

Appendix

APPENDIX TEXT 1 (text)

Caption: Additional methodologic details

Source/Notes:

SOURCE

Authors.

APPENDIX EXHIBIT 1 (table)

Caption: CONSORT checklist

Source/Notes:

SOURCE

Authors.

APPENDIX EXHIBIT 2 (figure)

Caption: Flow diagram of participants through the study

Source/Notes:

SOURCE

Authors.

APPENDIX EXHIBIT 3 (table)

Caption: Details of the calorie “consumption cycle” change among participants

Source/Notes:

SOURCE

Authors.

APPENDIX EXHIBIT 4 (table)

Caption: (A) Principal results, month 0 to month 6 (parallel to main text Exhibit 2, but with 95% confidence intervals included); (B) Principal results, month 0 to month 12

Source/Notes:

SOURCE

Authors.

NOTES

Changes in primary and secondary pre-specified outcome measures, between baseline and month 12 (end of intervention). Changes in each variable were estimated using a linear mixed effects model with main effects for treatment arm and assessment month, and a random effect for study participant to account for baseline differences in consumption among participants. All n=359 provided data at baseline for all outcomes. At 12 months, for the nutrition outcomes (whole F/V, HEI, AHEI), FV, weekly was missing 10/86, FV, monthly was missing 14/90, UN, weekly was missing 17/92, and UN, monthly was missing 11/91 (52/359 total missing). For the food insecurity outcome at 12 months, FV, weekly was missing 11/86, FV, monthly was missing 16/90, UN, weekly was missing 22/92, and UN, monthly was missing 13/91 (62/359 total missing).

APPENDIX EXHIBIT 5 (table)

Caption: Voucher ease of use variables at 6 months

Source/Notes:

SOURCE

Authors.

APPENDIX EXHIBIT 6 (table)

Caption: Voucher redemption rates at 6 months

Source/Notes:

SOURCE

Authors.

APPENDIX EXHIBIT 7 (table)

Caption: Summary of food security variables at baseline and 6 months

Source/Notes:

SOURCE

Authors.

APPENDIX EXHIBIT 8 (figure)

Caption: Boxplots of main study outcomes by group

(A) 0-6 month change in F/V intake

(B) 0-6 month change in HEI score

(C) 0-6 month change in AHEI score

Source/Notes:

SOURCE

Authors.

APPENDIX EXHIBIT 9 (table)

Caption: Adjusted models for primary and secondary outcomes

Source/Notes:

Covariate-adjusted results, adjusting for randomization variables (sex, black race, Hispanic ethnicity, income, number of individuals in household, and SNAP participation). Changes in primary and secondary pre-specified outcome measures, between baseline and month 6 (end of intervention), and tests of between group effects (FV vs. UN, weekly vs. monthly). N=359 study participants provided data at baseline and n=332 at month 6. Changes in each variable were estimated using a linear mixed effects model with main effects for treatment arm and assessment month, and a random effect for study participant. FV: Arms given vouchers redeemable for only fruits and vegetables. UN: Arms given unrestricted vouchers redeemable for any food. Compare to main text Exhibit 3, which presents unadjusted results.

SOURCE

Authors.

APPENDIX EXHIBIT 10 (table)

Caption: Effects of treatment on the treated

Source/Notes:

Instrumental variable analysis via two-stage least squares regression of change in fruit and vegetable consumption (from month 0 to month 6) on percent of vouchers utilized, using randomization into (A) weekly vouchers rather than monthly vouchers or (B) F&V-only vouchers rather than unrestricted vouchers, as an instrumental variable for voucher utilization. The second-stage estimate reflects the effect of treatment on change in fruit and vegetable consumption, rescaled by the percentage of vouchers used, to estimate the effect of the weekly (or F&V) vouchers among those who complied with the intervention (those who used the vouchers only if assigned to the weekly voucher as opposed to the monthly voucher, or F&V rather than unrestricted voucher). The findings suggest that randomization to weekly rather than monthly vouchers is a strong incentive not to adhere to the intervention, whereas randomization to F&V rather than unrestricted had no strong effects on adherence.

SOURCE

Authors.

APPENDIX EXHIBIT 11 (table)

Caption: Shopping habits data

Source/Notes: Where shown, p-value from Fisher's exact test for categorical variables and one-way ANOVA for continuous variables.

SOURCE

Authors.

APPENDIX TEXT 1

Voucher redemption

Vendors submitted the vouchers for reimbursement at the rate of \$5.25 for each \$5 voucher redeemed (similar to redemption processes for manufacturers' coupons), although the two largest, corporate stores declined the \$0.25 subsidy. The intervention was administered from February 2017 through March 2018.

Sample size

The trial was powered to test the mean effects of both axes (F&V-only versus unrestricted, and weekly versus monthly) on the primary outcome of F&V consumption at month 6, as well as to test the interaction between the axes and perform a moderator and a mediator analysis. In the moderator analysis, we explicitly tested the moderator of the consumption cycle on the effectiveness of the weekly versus monthly vouchers. Specifically, we tested the hypothesis that participants would have greater improvements in F&V consumption and HEI score in the weekly voucher than the monthly voucher group, if their dietary intake exhibited a lower consumption cycle in month 6 than in month 0. For this moderator analysis, we tested the significance of the interaction between voucher frequency assignment (weekly or monthly) and the ratio of week 4 to week 1 total calorie intake at month 6 relative to month 0. In a mediation analysis, we also tested whether self-reported ease of use was a mediator for restricted vouchers being more effective than unrestricted vouchers. For this mediator analysis, we pre-specified testing the significance of the interaction between voucher targeting assignment (restricted or unrestricted) and self-reported ease of use from the month 6 survey.

