence that the more restrictive Experience treatment imposes larger welfare costs than the weaker Information treatment. In fact, we find suggestive evidence that WTP is higher in the presence of restricted menus. These results are consistent with the temptation models discussed above which posit that commitment devices restricting choices can improve welfare by reducing self-control costs.

Ours is among the first studies to demonstrate the causal effect of an intervention on commitment demand. In related work, Kaur et al. (2015) correlate take-up of commitment contracts to increase effort at work with experience under the contracts and find evidence of learning over time. Bhattacharya et al. (2015) demonstrate that increasing the duration of the default commitment contract for exercise increases the duration of the contract chosen, the duration of self-reported exercise and the likelihood of taking up a subsequent contract. However, their sample consists of people who have already selected into choosing a commitment contract. To our knowledge, no previous study has examined whether initial take-up of a commitment device can be affected causally through an intervention.

Our context of food choice also provides an important policy contribution. The United States spends over $100 billion annually on food assistance programs, which provide benefits to over 40 million Americans.[5] A great deal of literature has focused on how to improve the healthfulness of foods purchased through these programs (see Meyerhoefer and Yang, 2011, for a summary). Identifying ways to improve food choices could increase the effectiveness of food assistance programs and have a significant impact on the health of their participants. Current policy considerations include offering voluntary commitment devices, such as allowing participants to pre-order groceries or restricting a portion of their subsidies to only healthy foods. However, these commitment devices can only have an impact if program recipients choose to take them up.

Our findings suggest that a substantial fraction of people are naive about the benefits of commitment devices and can learn through information and experience. We also show that imposing such interventions does not necessarily come at the cost of short-term welfare losses.[6] Together, our results suggest that there is scope for interventions – including commitment devices themselves – that are initially imposed externally rather than requiring voluntary take-up.

The remainder of the paper proceeds as follows: Section 2 describes the experimental design and implementation; Section 3 presents the results; Section 4 provides interpretation, including results from additional experiments; and Section 5 concludes.

2. Experimental design and implementation

2.1. Overview

We conducted the six-week long field experiment from March to May, 2014. We recruited 175 participants for a food delivery program that was a promotion conducted at the Chicago Heights Early Childhood Center (CHECC) through a partnership with Louis' Groceries, a non-profit grocery store operating in the area. All participants were parents of young children from CHECC.[7]

The experiment proceeded in three phases as outlined in Table 1: (1) an initial Treatment session, (2) a food delivery program that lasted 4 weeks, and (3) a final Post-Treatment session after the food deliveries. We randomized participants at the individual level to the Control group or one of two treatment groups (Information or Experience) and implemented the intervention during the initial Treatment session. Then, we implemented the food delivery program, which lasted 4 weeks. Finally, participants returned for a Post-Treatment session after the delivery program was completed. Critically, our interventions were carried out in the initial Treatment session only. We then measure the impact of the interventions on subsequent commitment demand in the Post-Treatment session.

Throughout the study, participants always made their choices in private after listening to a recording of the instructions and following along on a printed copy (see Appendix B). In both the treatment and Post-Treatment sessions, we told participants that they would select $10 worth of foods for weekly delivery, which they could purchase at a discount. We framed the program as a snack program for children, but we did not tell parents that these snacks were restricted to their chil-

[4] Allcott and Kessler (2015) use a similar approach in the context of social comparisons in energy usage.

[5] Spending in fiscal year 2016 totaled $101.9 billion, spread across 15 assistance programs. https://www.ers.usda.gov/data-products/chart-gallery/gallery/chart-detail/?chartId=58388.

[6] In related work, John (2016) and Bai et al. (2017) examine the welfare effects of commitment contracts when a substantial fraction of the population is partially naive, which leads to take up of costly commitment contracts that do not change behavior. Sadoff et al. (2015) examine the welfare implications of commitment contracts when sophistication is negatively correlated with dynamic inconsistency and therefore those whose behavior would be most affected by commitment contracts are least likely to take them up.

[7] The Chicago Heights Early Childhood Center (CHECC) is a large-scale field experiment focused on the impact of early childhood interventions on child achievement (Fryer Jr et al., 2015). Only the control group children from this field experiment were recruited for our study. The parents in this group had not previously participated in food-related studies. In the analysis, we drop one participant who has no CHECC ID or other demographic information. Including that participant does not affect the results (available upon request).

Table 1
Experiment timeline.

Treatment (Week 1)	Deliveries (Weeks 2–5)	Post-treatment (Week 6)
1. Informational video (Treatment groups only)		1. Commitment demand
2. Food choice (Restricted to healthy in Experience treatment)		2. Food choice (Restricted to healthy if chose commitment)
	4 weeks of food deliveries to those who purchased	
3. Willingness to pay		3. Willingness to pay
4. Learn price		4. Learn price
5. Purchase basket (Only if willing to pay)		5. Purchase basket (Only if willing to pay)

Table 2
Food choice menu.

'Healthy' options	'Unhealthy' options
2 apples	2 bags Cheetos
1 avocado	1 bag Cheez-its
1 lb. baby carrots	2 Hostess cupcakes
3 bananas	2 bags Doritos
1 lb. broccoli	2 Fudge Brownies
1 celery bunch	10 Grandma's vanilla cookies
1 large cucumber	2 Honey Buns
1/2 lb. green grapes	8 Keebler cheese crackers
2 green peppers	4 Now and Laters
2 kiwis	4 Nutter Butter cookies
1 mango	6 Oreo cookies
2 oranges	2 Pop Tarts
2 peaches	2 bags Chester's popcorn
2 pears	2 bags Smartfood popcorn
2 plums	2 bags potato chips
1/2 lb. red grapes	1 Rice Krispy treat
1 red pepper	2 bags Ruffles potato chips
1/3 lb. strawberries	1 package Skittles
1/2 lb. snap peas	1 Snickers bar
1 large tomato	2 Hostess Twinkies

Note: The Control group and Information group received the full menu. The Experience group received a menu restricted to the 'Healthy' foods.

dren and the children were not present when the parents made their decisions (children were present at the experimental sessions and participated separately in a survey we discuss in more detail below).[8]

2.2. Treatment session and food deliveries

All participants first attended a Treatment session. Participants received $50 for their attendance at the first session, and we informed them that at the end of the session they would have the opportunity to use some of their earnings to purchase the 4-week food delivery program.

Participants randomized to the Information and Experience groups first watched a short video about the importance of including fruits and vegetables in their child(ren)'s diet, tips for how to prepare and encourage their child(ren) to eat those foods and received a brochure containing the same information as the video. The educational information was based on the most recent U.S. Department of Agriculture (USDA) nutritional guidelines.[9] Participants randomized to the control group did not see the video or receive the information.

Second, all participants selected 10 foods that they would like to have delivered to their home for the following 4 weeks. Participants randomized to the Information group or to the Control group chose items from the full menu, which included both 'healthy' foods, 20 fresh fruits and vegetables, and 'unhealthy' foods, 20 processed salty and sugar-sweetened snacks (see Table 2 for list of foods). In the Information group, participants received a menu that listed the 'healthy' and 'unhealthy'

[8] The delivery program was described as follows: *Louis' Groceries is providing a new snack delivery program to CHECC parents and today you get a chance to participate! Today, you will... put together a basket with $10 worth of foods that your child can eat as a snack. You will be given the chance to buy your basket at a discount. So please fill it with snacks you would actually like to buy for your child... If you buy the basket, it will be delivered to your door once a week for the next 4 weeks.*

[9] See https://www.choosemyplate.gov/.

Table 3
Nutritional information.

	Healthy options	Unhealthy options	*F*-test *p*-value
Calories	174.17	342.65	0.0004
	(114.18)	(157.85)	
Fat (g)	1.92	15.33	0.0000
	(6.40)	(9.58)	
Saturated Fat (g)	0.26	4.12	0.0000
	(0.89)	(3.40)	
Carbohydrates (g)	36.31	44.84	0.3038
	(28.28)	(23.22)	
Fiber (g)	5.74	1.92	0.0019
	(4.77)	(1.86)	
Natural Sugar (g)	24.87	11.87	0.0430
	(22.28)	(16.56)	
Added Sugar (g)	0.00	6.35	0.0734
	(0.00)	(15.42)	
Protein (g)	2.40	3.21	0.1936
	(2.05)	(1.78)	

Note: The table reports means pooling foods by group. The healthy group includes: apples, avocado, baby carrots, bananas, broccoli, celery, cucumber, green grapes, green peppers, kiwis, mango, oranges, peaches, pears, plums, red grapes, red pepper, strawberries, snap peas and tomato. The unhealthy group includes: Cheetos, Cheez-its, Hostess Cupcakes, Doritos, Fudge Brownies, Grandma's Vanilla Creme cookies, Honey Buns, Keebler Cheese and Cheddar Crackers, Now and Later, Nutter Butter Cookies, Oreo Cookies, Pop Tarts, Chester's Flamin' Hot Popcorn, Smartfood White Cheddar Popcorn, Lay's Potato Chips, Rice Krispies Treats, Ruffles Potato Chips, Skittles, Snickers Bar, and Hostess Twinkies. The final column reports the *p*-value from an *F*-test of equality of means across food groups.

foods on separate sheets, sorted alphabetically within sheet. Participants in the Control group received a menu with the foods listed all together in alphabetical order.[10] Participants randomized to the Experience group received the restricted menu, which only included the healthy foods, and were not told about the unhealthy foods available to the other groups. The goal of the Experience treatment was to give participants experience with a restricted choice set.