We examined whether the consumption cycle moderated the effectiveness of weekly versus monthly vouchers in increasing F&V intake, and found that the interaction term between voucher frequency assignment (weekly or monthly) and the ratio of week 4 to week 1 total calorie intake in month 6 relative to month 0 was not significant (0.16; 95% CI: -0.03, 0.35; $P = 0.10$).

We also examined whether ease of use mediated the effectiveness of the restricted versus unrestricted vouchers in increasing F&V intake, and found that the interaction term between voucher restriction assignment (restricted or unrestricted) and ease of use was not significant (0.21; 95% CI: -0.14, 0.56; $P = 0.24$).

We aimed for power ($1 - \beta$) of 0.80 to detect a minimum effect size of $f=0.25$ for either of the two axes, which was chosen as the minimum effect size observed in the two most similar prior studies: an observational comparison of recipients of a F&V-only subsidy compared to matched recipients of a general grocery purchasing discount,⁴⁵ and a study of F&V-only versus unrestricted subsidies in the United Kingdom.⁴⁴ We calculated power with a conservative 15% attrition rate over the study period, requiring $N=288$ participants ($n=72$ per intervention condition; G*Power software v. 3.1).

Interim analyses and premature stopping were not planned or conducted.

Randomization

Sequence generation for randomization was produced by the study statistician in Stata (version MP-13, StataCorp, College Station, Texas) with covariate-adaptive randomization among monthly blocks of enrollees.^{46,47} The covariates used in adaptive

randomization were age, sex, Black race, Hispanic ethnicity, income, and SNAP participation.

Blinding

Participants were blinded to group assignment during the first phase of data collection (pre-intervention, month 0). The investigators and diet assessor team who performed 24-hour recalls and surveys over the phone were blinded to group assignment throughout the study. The study statistician was blinded to group assignment throughout analysis by using codes for group assignments. Codes were translated into the actual study arms by the unblinded recruitment coordinator, who held the code until after data collection and statistical analyses were completed.

Subgroup analysis

For hypothesis generating purposes, subgroup analysis was performed using the mCART algorithm for subgroup discovery.⁴⁸ The algorithm uses matching and the machine learning method of regression tree analysis to reduce the risk of false-positive subgroup findings. The algorithm was applied to identify whether any subgroups defined by combinations of the randomization variables (sex, age, black race, Hispanic ethnicity, income, and SNAP participation) had disproportionately positive or negative changes between month 0 and month 6 in the primary and secondary outcome variables, by randomization arm and by factorial axis (F&V-only versus unrestricted, and weekly versus monthly).

Subgroup analysis using the mCART algorithm did not find any treatment effect subgroups that experienced a disproportionate gain or loss in F&V, HEI or AHEI between month 0 and month 6.

Harm

Unintended adverse events were assessed through passive reporting. No participants reported adverse events.

Study protocol

The full trial protocol is available online at:
<https://clinicaltrials.gov/ct2/show/record/NCT02843178>

APPENDIX EXHIBIT 1

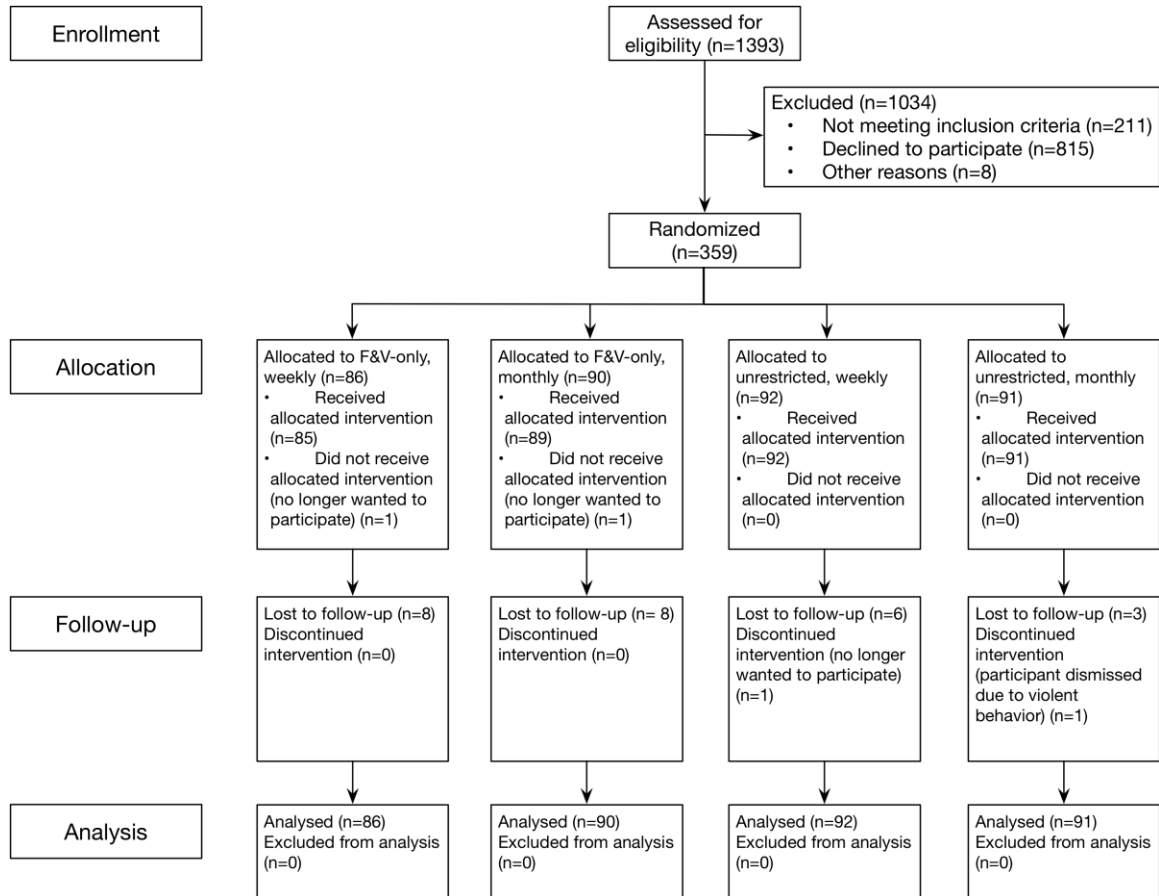


CONSORT 2010 checklist of information to include when reporting a randomised trial

Section/Topic	Item No	Checklist item	Reported in section
Title and abstract			
	1a	Identification as a randomised trial in the title	Title
	1b	Structured summary of trial design, methods, results, and conclusions (for specific guidance see CONSORT for abstracts)	Abstract
Introduction			
Background and objectives	2a	Scientific background and explanation of rationale	Introduction
	2b	Specific objectives or hypotheses	Introduction
Methods			
Trial design	3a	Description of trial design (such as parallel, factorial) including allocation ratio	Methods
	3b	Important changes to methods after trial commencement (such as eligibility criteria), with reasons	Methods
Participants	4a	Eligibility criteria for participants	Methods
	4b	Settings and locations where the data were collected	Methods
Interventions	5	The interventions for each group with sufficient details to allow replication, including how and when they were actually administered	Methods and Appendix
Outcomes	6a	Completely defined pre-specified primary and secondary outcome measures, including how and when they were assessed	Methods
	6b	Any changes to trial outcomes after the trial commenced, with reasons	Appendix
Sample size	7a	How sample size was determined	Appendix
	7b	When applicable, explanation of any interim analyses and stopping guidelines	Appendix
Randomisation:			
Sequence generation	8a	Method used to generate the random allocation sequence	
	8b	Type of randomisation; details of any restriction (such as blocking and block size)	Appendix
Allocation concealment mechanism	9	Mechanism used to implement the random allocation sequence (such as sequentially numbered containers), describing any steps taken to conceal the sequence until interventions were assigned	Appendix
Implementation	10	Who generated the random allocation sequence, who enrolled participants, and who assigned participants to interventions	Appendix
Blinding	11a	If done, who was blinded after assignment to interventions (for example, participants, care providers, those assessing outcomes) and how	N/A
	11b	If relevant, description of the similarity of interventions	Appendix
Statistical methods	12a	Statistical methods used to compare groups for primary and secondary outcomes	Appendix
	12b	Methods for additional analyses, such as subgroup analyses and adjusted analyses	Appendix

Results			
Participant flow (a diagram is strongly recommended)	13	For each group, the numbers of participants who were randomly assigned, received intended treatment, and were analysed for the primary outcome	<u>Results, Appendix</u>
	13	For each group, losses and exclusions after randomisation, together with reasons	<u>Results, Appendix</u>
Recruitment	14	Dates defining the periods of recruitment and follow-up	<u>Results</u>
	14	Why the trial ended or was stopped	<u>N/A</u>
Baseline data	15	A table showing baseline demographic and clinical characteristics for each group	<u>EXHIBIT 1</u>
Numbers analysed	16	For each group, number of participants (denominator) included in each analysis and whether the analysis was by original assigned groups	<u>Results, Appendix</u>
Outcomes and estimation	17	For each primary and secondary outcome, results for each group, and the estimated effect size and its precision (such as 95% confidence interval)	<u>EXHIBIT 2, Appendix</u>
	17	For binary outcomes, presentation of both absolute and relative effect sizes is recommended	<u>EXHIBIT 2, Appendix</u>
Ancillary analyses	18	Results of any other analyses performed, including subgroup analyses and adjusted analyses, distinguishing pre-specified from exploratory	<u>Appendix</u>
Harms	19	All important harms or unintended effects in each group (for specific guidance see CONSORT for harms)	<u>Appendix</u>
Discussion			
Limitations	20	Trial limitations, addressing sources of potential bias, imprecision, and, if relevant, multiplicity of analyses	<u>Discussion</u>
Generalisability	21	Generalisability (external validity, applicability) of the trial findings	<u>Discussion</u>
Interpretation	22	Interpretation consistent with results, balancing benefits and harms, and considering other relevant evidence	<u>Discussion</u>
Other information			
Registration	23	Registration number and name of trial registry	<u>Abstract</u>
Protocol	24	Where the full trial protocol can be accessed, if available	<u>Appendix</u>
Funding	25	Sources of funding and other support (such as supply of drugs), role of funders	<u>Abstract</u>