When making their choices, participants saw a printed menu with photos of the items, and also viewed all the items laid out on a table (see Appendix Figs. B.2 and B.3 for menus). All of the healthy and unhealthy foods we offered could be easily served as a snack. Preparation involved at most peeling and cutting with no cooking required. Each choice was offered in servings worth about $1 each (e.g., 2 apples for $1; 2 Fudge Brownies for $1). Participants were allowed to choose more than one of each item (e.g., choose 10 servings of 2 apples). Table 3 compares the nutritional content of the healthy and unhealthy items. Unhealthy items have significantly more calories, sugar and fat while healthy items have significantly more fiber.

Third, we elicited participants' willingness to pay (WTP) for the 4-week delivery program using a multiple price list. To do so, we presented participants with a series of coupons that varied the per basket price from $0 to $12 in $1 increments (i.e., $0 to $48 for the four-week delivery). For each coupon, participants indicated whether they wanted to purchase the basket at the offered price (see Appendix B.4 for sample coupons).

After participants filled in a response for each coupon, each participant opened a sealed envelope to reveal their personal discount offer. If the participant had indicated that he or she was willing to pay the chosen price, then he or she paid for the 4-week delivery program (through a deduction from his or her participation fee) and received it; if the participant had indicated that he or she was unwilling to pay the chosen price, then he or she did not pay for the delivery and did not receive the delivery program.

The discounts were randomly chosen from the following distribution of basket prices: *0.25*$0 per basket + 0.25*$1.00 per basket + 0.50*$5.00 per basket.* We chose these values based on pilot testing in order to maximize variance in price and basket purchase rates (see List et al., 2011, for discussion). We wanted a little over half of our participants to receive the delivery program in order to examine whether receiving the basket has an impact on choices in the Post-Treatment session: sixty percent of participants chose to receive delivery at their randomly chosen price; forty percent were not willing to pay their randomly chosen price in order to receive deliveries. We included both $0 and $1 prices to examine whether there are differential effects of "free" goods compared to goods of minimal cost.[11]

[10] As discussed in Section 4, we find no evidence of 'menu effects' – i.e., that just offering the foods on separate sheets without providing information affects food choice.

[11] Lower prices may decrease consumer valuation if recipients are sensitive to sunk costs (Arkes and Blumer, 1985; Thaler, 1980) or infer quality from price (Bagwell and Riordan, 1991; Riley, 2001). In the context of health products in developing countries, prior work finds little evidence that lower prices reduce valuation as measured by proper usage of the product (Ashraf et al., 2010; Berry et al., 2015; Cohen and Dupas, 2010). Another strand of the

At the end of the session, participants also completed a short questionnaire eliciting food shopping behavior, food assistance participation, and their child(ren)'s food intake using a 24 h recall survey (up to two children). While parents participated in the experimental sessions, we surveyed their children about the healthy food options (1–2 children per family). For each food, we asked whether the child could correctly name the food, whether the child had eaten the food in the past, and how much the child liked the food.[12] The experimental sessions lasted 30–45 min.

In the next phase, those participants who purchased the delivery program received their deliveries for 4 weeks (60% of participants). The remaining participants did not receive deliveries. During the delivery program, participants could change their basket items or cancel their delivery at any time. They could do so by calling us or filling out a form online. The participants who cancelled their delivery received a refund in the amount they had previously paid per basket times the number of baskets left in the program, which was refunded to a re-loadable debit card that they had received in the Treatment session. No participants made changes and only 3 participants (2.7%) canceled delivery.

2.3. Post-Treatment session

After all deliveries were completed, we invited participants to attend a Post-Treatment session. Post-Treatment sessions were conducted approximately 5 weeks after the first Treatment session. The purpose of this session was to investigate the effect of the Information and Experience treatments on subsequent commitment demand, as measured by restricting one's choice set to healthy foods only – i.e., to the same menu participants in the Experience group received in the Treatment session. As in the Treatment session, participants received $50 for participating in the Post-Treatment session. Out of the 175 participants in the Treatment session, 140 (80%) returned for the Post-Treatment session. In the analysis, we examine the extent of selective attrition and the robustness of the treatment effects to corrections for attrition.

In the Post-Treatment session, all participants experienced the same procedure regardless of their initial treatment assignment and whether or not they had received deliveries in the prior month. Participants were first reminded of the 4-week delivery program, and then asked to make a selection of the menu they would like to use to make their decisions. They could choose to receive the restricted menu that included only the healthy foods, or to receive the unrestricted full menu that included both the healthy and unhealthy foods.[13] We identify commitment demand as those recipients who choose the restricted menu.

Finally, as in the Treatment session, participants then made food selections from their chosen menu, completed the willingness to pay exercise, and learned the randomly chosen price, which determined whether they purchased the basket. Different from the Treatment session, the discounts were chosen from the following distribution of prices: *0.1*$11 per basket + 0.9*$12 per basket*, which decreased the proportion of participants who purchased the delivery program (9.4% of participants). Those participants who purchased the program in the Post-Treatment session received deliveries for the subsequent four weeks. As in the Treatment session, we surveyed both parents and children.

3. Results

3.1. Participant characteristics

Table 4 reports summary statistics for our population by treatment group. Over eighty percent of participants are black or Hispanic.[14] Over half report receiving food assistance through either the Supplemental Nutrition Assistance Program (SNAP) and/or the Special Supplemental Nutrition Program for Women, Infants and Children (WIC) in the last six months. Based on parents' reports in 24-h food recall surveys for up to two of their children, children are eating less than a serving of fruits and vegetables a day.[15] In line with the underconsumption of fruits and vegetables, when asked what foods they would like their child to eat more of (free answer) over half of parents answered that they would like their child to eat more fruits and vegetables. The remainder indicated that they would like their child to eat more of other foods (i.e., not fruits and vegetables); or indicated that they wanted their child to continue eating the same foods.

In Table 4, we report statistically significant binary differences of means between each treatment group and the Control group. The final column reports the *p*-value from a *F*-test of equality of means across all three groups. We are well balanced on baseline characteristics with no differences statistically significant at the 5% level. To maximize the sample size included in our main analysis, we do not include covariates (which are missing for some participants) and include all participants

literature has argued that consumers perceive higher benefits from free (zero cost) goods compared to goods with positive prices (e.g. Shampanier et al., 2007).

[12] Children rated whether they liked the food on a 1–4 scale with verbal descriptions and pictures: (1) Frowning face, "Really don't like, very bad"; (2) Frowning face, "Dislike a little, a little bad"; (3) Smiling face, "Like a little, a little good"; (4) Smiling face, "Like a lot, very good".

[13] The decision was described as follows: *Please check which delivery program you prefer to receive: I want to receive the* **All Snacks Delivery***that allows me to fill my basket with both fresh fruits and veggies and other prepared snacks [OR] I want to receive the* **Fruit & Veggie Delivery***that allows me to fill my basket with fresh fruits and veggies only.*

[14] We did not ask explicitly about race, and instead proxy for the participant's race by using data already collected at the Chicago Heights Early Childhood Center on participating children. This measure, as well as the measure of child age and gender, average across children by household.

[15] Prior work finds that fruit and vegetable consumption of Americans is far below USDA recommendations, see https://www.ers.usda.gov/amber-waves/2017/july/us-diets-still-out-of-balance-with-dietary-recommendations/.

Table 4
Baseline characteristics by treatment group.