APPENDIX EXHIBIT 2



APPENDIX EXHIBIT 3

Calories	FV, weekly	FV, monthly	UN, weekly	UN, monthly	Total
	n=86	n=90	n=92	n=91	n=359
Baseline					
Week 1	1602 (±621)	1771 (±702)	1640 (±668)	1763 (±687)	1695 (±672)
Missing	1 (1.2%)	1 (1.1%)	0 (0%)	0 (0%)	2 (0.6%)
Week 4	1680 (±579)	1683 (±649)	1638 (±657)	1730 (±753)	1682 (±662)
Ratio Week 4/1	1.1 (±0.4)	1.0 (±0.4)	1.1 (±0.6)	1.0 (±0.4)	1.1 (±0.4)
Missing	1 (1.2%)	1 (1.1%)	0 (0%)	0 (0%)	2 (0.6%)
6 Months					
Week 1	1744 (±723)	1767 (±757)	1717 (±725)	1738 (±606)	1741 (±700)
Missing	12 (14.0%)	12 (13.3%)	11 (12.0%)	7 (7.7%)	42 (11.7%)
Week 4	1712 (±722)	1691 (±633)	1654 (±759)	1709 (±648)	1692 (±690)
Missing	8 (9.3%)	13 (14.4%)	11 (12.0%)	5 (5.5%)	37 (10.3%)
Ratio Week 4/1	1.0 (±0.3)	1.0 (±0.3)	1.1 (±0.4)	1.0 (±0.4)	1.0 (±0.4)
Missing	12 (14.0%)	17 (18.9%)	15 (16.3%)	8 (8.8%)	52 (14.5%)

APPENDIX EXHIBIT 4

(A)

	Change from baseline to month 6, within arm				Between group effects	
	FV, weekly	FV, monthly	UN, weekly	UN, monthly	FV vs. UN arms	Weekly vs. monthly arms
Primary Outcome						
Whole Fruits/Vegetables (cup-eq) ¹	+0.18 (-0.004, 0.36)	+0.08 (-0.09, 0.26)	+0.09 (-0.09, 0.26)	+0.04 (-0.13, 0.21)	+0.07 (-0.11, 0.24)	+0.07 (-0.10, 0.25)
Secondary Outcomes						
Healthy Eating Index (HEI)	+1.22 (-0.85, 3.29)	+0.70 (-1.31, 2.72)	+2.06 (0.07, 4.04)*	-0.28 (-2.25, 1.68)	+0.09 (-1.92, 2.10)	+1.47 (-0.53, 3.47)
Alternative Healthy Eating Index (AHEI)	+0.15 (-1.90, 2.20)	+0.16 (-1.84, 2.15)	+0.61 (-1.35, 2.57)	+0.08 (-1.86, 2.03)	-0.18 (-2.17, 1.80)	+0.28 (-1.70, 2.26)
Voucher utilization rate (% used over 6 months)	66.8 (61.6, 72.0)	81.8 (76.6, 86.9)	67.8 (62.8, 72.9)	80.4 (75.4, 85.5)	+0.26 (-5.04, 5.55)	-13.7 (-18.8, -8.6)*
Food insecurity (month 6 vs month 0 odds ratio of food insecurity)	0.70 (0.44, 1.12)	0.75 (0.49, 1.13)	0.71 (0.51, 0.98) *	0.62 (0.43, 0.90) *	0.73 (0.53, 0.99) vs. 0.66 (0.52, 0.85) ²	0.71 (0.54, 0.93) vs. 0.68 (0.51, 0.89) ²

(B)

	Change from baseline to month 12, within arm				Between group effects	
	FV, weekly N=86	FV, monthly N=90	UN, weekly N=92	UN, monthly N=91	FV vs. UN arms	Weekly vs. monthly arms
Primary Outcome						
Whole Fruits/Vegetables (cup-eq) ¹	0.0316 (-0.1529, 0.2161) P=0.7371	0.018 (-0.1655, 0.2015) P=0.8476	-0.0849 (-0.2689, 0.0991) P=0.366	0.2112 (0.0315, 0.3909) P=0.0212	-0.04 (-0.23, 0.14) P=0.6499	-0.15 (-0.33, 0.04) P=0.1206
Secondary Outcomes						
Healthy Eating Index (HEI)	1.1863 (-0.8823, 3.255) P=0.261	1.5979 (-0.4635, 3.6593) P=0.1287	-0.1282 (-2.1979, 1.9416) P=0.9034	1.1995 (-0.8159, 3.2149) P=0.2434	0.84 (-1.2, 2.89) P=0.4192	-0.89 (-2.94, 1.16) P=0.3961
Alternative Healthy Eating Index (AHEI)	-0.3124 (-2.2699, 1.645) P=0.7544	0.9542 (-0.9977, 2.9062) P=0.338	-0.5405 (-2.5014, 1.4203) P=0.589	1.7493 (-0.1579, 3.6566) P=0.0722	-0.32 (-2.26, 1.63) P=0.7505	-1.8 (-3.74, 0.13) P=0.0681
Food insecurity (month 12 vs month 0 odds ratio of food insecurity)	0.59 (0.39, 0.89) P=0.0111	0.60 (0.39, 0.94) P=0.0257	0.94 (0.66, 1.35) P=0.751	0.71 (0.49, 1.05) P=0.1267	0.60 (0.44, 0.82 (0.63, 1.07) vs. 0.81 vs. 0.66 (0.49, 0.88) P=0.12	0.76 (0.58, 0.99) vs. 0.66 (0.49, 0.88) P=0.489

*P<0.05

¹Whole Fruits and Vegetables include all Whole Fruits (citrus and non-citrus fruits) and Whole Vegetables (dark green vegetables, deep yellow vegetables, tomatoes, and starchy vegetables).

²Odds ratios reported for each category

APPENDIX EXHIBIT 5

	FV, weekly	FV, monthly	UN, weekly	UN, monthly	Total
	n=86	n=90	n=92	n=91	n=359
Do you feel you understood how to use the vouchers (Q1)?					
No	0 (0.0%)	1 (1.1%)	1 (1.1%)	0 (0.0%)	2 (0.6%)
Yes	77 (89.5%)	80 (88.9%)	84 (91.3%)	86 (94.5%)	327 (91.1%)
Missing	9 (10.5%)	9 (10.0%)	7 (7.6%)	5 (5.5%)	30 (8.4%)
Was it easy to decide which foods you are allowed to spend the voucher on (Q2)?					
No	2 (2.3%)	7 (7.8%)	7 (7.6%)	3 (3.3%)	19 (5.3%)
Yes	75 (87.2%)	74 (82.2%)	78 (84.8%)	83 (91.2%)	310 (86.4%)
Missing	9 (10.5%)	9 (10.0%)	7 (7.6%)	5 (5.5%)	30 (8.4%)
Did you have any trouble using the vouchers at any stores; that is, did any cashiers or store employees give you a hard time or not allow you to use the vouchers (Q3)?					
No	69 (80.2%)	66 (73.3%)	56 (60.9%)	53 (58.2%)	244 (68.0%)
Yes	8 (9.3%)	15 (16.7%)	29 (31.5%)	33 (36.3%)	85 (23.7%)
Missing	9 (10.5%)	9 (10.0%)	7 (7.6%)	5 (5.5%)	30 (8.4%)
Total score¹					
0	0 (0.0%)	1 (1.1%)	1 (1.1%)	0 (0.0%)	2 (0.6%)
1	0 (0.0%)	1 (1.1%)	2 (2.2%)	2 (2.2%)	5 (1.4%)
2	10 (11.6%)	18 (20.0%)	30 (32.6%)	32 (35.2%)	90 (25.1%)
3	67 (77.9%)	61 (67.8%)	52 (56.5%)	52 (57.1%)	232 (64.6%)
Missing	9 (10.5%)	9 (10.0%)	7 (7.6%)	5 (5.5%)	30 (8.4%)

¹Defined as total of yes to Q1, yes to Q2, and no to Q3

APPENDIX EXHIBIT 6

	FV, weekly	FV, monthly	UN, weekly	UN, monthly	Total
	n=86	n=90	n=92	n=91	n=359
Total redemptions	16.8 (±7.1)	20.6 (±5.3)	17.1 (±7.2)	20.3 (±5.5)	18.7 (±6.5)
Missing	2 (2.3%)	4 (4.4%)	2 (2.2%)	1 (1.1%)	9 (2.5%)
Percentage of vouchers redeemed	66.8 (±27.9)	81.8 (±19.9)	67.8 (±27.9)	80.4 (±20.1)	74.3 (±25.1)
Missing	2 (2.3%)	4 (4.4%)	2 (2.2%)	1 (1.1%)	9 (2.5%)

APPENDIX EXHIBIT 7

	FV, weekly	FV, monthly	UN, weekly	UN, monthly	Total
	n=86	n=90	n=92	n=91	n=359
<i>The food that (I/we) bought just didn't last, and (I/we) didn't have money to get more (HH3)</i>					
Baseline					
Often true	23 (26.7%)	22 (24.4%)	17 (18.5%)	19 (20.9%)	81 (22.6%)
Sometimes true	40 (46.5%)	41 (45.6%)	34 (37.0%)	35 (38.5%)	150 (41.8%)
Never true	23 (26.7%)	27 (30.0%)	41 (44.6%)	37 (40.7%)	128 (35.7%)
6 Months					
Often true	13 (15.1%)	20 (22.2%)	12 (13.0%)	18 (19.8%)	63 (17.5%)
Sometimes true	38 (44.2%)	33 (36.7%)	33 (35.9%)	28 (30.8%)	132 (36.8%)
Never true	26 (30.2%)	28 (31.1%)	40 (43.5%)	40 (44.0%)	134 (37.3%)
Missing	9 (10.5%)	9 (10.0%)	7 (7.6%)	5 (5.5%)	30 (8.4%)
<i>(I/we) couldn't afford to eat balanced meals. (HH4)</i>					
Baseline					
Often true	21 (24.4%)	18 (20.0%)	12 (13.0%)	13 (14.3%)	64 (17.8%)
Sometimes true	40 (46.5%)	41 (45.6%)	42 (45.7%)	40 (44.0%)	163 (45.4%)
Never true	25 (29.1%)	31 (34.4%)	38 (41.3%)	38 (41.8%)	132 (36.8%)
6 Months					
Often true	11 (12.8%)	18 (20.0%)	8 (8.7%)	11 (12.1%)	48 (13.4%)
Sometimes true	31 (36.0%)	25 (27.8%)	31 (33.7%)	33 (36.3%)	120 (33.4%)
Never true	35 (40.7%)	38 (42.2%)	46 (50.0%)	42 (46.2%)	161 (44.8%)
Missing	9 (10.5%)	9 (10.0%)	7 (7.6%)	5 (5.5%)	30 (8.4%)
<i>In the last 12 months, since last [name of current month], did you (or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food? (AD1)</i>					
Baseline					
No	34 (39.5%)	38 (42.2%)	47 (51.1%)	42 (46.2%)	161 (44.8%)
Yes	52 (60.5%)	52 (57.8%)	45 (48.9%)	49 (53.8%)	198 (55.2%)
6 Months					
No	41 (47.7%)	33 (36.7%)	48 (52.2%)	41 (45.1%)	163 (45.4%)
Yes	36 (41.9%)	48 (53.3%)	37 (40.2%)	45 (49.5%)	166 (46.2%)
Missing	9 (10.5%)	9 (10.0%)	7 (7.6%)	5 (5.5%)	30 (8.4%)