	Control	Information	Experience	*F*-test *p*-value
Observations	65	49	60	
Children in household	1.25	1.35	1.20	0.29
	(0.53)	(0.52)	(0.40)	
Child age	5.81	5.46	5.34	0.10
	(1.29)	(1.05)	(1.20)	
Child female	0.49	0.58	0.55	0.63
	(0.46)	(0.44)	(0.47)	
Child black	0.57	0.55	0.49	0.70
	(0.49)	(0.50)	(0.51)	
Child Hispanic	0.37	0.35	0.29	0.65
	(0.48)	(0.47)	(0.45)	
Received SNAP/WIC in last 6 months	0.59	0.55	0.64	0.64
	(0.50)	(0.50)	(0.48)	
Time to grocery store (minutes)	13.74	17.29	17.08	0.51
	(10.74)	(20.03)	(21.42)	
Grocery spending ($)	134.50	173.05	125.44	0.10
	(89.32)	(162.21)	(85.07)	
Child fruit/vegetable servings	0.35	0.22	0.32	0.56
	(0.73)	(0.51)	(0.69)	
Want child to eat more fruits/vegetables	0.68	0.49	0.58	0.19
	(0.47)	(0.51)	(0.50)	
Want child to eat more other foods	0.04	0.18	0.10	0.10
	(0.20)	(0.39)	(0.30)	
Want child to eat the same foods	0.28	0.33	0.32	0.85
	(0.45)	(0.48)	(0.47)	
Child proportion healthy foods know	0.56	0.56	0.56	0.98
	(0.16)	(0.17)	(0.17)	
Child proportion healthy foods ate	0.67	0.67	0.69	0.90
	(0.23)	(0.19)	(0.21)	
Child proportion healthy foods like	0.83	0.77	0.80	0.18
	(0.15)	(0.18)	(0.17)	

Note: The table reports means with standard deviations in parentheses. The final column reports the *p*-value from an *F*-test of equality of across treatment groups. Age, gender and race/ethnicity are averages across all children in the household. Grocery spending averages amount spent on most recent trip and amount spent in typical week. Child fruit/vegetable servings computed based on 24-hour recall survey (excludes juice). Child proportion healthy foods variables are averages across all children in household who took the healthy foods survey (1–2 per household).

who participated in the Treatment session. As shown in the Appendix, the results discussed below are robust to including covariates and to limiting the analysis of the Treatment session outcomes to only those participants who returned for the Post-Treatment session.

3.2. Effects of interventions on short-term food choice

We first test whether our interventions worked as expected, by increasing the healthfulness of the foods that participants selected for their baskets. We find that participants randomized to the Information and Experience treatments selected food baskets that were significantly healthier along several dimensions. Fig. 1 shows the mean proportion of healthy items by treatment. The average proportion of healthy items is 73% in the Control group – i.e., a little over 7 of the 10 items chosen are healthy. The Information intervention increases the proportion of healthy items by about 20 percentage points to 93%. As discussed above, participants in the Experience group were required to choose only healthy foods – i.e., 100% healthy baskets. Fig. 2 shows the distribution of the 'proportion healthy' – i.e., the proportion of items in the basket that are fresh fruits and vegetables. Of note is that the Information treatment generates a large shift in the proportion of baskets that participants fill with only healthy items, from 18% in the Control group to 71% in the Information group.

Table 5 estimates treatment effects on the proportion of healthy items chosen, as well as the nutritional content of the basket, measured by calories, fats, carbohydrates, fiber, and sugars. We report coefficients and standard errors from Ordinary Least Squares (OLS) regressions that include only a constant and indicators for the Information and Experience treatment groups. We also report the *p*-value from a test of differences between the effects of the Information and Experience treatments.[16]

[16] We do not include a coefficient for the Experience treatment for the proportion healthy because there is no variance in the Experience treatment group. We test whether the proportion healthy in the Information treatment is significantly different from 1 (i.e., the proportion healthy in the Experience treatment), yielding $p = 0.003$.

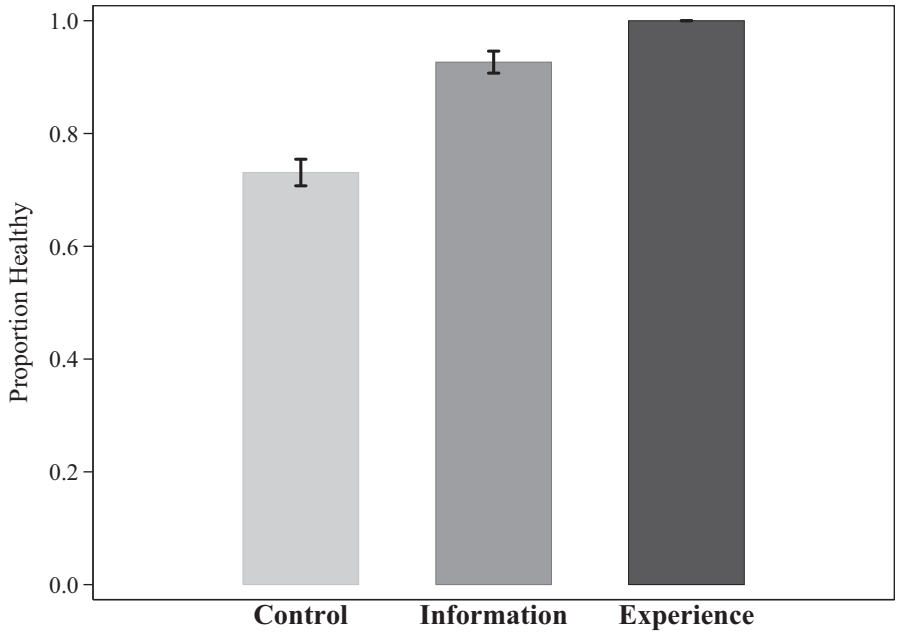

Fig. 1. Proportion of items selected that are healthy by treatment. The figure presents the mean proportion of healthy items chosen by treatment group. Error bars present 95% confidence intervals.

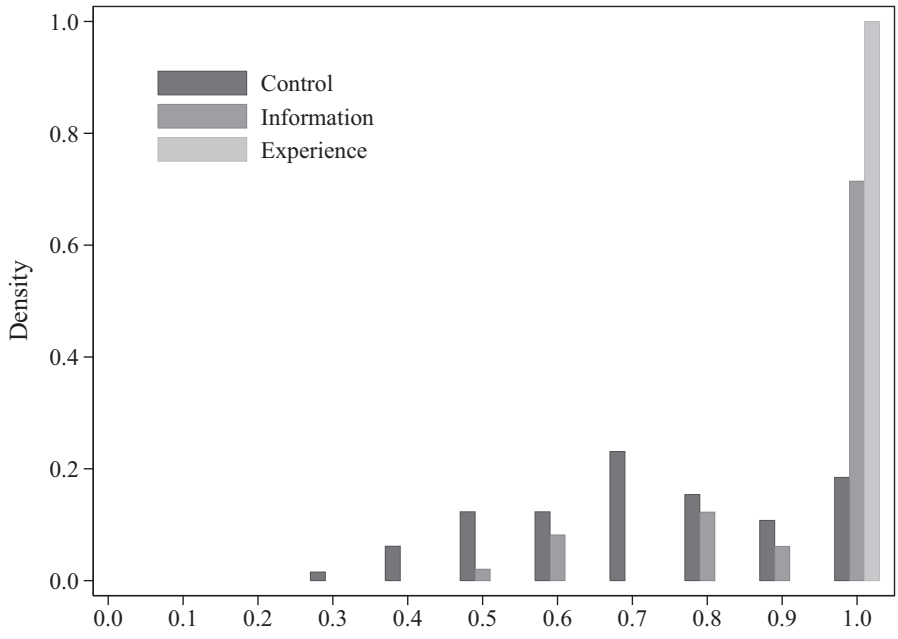

Fig. 2. Distribution of proportion healthy by treatment.

The interventions have large impacts on food choice. The Information and Experience interventions reduce calories by 15% and 18%, fat by 50% and 65%, saturated fat by 60% and 80%, and added sugar by 90% and 100%; and increase fiber by 20% and 30%, respectively, with all effects significant at the $p < 0.01$ level. These effects are larger for the Experience treatment compared to the Information treatment, but are not statistically distinguishable. The interventions also have small negative

Table 5
Treatment effects on food choice.

	Proportion healthy	Calories	Fat	Saturated fat	Carbohydrates	Fiber	Natural sugar	Added sugar	Protein
Information	0.196***	−367.290***	−22.853***	−6.654***	−20.844	9.257***	17.069	−11.535***	−0.716
	(0.032)	(69.721)	(4.721)	(1.161)	(14.155)	(2.272)	(11.482)	(3.132)	(0.898)
Experience		−459.585***	−30.358***	−8.616***	−38.320***	12.931***	10.772	−12.862***	0.376
		(65.976)	(4.468)	(1.098)	(13.395)	(2.150)	(10.865)	(2.964)	(0.850)
Constant	0.731***	2455.485***	46.734***	10.821***	462.436***	44.088***	282.346***	12.862***	22.002***
	(0.021)	(45.710)	(3.095)	(0.761)	(9.280)	(1.489)	(7.527)	(2.054)	(0.589)
Pr(Info = Exp)	0.003	0.195	0.120	0.099	0.227	0.114	0.591	0.678	0.234
N	114	174	174	174	174	174	174	174	174

Note: OLS estimates with standard errors in parentheses. Units are grams except for columns 1–2. The first column excludes the Experience treatment because proportion healthy equals one for all observations. In column 1, Pr(Info=Experience) is the *p*-value from a test that the proportion healthy in the Information treatment equals one. Asterisks indicate significance at the 10/5/1 percent level.

effects on carbohydrates, small positive effects on natural sugar and no effect on protein, all of which are not statistically significant (except for the effect of the Experience treatment on carbohydrates which is significant at the $p < 0.01$ level).[17]

3.3. Post-Treatment effects

We now turn to our main treatment effect of interest, the commitment demand measured in the Post-Treatment session. All participants, regardless of treatment, repeated the same process of choosing foods and reporting their willingness to pay for a 4-week delivery program. Critically, before making their food choices, participants received the offer of a commitment device that restricted their menu choices to healthy foods. If they took up the commitment device, they received the restricted menu, which was identical to the menu for the Experience treatment in the initial Treatment session. If they declined the commitment device, they received the full unrestricted menu, which was identical to the menu for the Control group in the initial Treatment session.

In the analysis of Post-Treatment outcomes, we estimate the effects of treatment assignment as well as the randomly drawn price of the initial session basket ($0, $1, or $5). The randomly drawn price generates exogenous variation in the likelihood that a participant purchased and received delivery of the basket between the initial Treatment and Post-Treatment sessions.[18]

Fig. 3 presents results for the first decision participants make in the second session: whether to take up the commitment device restricting themselves to the healthy foods menu. Both the Information and Experience treatment have a large impact on demand for commitment. In the Control group, 19.6% of participants demand commitment. In the Information and Experience groups, demand for commitment more than doubles, to 39.4% and 50% respectively.

Table 6 estimates the effect of treatment on Post-Treatment commitment demand, including controls for the price drawn in the initial Treatment session. In the final column, we report lower Lee (2009) bounds on the treatment effects by assigning all attrited control group participants to Demand Commitment and all attrited treatment group participants to Decline Commitment.[19]

The estimated effects of the Experience intervention are large and robust, increasing commitment demand by 30 percentage points ($p < 0.01$). The estimated lower Lee bound of 20 percentage points is significant at the $p < 0.05$ level. The estimated effects of the Information intervention are also large, 20 percentage points ($p < 0.05$). However, the estimated effects are not robust to correcting for attrition with an estimated lower Lee bound of 4 percentage points that is not statistically significant at conventional levels. While the impact of the Information treatment is smaller than the Experience treatment, they are never statistically distinguishable. We find little evidence for an impact of price on commitment demand. Relative to the $5 price (the omitted group), the lowest price of $0 has no effect on commitment demand while the point estimates for the $1 price are negative and not statistically significant.[20]

[17] We also estimate *p*-values adjusting for multiple hypothesis testing using the procedure developed by Anderson (2008). There are no changes in the reported significance levels (1%, 5%, 10%). As shown in Appendix Table A.1 Panel A, the results are robust to including only participants who returned for the Post-Treatment session (column 1), including only participants who have baseline covariates (column 2), controlling for baseline covariates (column 3), or excluding participants who did not select a complete basket from the menu: one participant only selected 7 of 10 items and two participants listed one item each that was not on the menu (column 4).

[18] Appendix Table A.2 estimates the effects of randomly assigned treatment and price on purchasing the delivery program. Receiving deliveries at a cost of $1 rather than $5 approximately doubles purchase rates. When there is no cost to participants, over 90% receive delivery (as discussed below some participants do not want to receive delivery even if the baskets are free). There is little impact of either treatment intervention on purchase rates.

[19] Appendix Table A.3 estimates the effect of treatment on attrition with and without the inclusion of observable baseline characteristics. We find no statistically significant predictors of attrition. Appendix Table A.4 reports baseline characteristics by treatment group for the Post-Treatment sample. There are no significant differences across groups at the 5% level.

[20] As shown in Appendix Table A.5, the results are robust to including only participants who have baseline covariates (column 1), controlling for baseline covariates (column 2), or excluding four participants who did not indicate a commitment choice (column 3) – in our main analysis, we consider those participants as not committing. In addition, using probit estimation rather than OLS estimation does not affect the results (column 5).

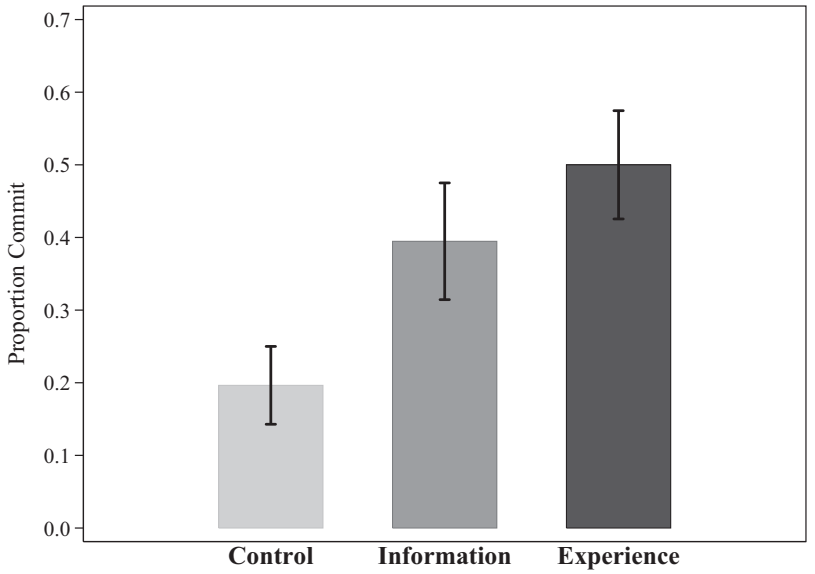

Fig. 3. Post-Treatment commitment demand by treatment. The figure presents the mean proportion of participants who demand commitment by treatment group. Error bars present 95% confidence intervals.

Table 6
Post-Treatment effects on commitment demand.

	Dependent variable: Commit = 1			Lower Lee bound
Information	0.198**		0.204**	0.044
	(0.097)		(0.098)	(0.099)
Experience	0.304***		0.296***	0.203**
	(0.092)		(0.093)	(0.093)
Price = $0		0.015	0.032	
		(0.095)	(0.093)	
Price = $1		−0.120	−0.089	
		(0.107)	(0.106)	
Constant	0.196***	0.370***	0.206***	
	(0.062)	(0.056)	(0.074)	
Pr(Info = Exp)	0.302		0.382	0.376
N	140	140	140	

Note: OLS estimates with standard errors in parentheses. Asterisks indicate significance at the 10/5/1 percent level.

We also examine effects on food choices made after the commitment decision. Treatment effects on food choice persist in the Post-Treatment session. As shown in Fig. 4, participants in the Information and Experience treatment groups select a higher proportion of healthy items compared to the Control group. About 59% of participants in the Experience group select 100% healthy baskets compared to about 45% in the Information group and about 25% in the Control group (Fig. 5).

We estimate the impact on nutritional content in Table 7, which has the same structure as Table 5 except that we add controls for price (beginning in column 2). The estimated Post-Treatment effect on the proportion of healthy items chosen is 8–9 percentage points for the Information treatment ($p < 0.05$ and $p < 0.1$ with and without price controls respectively) and 13–14 percentage points for the Experience treatment ($p < 0.01$). The chosen items also contain fewer calories, less fat, less saturated fat and less added sugar along with more fiber. The magnitude of the estimated Post-Treatment effects are generally smaller than in the initial session though still economically meaningful and are generally statistically significant. We find some evidence that the $1 price decreases the healthfulness of the foods chosen with no impact of the $0 price.[21]

[21] We also estimate *p*-values adjusting for multiple hypothesis testing using the procedure developed by Anderson (2008). The effects of the Experience treatment remain significant at the 5% level. The effects of the Information treatment and the $1 price are not significant at the 5% level (except for the estimated effect of the $1 price on natural sugar). In Appendix Table A.1 Panel B, we examine the sensitivity of the results to including only participants who have baseline covariates (column 2), controlling for baseline covariates (column 3), or excluding participants who did not select a complete basket from the menu: one participant only selected 7 of 10 items (column 4). The effects of the Information treatment are smaller in the sample with baseline covariates. The effects of the Experience treatment do not change.