How often did this happen-almost every month, some months but not every month, or in only 1 or 2 months? (AD1a)

Baseline

Almost every month	22 (25.6%)	25 (27.8%)	15 (16.3%)	22 (24.2%)	84 (23.4%)
Some months	24 (27.9%)	15 (16.7%)	20 (21.7%)	20 (22.0%)	79 (22.0%)
Only 1 or 2 months	6 (7.0%)	12 (13.3%)	10 (10.9%)	7 (7.7%)	35 (9.7%)
Missing	34 (39.5%)	38 (42.2%)	47 (51.1%)	42 (46.2%)	161 (44.8%)

6 Months

Almost every month	14 (16.3%)	18 (20.0%)	12 (13.0%)	18 (19.8%)	62 (17.3%)
Some months	20 (23.3%)	18 (20.0%)	14 (15.2%)	16 (17.6%)	68 (18.9%)
Only 1 or 2 months	2 (2.3%)	12 (13.3%)	11 (12.0%)	11 (12.1%)	36 (10.0%)
Missing	50 (58.1%)	42 (46.7%)	55 (59.8%)	46 (50.5%)	193 (53.8%)

In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food? (AD2)

Baseline

No	39 (45.3%)	44 (48.9%)	46 (50.0%)	43 (47.3%)	172 (47.9%)
Yes	47 (54.7%)	46 (51.1%)	46 (50.0%)	48 (52.7%)	187 (52.1%)

6 Months

No	44 (51.2%)	42 (46.7%)	47 (51.1%)	45 (49.5%)	178 (49.6%)
Yes	33 (38.4%)	39 (43.3%)	38 (41.3%)	41 (45.1%)	151 (42.1%)
Missing	9 (10.5%)	9 (10.0%)	7 (7.6%)	5 (5.5%)	30 (8.4%)

In the last 12 months, were you ever hungry but didn't eat because there wasn't enough money for food? (AD3)

Baseline

No	51 (59.3%)	50 (55.6%)	62 (67.4%)	55 (60.4%)	218 (60.7%)
Yes	35 (40.7%)	40 (44.4%)	30 (32.6%)	36 (39.6%)	141 (39.3%)

6 Months

No	51 (59.3%)	51 (56.7%)	57 (62.0%)	55 (60.4%)	214 (59.6%)
Yes	26 (30.2%)	30 (33.3%)	28 (30.4%)	31 (34.1%)	115 (32.0%)
Missing	9 (10.5%)	9 (10.0%)	7 (7.6%)	5 (5.5%)	30 (8.4%)

Total score (0-6)¹

Baseline

0	14 (16.3%)	18 (20.0%)	25 (27.2%)	21 (23.1%)	78 (21.7%)
1	10 (11.6%)	9 (10.0%)	12 (13.0%)	8 (8.8%)	39 (10.9%)
2	9 (10.5%)	9 (10.0%)	6 (6.5%)	12 (13.2%)	36 (10.0%)
3	4 (4.7%)	7 (7.8%)	11 (12.0%)	7 (7.7%)	29 (8.1%)

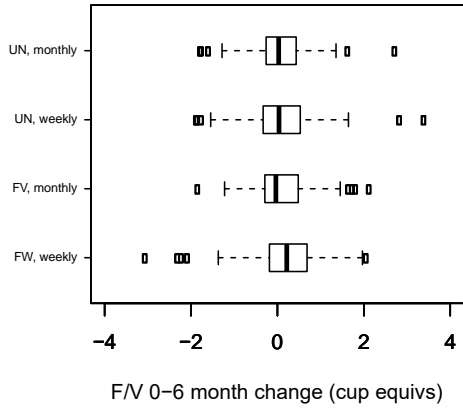
4	8 (9.3%)	8 (8.9%)	5 (5.4%)	9 (9.9%)	30 (8.4%)
5	14 (16.3%)	14 (15.6%)	14 (15.2%)	11 (12.1%)	53 (14.8%)
6	27 (31.4%)	25 (27.8%)	19 (20.7%)	23 (25.3%)	94 (26.2%)
6 Months					
0	20 (23.3%)	21 (23.3%)	28 (30.4%)	26 (28.6%)	95 (26.5%)
1	7 (8.1%)	9 (10.0%)	14 (15.2%)	12 (13.2%)	42 (11.7%)
2	12 (14.0%)	6 (6.7%)	5 (5.4%)	5 (5.5%)	28 (7.8%)
3	5 (5.8%)	4 (4.4%)	5 (5.4%)	7 (7.7%)	21 (5.8%)
4	6 (7.0%)	9 (10.0%)	6 (6.5%)	4 (4.4%)	25 (7.0%)
5	10 (11.6%)	12 (13.3%)	12 (13.0%)	10 (11.0%)	44 (12.3%)
6	17 (19.8%)	20 (22.2%)	15 (16.3%)	22 (24.2%)	74 (20.6%)
Missing	9 (10.5%)	9 (10.0%)	7 (7.6%)	5 (5.5%)	30 (8.4%)
Total score category²					
Baseline					
High Security	24 (27.9%)	27 (30.0%)	37 (40.2%)	29 (31.9%)	117 (32.6%)
Low Security	21 (24.4%)	24 (26.7%)	22 (23.9%)	28 (30.8%)	95 (26.5%)
Very Low Security	41 (47.7%)	39 (43.3%)	33 (35.9%)	34 (37.4%)	147 (40.9%)
6 Months					
High Security	27 (31.4%)	30 (33.3%)	42 (45.7%)	38 (41.8%)	137 (38.2%)
Low Security	23 (26.7%)	19 (21.1%)	16 (17.4%)	16 (17.6%)	74 (20.6%)
Very Low Security	27 (31.4%)	32 (35.6%)	27 (29.3%)	32 (35.2%)	118 (32.9%)
Missing	9 (10.5%)	9 (10.0%)	7 (7.6%)	5 (5.5%)	30 (8.4%)