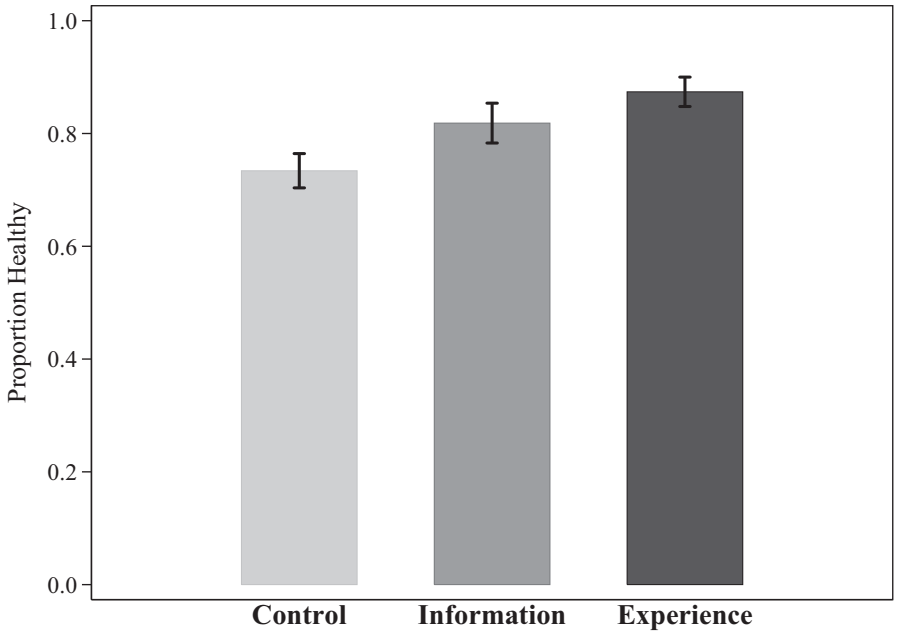

Fig. 4. Post-Treatment proportion of items selected that are healthy by treatment. The figure presents the mean proportion of healthy items chosen by treatment group. Error bars present 95% confidence intervals.

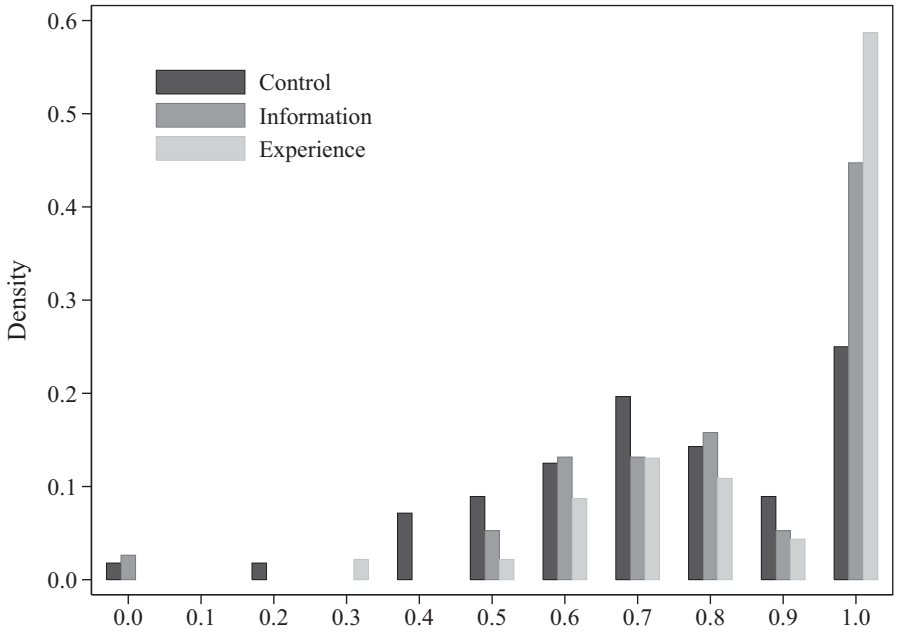

Fig. 5. Post-Treatment distribution of proportion healthy by treatment.

We also estimate the effect of treatment and price on children's Post-Treatment familiarity with healthy foods and find no impact on the proportion of foods they know, have eaten or like (Appendix Table A.6). This result is not particularly surprising given that 40% of households did not receive the delivery program, they received at most 10 healthy items a week and these items were likely shared among the household.

3.4. Treatment effects on willingness to pay

Finally, we examine the effects of treatment and randomly chosen price on willingness to pay (WTP) for the 4-week delivery program. Our primary motivation for measuring WTP is to examine whether the effects of our interventions on

Table 7
Post-Treatment effects on food choice.

	Proportion healthy		Calories	Fat	Saturated fat	Carbohydrates	Fiber	Natural sugar	Added sugar	Protein
Information	0.084*	0.093**	−168.262*	−13.093*	−3.850**	−16.521	5.828*	1.336	−6.973	−0.379
	(0.044)	(0.043)	(94.746)	(6.631)	(1.776)	(18.396)	(3.242)	(15.707)	(5.073)	(1.087)
Experience	0.140***	0.128***	−127.578	−18.230***	−5.118***	11.583	8.122***	25.453*	−13.398***	0.354
	(0.042)	(0.041)	(90.213)	(6.314)	(1.691)	(17.516)	(3.087)	(14.955)	(4.831)	(1.035)
Price = $0		−0.000	2.710	2.439	0.820	−0.698	1.898	−4.336	0.582	0.832
		(0.041)	(89.782)	(6.284)	(1.683)	(17.432)	(3.072)	(14.884)	(4.807)	(1.031)
Price = $1		−0.114**	72.096	12.068*	3.611*	−23.946	−7.874**	−44.402***	6.061	1.965*
		(0.047)	(101.999)	(7.139)	(1.912)	(19.804)	(3.490)	(16.909)	(5.462)	(1.171)
Constant	0.734***	0.758***	2409.007***	47.038***	10.505***	463.898***	45.603***	291.787***	15.035***	21.705***
	(0.028)	(0.033)	(71.420)	(4.999)	(1.338)	(13.867)	(2.444)	(11.840)	(3.824)	(0.820)
Pr(Info = Exp)	0.229	0.453	0.687	0.468	0.503	0.153	0.507	0.151	0.236	0.527
N	140	140	140	140	140	140	140	140	140	140

Note: OLS estimates with standard errors in parentheses. Units are grams except for columns 1–3. Asterisks indicate significance at the 10/5/1 percent level.

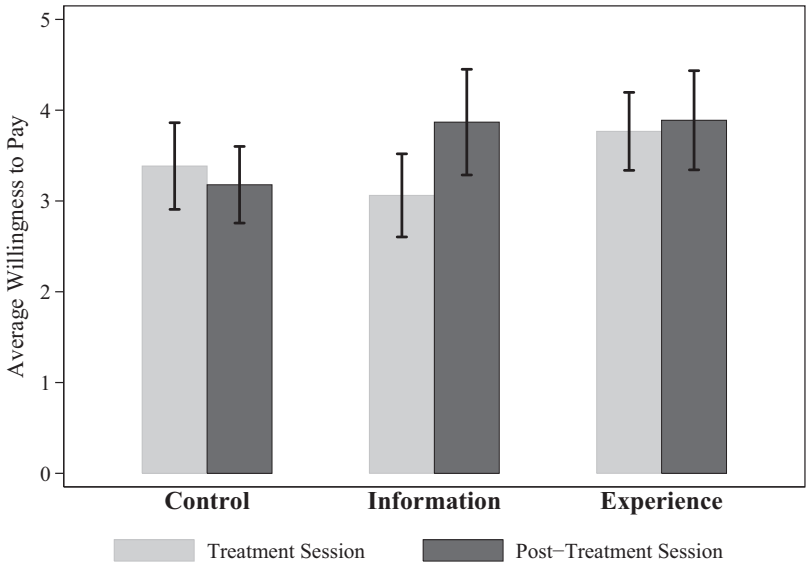

Fig. 6. Willingness to pay by treatment and session. The figure presents the mean willingness to pay (WTP) by treatment group and session (Treatment and Post-Treatment). Error bars present 95% confidence intervals.

behavior potentially have tradeoffs with effects on welfare. That is, do the interventions increase commitment demand and healthy food choices but make people less happy with their choices? As discussed above, we are particularly interested in whether the more restrictive Experience intervention, which has large effects on behavior, leads to welfare losses. Our second motivation is to examine whether price has a subsequent effect on valuation for the delivery program. There are two potential channels. First, a lower price makes it more likely that an individual receives the delivery program which could affect his/her subsequent valuation. Second, as discussed in Section 2, a lower price may directly affect how much people think the delivery program is worth.

We measure WTP as the highest price a participant is willing to pay for the basket after making food selections but before learning the actual price of the basket. We consider a participant "never" WTP if he or she declines the basket at a price of $0 – i.e., he or she does not want the basket even if it is free. In the Treatment and Post-Treatment sessions, 10.9% and 7.1% of participants respectively were never WTP.[22] Fig. 6 shows average WTP by treatment group both in the initial Treatment session and in the Post-Treatment sessions (with never WTP set equal to $0). We find little evidence that our interventions decrease participants' satisfaction with their choices, though we note that the estimates are noisy. Directionally, participants in the Experience treatment are willing to pay *more* for their baskets than the Control group both in the Treatment and Post-Treatment sessions. In the Information treatment, the direction of effects is less consistent: WTP is slightly lower in the Treatment session and increases in the Post-Treatment session.

[22] The effects of interventions on behavior (food choice and commitment demand) are robust to excluding participants who are never willing to pay for the program or who are missing WTP (1 participant in the Post-Treatment session). See Appendix Table A.1 column 5 and Appendix Table A.5 column 4.

Table 8
Treatment effects on willingness to pay (WTP).

	WTP			WTP ≥ $0	WTP > $0
Panel A: Treatment					
Information	−0.323			−0.040	0.048
	(0.662)			(0.059)	(0.087)
Experience	0.382			0.073	0.104
	(0.626)			(0.056)	(0.083)
Constant	3.385***			0.877***	0.646***
	(0.434)			(0.039)	(0.057)
Pr(Info = Exp)	0.296			0.060	0.529
N	174			174	174
Panel B: Post-Treatment					
Information	0.690		0.630	0.001	0.041
	(0.724)		(0.721)	(0.055)	(0.084)
Experience	0.710		0.792	0.058	0.013
	(0.690)		(0.691)	(0.052)	(0.081)
Price = $0		1.358**	1.391**	0.092*	0.173**
		(0.678)	(0.685)	(0.052)	(0.080)
Price = $1		0.177	0.238	0.088	0.130
		(0.760)	(0.777)	(0.059)	(0.091)
Constant	3.179***	3.181***	2.730***	0.865***	0.709***
	(0.460)	(0.402)	(0.544)	(0.041)	(0.064)
Pr(Info = Exp)	0.979		0.834	0.331	0.750
N	139	139	139	139	139

Note: OLS estimates with standard errors in parentheses. The dependent variable in columns 1–3 is willingness to pay; in column 4 is an indicator for willingness to receive the basket if it is free; in column 5 is an indicator for willingness to pay a positive price. Asterisks indicate significance at the 10/5/1 percent level.

In Table 8, we examine treatment effects on WTP as measured by participants' highest price willing to pay with never WTP set equal to $0 (column 1), as well as whether a participant was willing to pay any price (WTP ≥ $0, column 2) or a positive price (WTP > $0, column 3).[23] In the Treatment session (Panel A), there is suggestive evidence that the Information treatment decreases WTP while the Experience treatment increases WTP, though these measures are never statistically significant. In the Post-Treatment session (Panel B), the estimated effects of both interventions are positive but again never statistically significant. Together, our results suggest that the interventions do not decrease welfare as measured by willingness to pay. Rather, we find suggestive evidence that willingness to pay is higher in the presence of restricted choice sets – either when externally imposed on the Experience group in the Treatment session, or when taken up in larger proportions by the Information and Experience groups in the Post-Treatment session.[24]

Turning to the effects of price, we find that receiving a randomly chosen lower price for the basket of either $0 or $1 increases WTP, with effects of the free basket significant at the 5% level. These results suggest that receiving the delivery program via a lower price leads individuals to value the program more highly. Similarly, there is no evidence that providing the delivery program for free causes participants to value it less.

4. Interpretation

Our main findings are consistent with a framework with the following key components. First, people would like to make healthy food choices, but find processed snacks and candy tempting. Second, they are naive about the benefits of a commitment device that restricts their choices to healthy food. However, people can learn about the benefits of the commitment device through interventions that provide information about healthy eating and give individuals experience with the commitment device itself. In this section, we discuss potential alternatives to our interpretation of the results.

4.1. Lack of temptation

One possibility is that the foods in our study do not align with the temptation framework. That is, either people do not think they should be choosing the food we categorized as 'healthy' more often than they are; or, the foods we categorized as 'unhealthy' are not a source of temptation for our participants. If this is the case, then a commitment device that excludes

[23] In both the Treatment and Post-Treatment sessions, 95% and 94% of participants respectively have consistent choices – i.e., if they are willing to pay a price *X* for the basket, they also are willing to pay all prices lower than *X* for the basket. Excluding participants who are inconsistent does not affect the results (Appendix Table A.7)

[24] In addition to reducing temptation, the restricted menu reduces the number of options, which may increase welfare if participants suffer from 'choice overload' (e.g., Iyengar and Lepper, 2000). There is mixed evidence on whether the number of options increases, decreases or has no effect on satisfaction with the option ultimately chosen (see Chernev et al., 2015; Scheibehenne et al., 2010; Simonsohn et al., 2014, for discussion).

'unhealthy' foods from the menu would not provide benefits to participants – i.e., because they do not suffer a self-control problem related to these foods.

To address this concern directly, in spring 2018 we surveyed 68 people from the same participant pool as our main experiment (i.e., parents of children in the CHECC program discussed in Section 2).[25] For each food item in our study, we asked two questions. First, we asked how much participants *like* eating each food. Second, we asked how often participants think they *should* eat each food. We construct a 'temptation index' for each food, which is the difference between how much people say they like eating a food and how often they think they should eat it – i.e., tempting foods are those that people rate high in terms of liking to eat but rate low in terms how often the food should be eaten.[26]

For the 'healthy' foods in our study, the average temptation index is negative: people like eating fresh fruits and vegetables significantly *less* than how often they think they should eat these foods ($p = 0.0000$). For the 'unhealthy' foods, the average temptation index is positive: people like eating processed salty and sweet snack significantly *more* than how often they think they should eat these foods ($p = .0000$). Combining these two measures, we find that the survey respondents rate the unhealthy foods significantly more tempting than the healthy foods ($p = 0.0000$). These results suggest that people would like to be eating the healthy foods in our study more often than they are; and that the unhealthy foods in our study are indeed a source of temptation.

4.2. Menu effects

A potential concern with our study design is that 'menu effects' – rather than information provision – drive the impact of the Information intervention. In the Information treatment we provided participants with a menu that listed the 'healthy' and 'unhealthy' foods on separate sheets; whereas, in the Control group, the menu listed the foods together. During the Treatment session, participants may have chosen to look only at the menu that lists healthy items in order to avoid the temptation of unhealthy items. This is a form of self-commitment that may carry through to the Post-Treatment session in which participants explicitly choose to restrict themselves to the healthy menu. Thus, the Information intervention may actually be providing some participants with the experience of a restricted menu – i.e., the intervention we imposed on participants in the Experience treatment.

To evaluate whether menu effects could drive our results, we ran an additional experiment in the spring of 2018 with 72 customers at a grocery store. We randomly assigned participants to choose 10 $1 items either from a "control" menu that listed healthy and unhealthy foods together ($n = 36$); or from a "treatment" menu that listed healthy and unhealthy foods separately ($n = 36$).[27]

We find no evidence that just listing healthy and unhealthy items separately increases the proportion of healthy items chosen. Participants who received the mixed "control" menu chose on average 64.1% healthy items. Participants who received the "treatment" menu that listed healthy and unhealthy items separately chose directionally *fewer* healthy items on average: 60.8%. And, as shown in Appendix Fig. A.1, the format of the menu does not affect the proportion of baskets that participants fill with only healthy items. These results suggest that menu effects alone are not driving the impact of the Information intervention in our main experiment.

4.3. Prices and framing

As discussed in Section 2, we constructed all the items on our menus to have a retail price of approximately $1. However, it could be the case that the (perceived) price of certain items was higher or lower than $1. For example, if participants have little access to fresh fruits and vegetables, the healthy items on our menu may be perceived as costlier than the unhealthy items. It could also be the case that the prices of the items varied over time, which could affect choices differently in the initial Treatment session compared to the Post-Treatment session. However, we argue that while prices may affect choices in the population, they are less likely to explain our treatment effects. That is, the (perceived) outside price of the food items should be the same on average for participants in the randomly assigned treatment groups.