¹Defined as total of HH3 often or sometimes true, HH4 often or sometimes true, AD1 yes, AD1a almost every month or some months but not every month, AD2 yes, and AD3 yes.

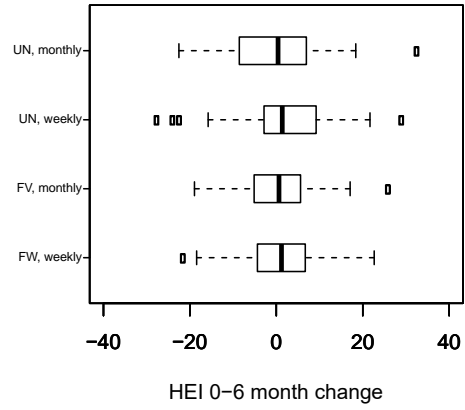
²Defined as high security if total score = 0-1, low security if 2-4, and very low security if 5-6

APPENDIX EXHIBIT 8

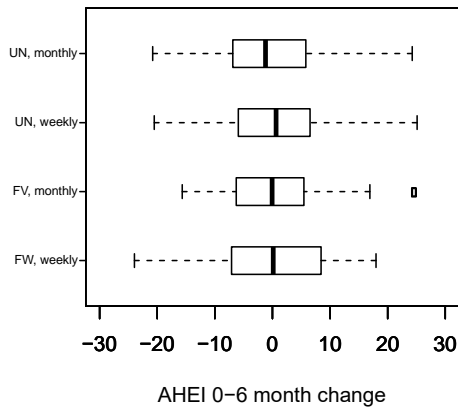
A



B



C



APPENDIX EXHIBIT 9

Covariate-adjusted results, adjusting for randomization variables (sex, black race, Hispanic ethnicity, income, number of individuals in household, and SNAP participation). Changes in primary and secondary pre-specified outcome measures, between baseline and month 6 (end of intervention), and tests of between group effects (FV vs. UN, weekly vs. monthly). N=359 study participants provided data at baseline and n=332 at month 6. Changes in each variable were estimated using a linear mixed effects model with main effects for treatment arm and assessment month, and a random effect for study participant. FV: Arms given vouchers redeemable for only fruits and vegetables. UN: Arms given unrestricted vouchers redeemable for any food.

	Change from baseline to month 6, within arm				Between group effects	
	FV, weekly	FV, monthly	UN, weekly	UN, monthly	FV vs. UN arms	Weekly vs. monthly arms
Primary Outcome						
Whole Fruits/Vegetables (cup-eq) ¹	+0.18 (-0.001, 0.36)	+0.08 (-0.10, 0.26)	+0.08 (-0.09, 0.26)	+0.04 (-0.14, 0.21)	+0.07 (-0.11, 0.24)	+0.07 (-0.10, 0.25)
Secondary Outcomes						
Healthy Eating Index (HEI)	+1.19 (-0.88, 3.26)	+0.68 (-1.34, 2.70)	+2.06 (0.07, 4.05)*	-0.30 (-2.27, 1.67)	+0.07 (-1.94, 2.08)	+1.48 (-0.52, 3.48)
Alternative Healthy Eating Index (AHEI)	+0.17 (-1.87, 2.22)	+0.13 (-1.87, 2.13)	+0.61 (-1.36, 2.57)	+0.07 (-1.88, 2.01)	-0.18 (-2.16, 1.81)	+0.31 (-1.67, 2.29)
Voucher utilization rate (% used over 6 months)	67.7 (61.0, 74.4)	82.3 (75.6, 89.0)	68.0 (61.5, 74.6)	81.5 (75.1, 87.9)	+0.37 (-4.89, 5.64)	-14.0 (-19.1, -9.0)*
Food insecurity (month 6 vs month 0 odds ratio of food insecurity)	0.69 (0.44, 1.11)	0.74 (0.49, 1.13)	0.70 (0.5, 0.99) *	0.62 (0.43, 0.90) *	0.72 (0.52, 0.98) vs. 0.66 (0.52, 0.85) ²	0.70 (0.53, 0.93) vs. 0.67 (0.51, 0.89) ²
Ease of use of vouchers ³	2.91 (2.76, 3.07)	2.76 (2.60, 2.91)	2.61 (2.46, 2.76)	2.63 (2.48, 2.77)	+0.21 (0.10, 0.33)*	+0.06 (-0.05, 0.18)

*P<0.05

¹Whole Fruits and Vegetables include all Whole Fruits (citrus and non-citrus fruits) and Whole Vegetables (dark green vegetables, deep yellow vegetables, tomatoes, and starchy vegetables).