More broadly, our between-subjects design addresses many of the factors that could be driving choice, but that are common across the three treatment groups. Such factors include that we framed the food deliveries as a snack program for children, but we did not restrict who consumed the food (participants made the commitment decision individually without their child(ren) present). This design feature means that the choices participants made may reflect their preferences over both their own consumption and their children's consumption. We therefore interpret the commitment decision as

[25] Four of the survey respondents had previously participated in the main experiment. Excluding these four respondents does not affect the results (available upon request).

[26] For each of the 40 foods on our menu (listed in alphabetical order), we first instructed participants *"when you answer how much you like eating the food, please think carefully about how much you enjoy the food, including aspects such as how the food tastes to you."* Answers are on a 7-point scale corresponding to *'Do not like at all, Do not like, Do not like a little, No preference, Like a little, Like, Like very much.'* We then asked participants *"how often do you think you should eat this food?"* Answers are on a 3-point scale corresponding to *'least often (once in a while), less often (sometimes), most often (almost anytime)."* We normalize each question to have mean zero and standard deviation one and then take the difference between the standardized 'liking' measure and the standardized 'should' measure.

[27] Participants were customers at Northgate Gonzalez Market, a large supermarket in low-income South-Central Los Angeles. The menus consisted of ten healthy and ten unhealthy items (see Appendix C for menus).

individuals choosing to avoid a menu that includes options that they would potentially find tempting to choose – either for themselves or someone else in their household. Both of these temptations are faced by parents who seek to improve the healthfulness of their household consumption.

5. Conclusion

In this study, we demonstrate that providing information about healthy eating and giving individuals experience with a commitment device restricting oneself to healthy choices have a large impact on willingness to take up the commitment device voluntarily. The interventions also lead to healthier food selections, with little impact on participants' valuation of the food deliveries. We contribute to the growing literature on self control problems by demonstrating that policy interventions can affect demand for commitment.

Our study also informs policies related to improving eating habits, nutrition and health outcomes among at-risk populations. We chose to focus our experiment on parents of young children, in part because of growing evidence that the tendency to consume an unhealthy diet is learned at an early age, and these habits are often learned in the home (Belot et al., 2018; Campbell et al., 2007; De Bourdeaudhuij, 1997). Thus, intervening with parents of young children may be an effective policy strategy. This is particularly relevant in low-income and minority populations, similar to our participant sample, who have higher risks of health problems related to poor diet (Ogden et al., 2010).

One potential caveat is that the foods participants chose from account for only a small portion of their household consumption. An interesting open question is whether people are naive about their self-control problems when more is at stake (e.g., their entire food budget). Future work should further explore the feasibility and cost-effectiveness of interventions like our information and experience treatments, for example in the context of food assistance programs. Another interesting question is to understand whether self-control problems for the self are different from self-control problems when parents are choosing for both themselves and for their children. While our study did not differentiate between these two questions, future work could explore this.

More broadly, the kinds of interventions we design provide a policy response to recent evidence that offering commitment contracts may have limited impact because few people take them up and those who do are often already making healthy choices (Royer et al., 2015; Sadoff et al., 2015). That is, people whose behavior would be most affected by commitment devices are least likely to take them up. Finding ways to increase commitment demand can help increase the practical relevance of commitment devices as a means of addressing self control problems and improving behavioral outcomes.

Appendix A. Appendix figures and tables

Table A.1
Treatment effects on proportion healthy: sensitivity checks.

	In Post-Treatment	Has covariates	Include covariates	Has complete basket	Has WTP $\geq$ 0
Panel A: Treatment					
Information	0.177***	0.198***	0.179***	0.196***	0.210***
	(0.038)	(0.040)	(0.040)	(0.033)	(0.033)
Constant	0.734***	0.726***	0.869***	0.731***	0.726***
	(0.024)	(0.027)	(0.171)	(0.021)	(0.022)
Pr(Info = Exp)	0.000	0.000	0.000	0.000	0.000
N	94	71	71	112	98
Panel B: Post-Treatment					
Information		0.041	0.062	0.095**	0.122***
		(0.050)	(0.051)	(0.044)	(0.043)
Experience		0.128***	0.144***	0.128***	0.126***
		(0.048)	(0.048)	(0.042)	(0.041)
Price = $0		0.006	0.020	–0.001	0.004
		(0.047)	(0.046)	(0.042)	(0.040)
Price = $1		–0.133**	–0.096*	–0.115**	–0.131***
		(0.053)	(0.054)	(0.047)	(0.046)
Constant		0.778***	1.124***	0.759***	0.755***
		(0.039)	(0.181)	(0.033)	(0.033)
Pr(Info = Exp)		0.090	0.104	0.480	0.928
N		95	95	139	129

Note: OLS estimates with standard errors in parentheses. The dependent variable is proportion of healthy items chosen in the Treatment session. In Panel A, the regressions exclude the Experience treatment because proportion healthy equals one for all observations. Pr(Info=Experience) is the p-value from a test that the proportion healthy in the Information treatment equals one. The following participants are excluded: missing from Post-Treatment session (col 1), missing covariates (col 2–3), selected fewer than 10 items for the basket (col 4), inconsistent or never WTP (col 5). Column 3 includes the following covariates: number of children in household, child(ren)'s gender, age and race/ethnicity; SNAP/WIC receipt, time to grocery store, grocery spending, child(ren)'s fruit/vegetable servings, what want child(ren) to eat more of and the proportion of healthy foods the child(ren) know, have eaten and like. Asterisks indicate significance at the 10/5/1 percent level.

Table A.2
Treatment effects on purchasing delivery program.

	Dependent variable: Purchase delivery = 1		
Information	0.104		0.012
	(0.093)		(0.082)
Experience	–0.003		0.066
	(0.088)		(0.077)
Price = $0		0.575***	0.584***
		(0.077)	(0.079)
Price = $1		0.384***	0.398***
		(0.081)	(0.086)
Constant	0.569***	0.360***	0.328***
	(0.061)	(0.045)	(0.062)
Pr(Info = Exp)	0.261		0.537
N	174	174	174

Note: OLS estimates with standard errors in parentheses. Asterisks indicate significance at the 10/5/1 percent level.

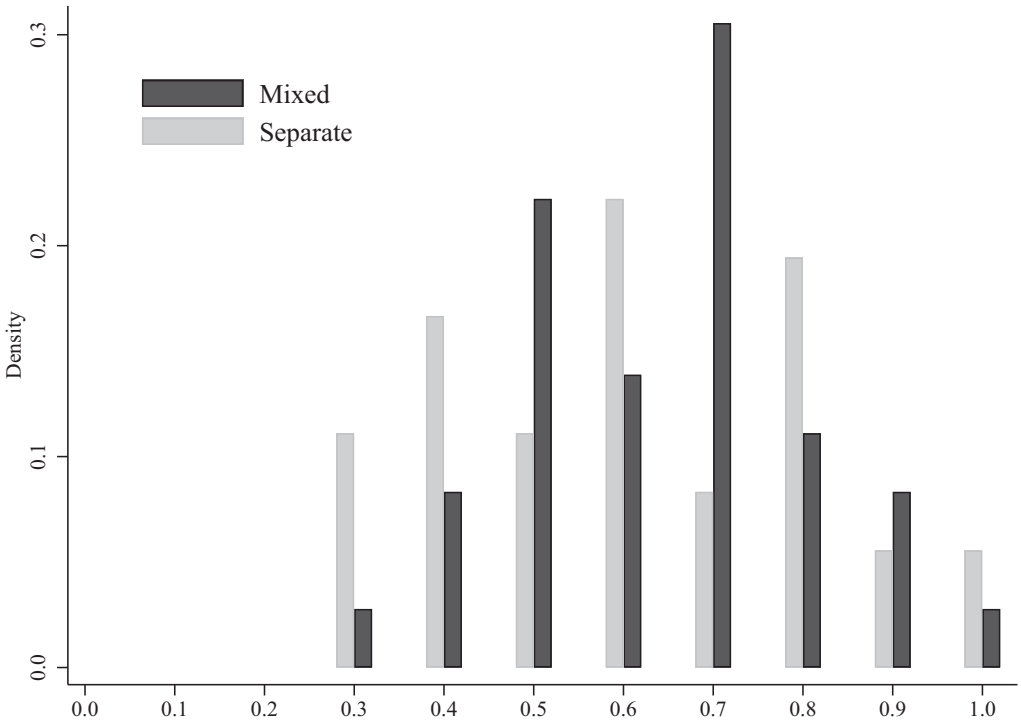

Fig. A.1. Distribution of proportion healthy by menu type.

Table A.3
Attrition.

	Full sample			Has covariates	
Information	0.086		0.066	0.012	0.088
	(0.075)		(0.077)	(0.080)	(0.087)
Experience	0.095		0.103	0.026	0.060
	(0.071)		(0.072)	(0.077)	(0.083)
Price = $0		−0.028	−0.021	−0.053	−0.038
		(0.072)	(0.073)	(0.077)	(0.082)
Price = $1		0.102	0.109	0.051	0.024
		(0.076)	(0.080)	(0.084)	(0.094)
Children in household					−0.062
					(0.067)
Child female					−0.027
					(0.081)
Child black					0.128
					(0.121)
Child Hispanic					−0.044
					(0.126)
Child age					0.049
					(0.032)
Received SNAP/WIC in last 6 months					0.024
					(0.072)
Time to grocery store (minutes)					0.000
					(0.002)
Grocery spending (d)					−0.000
					(0.000)
Child fruit/vegetable servings					−0.039
					(0.047)
Want child to eat more fruits/vegetables					0.135
					(0.124)
Want child to eat the same foods					0.115
					(0.128)
Child proportion healthy foods know					−0.423
					(0.283)
Child proportion healthy foods ate					0.179
					(0.190)
Child proportion healthy foods like					0.235
					(0.207)
Constant	0.138***	0.180***	0.122**	0.111*	−0.284
	(0.049)	(0.042)	(0.058)	(0.062)	(0.336)
N	174	174	174	108	108

Table A.4
Baseline characteristics: Post-Treatment sample.

	Control	Information	Experience	*F*-test *p*-value
Observations	56	38	46	
Children in household	1.27	1.39	1.20	0.20
	(0.56)	(0.55)	(0.40)	
Child age	5.74	5.46	5.34	0.23
	(1.29)	(1.06)	(1.20)	
Child female	0.51	0.53	0.55	0.91
	(0.46)	(0.43)	(0.47)	
Child black	0.54	0.50	0.46	0.77
	(0.50)	(0.51)	(0.51)	
Child Hispanic	0.40	0.37	0.29	0.57
	(0.49)	(0.48)	(0.45)	
Received SNAP/WIC in last 6 months	0.57	0.50	0.68	0.25
	(0.50)	(0.51)	(0.47)	
Time to grocery store (minutes)	13.43	18.02	17.51	0.42
	(10.27)	(21.73)	(22.11)	
Grocery spending ($)	134.51	184.55	125.64	0.06
	(87.67)	(172.57)	(82.40)	
Child fruit/vegetable servings	0.36	0.18	0.40	0.32
	(0.72)	(0.51)	(0.75)	
Want child to eat more fruits/vegetables	0.68	0.44	0.53	0.09
	(0.47)	(0.50)	(0.51)	
Want child to eat more other foods	0.05	0.21	0.13	0.09
	(0.21)	(0.41)	(0.33)	
Want child to eat the same foods	0.27	0.35	0.35	0.68
	(0.45)	(0.49)	(0.48)	
Child proportion healthy foods know	0.56	0.57	0.58	0.75
	(0.17)	(0.18)	(0.15)	
Child proportion healthy foods ate	0.66	0.67	0.70	0.56
	(0.24)	(0.20)	(0.18)	
Child proportion healthy foods like	0.83	0.75	0.80	0.06
	(0.15)	(0.19)	(0.16)	

Note: The table reports means with standard deviations in parentheses. The final column reports the *p*-value from an *F*-test of equality of across treatment groups. Age, gender and race/ethnicity are averages across all children in the household. Grocery spending averages amount spent on most recent trip and amount spent in typical week. Child fruit/vegetable servings computed based on 24-hour recall survey (excludes juice). Child proportion healthy foods variables are averages across all children in household who took the healthy foods survey (1–2 per household).

Table A.5
Post-Treatment effects on commitment demand: sensitivity checks.

	Has covariates	Include covariates	Non-missing response	Has WTP ≥ 0	Probit estimation
Information	0.124	0.165	0.240**	0.275***	0.780***
	(0.122)	(0.138)	(0.102)	(0.103)	(0.283)
Experience	0.190	0.250*	0.287***	0.268***	0.753***
	(0.119)	(0.130)	(0.094)	(0.098)	(0.266)
Price = $0	−0.045	−0.031	0.005	−0.007	−0.091
	(0.117)	(0.124)	(0.095)	(0.097)	(0.260)
Price = $1	−0.206	−0.110	−0.120	−0.167	−0.498
	(0.131)	(0.148)	(0.108)	(0.111)	(0.314)
Constant	0.320***	0.858*	0.225***	0.237***	−0.677***
	(0.097)	(0.491)	(0.076)	(0.079)	(0.217)
Pr(Info = Exp)	0.598	0.535	0.663	0.954	0.925
N	95	95	136	129	140

Note: OLS estimates with standard errors in parentheses except column 5 which present probit estimates. The dependent variable is an indicator for commitment demand in the Post-Treatment session. The following participants are excluded: missing covariates (col 1–2), missing response to commitment question (col 3), never WTP (col 4). Column 2 includes the following covariates: number of children in household, child(ren)'s gender, age and race/ethnicity; SNAP/WIC receipt, time to grocery store, grocery spending, child(ren)'s fruit/vegetable servings, what want child(ren) to eat more of and the proportion of healthy foods the child(ren) know, have eaten and like. Asterisks indicate significance at the 10/5/1 percent level.

Table A.6
Treatment effects on proportion of healthy foods children know, have eaten and like.

	Knows name of the food			Has eaten the food			Likes the food		
Information	−0.001	0.001	−0.007	−0.052	−0.045	−0.054*	0.013	0.012	0.024
	(0.041)	(0.041)	(0.030)	(0.044)	(0.044)	(0.027)	(0.029)	(0.029)	(0.029)
Experience	0.001	−0.004	−0.012	0.015	−0.001	−0.024	−0.016	−0.012	−0.007
	(0.039)	(0.040)	(0.029)	(0.042)	(0.042)	(0.026)	(0.027)	(0.028)	(0.027)
Price = $0		−0.012	0.005		−0.016	−0.005		−0.024	−0.019
		(0.040)	(0.029)		(0.042)	(0.026)		(0.028)	(0.027)
Price = $1		−0.032	0.019		−0.123***	−0.061**		0.041	0.048
		(0.044)	(0.032)		(0.046)	(0.029)		(0.031)	(0.030)
Baseline proportion know			0.813***						
			(0.074)						
Baseline proportion have eaten						0.784***			
						(0.056)			
Baseline proportion like									0.157**
									(0.070)
Constant	0.599***	0.610***	0.136***	0.717***	0.750***	0.213***	0.871***	0.868***	0.735***
	(0.027)	(0.032)	(0.049)	(0.029)	(0.034)	(0.044)	(0.019)	(0.022)	(0.063)
N	134	134	134	134	134	134	134	134	134

Note: OLS estimates with standard errors in parentheses. The dependent variable is the proportion of the 10 healthy foods the child(ren) of the participant knows the name of (columns 1–3), has eaten (columns 4–6) or likes (columns 7–10) measured in the Post-Treatment session. Baseline proportions are measured in the Treatment session. Observations are at the participant level averaged across children in the household (up to 2 children per participant). Asterisks indicate significance at the 10/5/1 percent level.

Table A.7
Treatment effects on willingness to pay: excluding inconsistent WTP.

	WTP			WTP ≥ $0	WTP > $0
Panel A: Pre WTP					
Information	−0.350			−0.015	0.069
	(0.684)			(0.060)	(0.089)
Experience	0.332			0.079	0.097
	(0.654)			(0.057)	(0.085)
Constant	3.475***			0.869***	0.639***
	(0.454)			(0.040)	(0.059)
Pr(Info = Exp)	0.328			0.128	0.754
N	166			166	166
Panel B: Post WTP					
Information	0.664		0.579	0.019	0.078
	(0.763)		(0.760)	(0.058)	(0.089)
Experience	0.769		0.849	0.056	0.018
	(0.723)		(0.723)	(0.055)	(0.085)
Price = $0		1.435**	1.476**		
		(0.711)	(0.719)		
Price = $1		0.164	0.252		
		(0.791)	(0.812)		
Constant	3.120***	3.132***	2.651***	0.900***	0.760***
	(0.497)	(0.422)	(0.583)	(0.038)	(0.058)
Pr(Info = Exp)	0.893		0.734	0.537	0.513
N	132	132	132	132	132

Note: OLS estimates with standard errors in parentheses. The dependent variable in columns 1–3 is willingness to pay; in column 4 is an indicator for willingness to receive the basket if it is free; in column 5 is an indicator for willingness to pay a positive price. Asterisks indicate significance at the 10/5/1 percent level.

Supplementary material

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jebo.2018.11.016.

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