²Odds ratios reported for each category

³Ease of use composite score (0 to 3) was based on individual scores (0 or 1) in response to three questions at month 6 (see Appendix), assessing understanding how to use the vouchers, ability to determine which foods were redeemable, and ease of redeeming the voucher with a cashier.

APPENDIX EXHIBIT 10

Instrumental variable analysis via two-stage least squares regression of change in fruit and vegetable consumption (from month 0 to month 6) on percent of vouchers utilized, using randomization into weekly vouchers rather than monthly vouchers as an instrumental variable for voucher utilization. The second-stage estimate reflects the effect of treatment on change in fruit and vegetable consumption, rescaled by the percentage of vouchers used, to estimate the effect of the weekly vouchers among those who complied with the intervention (those who used the vouchers only if assigned to the weekly voucher as opposed to the monthly voucher). The findings suggest that randomization to weekly rather than monthly vouchers is a strong incentive not to adhere to the intervention.

(A)

First-stage regression results (coefficient of regressing utilization on weekly versus monthly randomized assignment), % change in utilization given weekly instead of monthly assignment (95% CI)	Second-stage regression results (coefficient of regressing change in fruit and vegetable consumption on predicted utilization from first stage), cup-equivalent changes in F&V from month 0 to month 6 (95% CI)
-13.7 (-18.8, -8.6)	-0.008 (-0.03, +0.01)
<i>F</i> statistic = 28.16	

(B)

First-stage regression results (coefficient of regressing utilization on F&V-only versus unrestricted randomized assignment), % change in utilization given F&V-only instead of unrestricted assignment (95% CI)	Second-stage regression results (coefficient of regressing change in fruit and vegetable consumption on predicted utilization from first stage), cup-equivalent changes in F&V from month 0 to month 6 (95% CI)
0.3 (-5.0, 5.6)	-0.02 (-0.24, 0.21)
<i>F</i> statistic = 0.01	

APPENDIX EXHIBIT 11

Shopping habits data. Where shown, p-value from Fisher’s exact test for categorical variables and one-way ANOVA for continuous variables.

	FV, weekly	FV, monthly	UN, weekly	UN, monthly	Total	P-value
	n=86	n=90	n=92	n=91	n=359	
Free groceries in past 6 months from food pantry, food bank, church, or other?						
No	43 (50.0%)	44 (48.9%)	49 (53.3%)	53 (58.2%)	189 (52.6%)	0.70
Yes	31 (36.0%)	34 (37.8%)	28 (30.4%)	30 (33.0%)	123 (34.3%)	
Missing	12 (14.0%)	12 (13.3%)	15 (16.3%)	8 (8.8%)	47 (13.1%)	
Free meal in past 6 months from food pantry, food bank, church, or other?						
No	57 (66.3%)	60 (66.7%)	59 (64.1%)	62 (68.1%)	238 (66.3%)	1.00
Yes	17 (19.8%)	18 (20.0%)	18 (19.6%)	20 (22.0%)	73 (20.3%)	
Missing	12 (14.0%)	12 (13.3%)	15 (16.3%)	9 (9.9%)	48 (13.4%)	
Grocery shopping in last 6 months						
Per day	1 (1.2%)	1 (1.1%)	3 (3.3%)	0 (0.0%)	5 (1.4%)	
Per week	58 (67.4%)	46 (51.1%)	64 (69.6%)	43 (47.3%)	211 (58.8%)	
Per month	21 (24.4%)	33 (36.7%)	17 (18.5%)	43 (47.3%)	114 (31.8%)	
How many times grocery shop/day	1.3 (± NA)	1.0 (± NA)	1.0 (±0.0)	NaN (± NA)	1.1 (±0.1)	<0.0001
How many times grocery shop/week	1.7 (±0.9)	1.9 (±1.0)	1.7 (±1.0)	1.7 (±0.9)	1.7 (±1.0)	0.75
How many times grocery shop/month	2.3 (±1.3)	2.6 (±1.7)	2.6 (±1.1)	2.2 (±1.1)	2.4 (±1.3)	0.57
Grocery shop travel (may choose more than 1 option)						
Own car	23 (26.7%)	12 (13.3%)	19 (20.7%)	17 (18.7%)	71 (19.8%)	
Bus/MUNI	44 (51.2%)	53 (58.9%)	52 (56.5%)	51 (56.0%)	200 (55.7%)	
BART	0 (0.0%)	0 (0.0%)	4 (4.3%)	1 (1.1%)	5 (1.4%)	
Taxi	0 (0.0%)	2 (2.2%)	0 (0.0%)	1 (1.1%)	3 (0.8%)	
Uber/Lyft	1 (1.2%)	3 (3.3%)	0 (0.0%)	3 (3.3%)	7 (1.9%)	
Walking	24 (27.9%)	25 (27.8%)	31 (33.7%)	31 (34.1%)	111 (30.9%)	
Bicycle	4 (4.7%)	2 (2.2%)	2 (2.2%)	1 (1.1%)	9 (2.5%)	
Ride from friend/family	4 (4.7%)	10 (11.1%)	5 (5.4%)	10 (11.0%)	29 (8.1%)	
Other	3 (3.5%)	5 (5.6%)	5 (5.4%)	4 (4.4%)	17 (4.7%)	