Appendix Exhibit A1. Food Groups

Food Group	Example Products
Candy, Chocolate, & Gum	Milk Chocolate Chips, Chocolate Truffles, Gummy Worms, Spearmint Gum
Desserts & Sweet Snacks	Cake Mix, Refrigerated Cookie Dough, Ice Cream, Mini Donuts
Fruits, Vegetables, Nuts, & Legumes	Strawberries, Cauliflower, Canned Diced Tomatoes, Frozen Edamame, Dry Roasted Peanuts, Canned Baked Beans
Fruits, Vegetables, Nuts, & Legumes w/No Added Sugar, Fat or Sodium*	Blueberries, Russet Potatoes, Canned Whole Kernel Corn, Pinto Beans
Processed Meats & Processed Seafood	Beef Franks, Bologna, Canned Tuna, Sausage Links, Honey Ham
Salty Snacks	Potato Chips, Cheddar Popcorn, Peanut Butter Crackers, Pork Skins, Pretzel Sticks
Sugar-Sweetened Beverages	Fruit Punch, Cola (regular), Lemonade, Ginger Ale, Root Beer, Margarita Mix
Sweeteners & Toppings	Dark Brown Sugar, Light Corn Syrup, Chocolate Syrup, Stevia, Vanilla Frosting

Source: Transaction data from a supermarket chain in North Carolina, October 2019 to December 2020, linked to nutrition facts panel data by barcode.

Notes: Fruits, Vegetables, Nuts, & Legumes with No Added Sugar, Fat, or Sodium (FVNLNA) is a sub-category of Fruits, Vegetables, Nuts & Legumes (FVNL). Fruits and vegetables in the FVNLNA group meet the WIC-nutritional standards to be allowed for the WIC Cash Value Benefit and were eligible for purchase with the Healthy Helping fruit and vegetable incentive. Less healthy categories were selected based on product categories that are over-consumed in the U.S. (1) and contribute substantially to total energy, saturated fat, sodium, and sugar in the U.S. diet (2).

Appendix Exhibit A2. Healthy Helping Program Outreach, Recruitment, and Screening

In May 2022, Reinvestment Partners received $2.5 million allocated by the North Carolina General Assembly (see page 14, item 37 of NC House Bill 1043 (3)) from federal CARES Act funds, which needed to be spent by December 31, 2020. The intent was to enroll as many eligible individuals as possible, within the time and budgetary constraints. Enrollment began in late-June 2020, but most individuals were enrolled in September and October, after recruitment efforts ramped up and word about the program spread.

Outreach & Recruitment:

1) 47 NC Division of Social Services (DSS) county offices and Federally Qualified Health Clinics in North Carolina were able to enroll eligible constituents and patients.
2) COVID-19 Help Hotline: Community Care of North Carolina (CCNC) had a contract with the NC Department of Health and Human Services (DHHS) to offer a COVID hotline, available to anyone affected by COVID-19 and in need of assistance. Hotline operators were able to screen and enroll eligible individuals.
3) Mass Media: The hotline was promoted by NC DHHS. Healthy Helping was the subject of news coverage and local government outreach. Awareness of the Healthy Helping also spread through word-of-mouth and social media.
    a. Ex. 1: https://spectrumlocalnews.com/nc/charlotte/news/2020/09/01/healthy-helping-aids-snap-recipients-in-buying-more-fruits-and-vegetables
    b. Ex. 2: https://www.the-dispatch.com/story/news/2020/08/28/healthy-helping-produce-program-three-month-benefit/5650061002/
    c. Ex. 3: https://www.brunswickcountync.gov/healthy-helping-program-8-20/

Screening:

Program eligibility was assessed via two screener questions:

1) Are you a SNAP recipient?
2) Have you been negatively affected by COVID-19?

Appendix Exhibit A3. Propensity Score Variables

Covariates used to generate propensity scores:

Index month, amount of pre-index follow-up time, top store (based on frequency of purchases), number of shopping trips, number of shopping trips using SNAP, percentage of purchases including a coupon, number of tender types used, percentage of purchases using cash, percentage of purchases using a credit card, percentage of purchases using a debit card, percentage of purchases using SNAP benefits, percentage of purchases using WIC benefits, WIC use (any WIC spending in prior 3 months), total calories (kcal) purchased, calories from Candy, Chocolate, and Gum (CCG), calories from Desserts and Sweet Snacks (DSS), calories from Fruits, Vegetables, Nuts, & Legumes (FVNL), calories from Fruits, Vegetables, Nuts, & Legumes with No Added Sugar, Sodium or Fat (FVNLNA), calories from Processed Meats and Seafood (PMS), calories from Salty Snacks (SAS), calories from Sugar-Sweetened Beverages (SSB), calories from Sweeteners and Toppings (ST), total expenditure ($), total expenditure on food and beverages, dollars spent on CCG, dollars spent on DSS, dollars spent on FVNL, dollars spent on FVNLNA, dollars spent on PMS, dollars spent on SAS, dollars spent on SSB, dollars spent on ST, percentage of CCG spending ($) with no nutrient data, percentage of DSS spending with no nutrient data, percentage of FVNL spending with no nutrient data, percentage of FVNLNA spending with no nutrient data, percentage of PMS spending with no nutrient data, percentage of SAS spending with no nutrient data, percentage of SSB spending with no nutrient data, percentage of ST spending with no nutrient data, volume (oz) purchased of CCG, volume (oz) purchased of DSS, volume (oz) purchased of FVNL, volume (oz) purchased of FVNLNA, volume (oz) purchased of PMS, volume (oz) purchased of SAS, volume (oz) purchased of SSB, volume (oz) purchased of ST, percentage of calories from carbohydrates, percentage of calories from protein, percentage of calories from saturated fat, percentage of calories from sugar, percentage of calories from total fat, ratio of fiber (g) to carbs (g), ratio of fiber (g) to total calories (kcal), and ratio of sodium (mg) to total calories (kcal).

Note: The variables listed were included in a logistic regression estimating the probability of enrollment in Healthy Helping (the treatment), based on pre-index purchase data only, with standard errors clustered at shopper ID level, which was used to generate propensity scores.

Abbreviations: SNAP, Supplemental Nutrition Assistance Program; WIC, Special Supplemental Nutrition Program for Women, Infants, and Children

Appendix Exhibit A4. Purchasing Behavior before the Implementation of a Fruit and Vegetable Incentive Program at a Supermarket Chain in North Carolina

		Unweighted			Weighted	
	Overall N=105,756	Control N=86,034	HH N=19,722		Control N=86,034	HH N=19,722
Variable	Mean (SD)	Mean (SD)	Mean (SD)	P	Mean (SD)	Mean (SD)
All Spending ($/month)	217.23 (187.87)	221.51 (189.80)	200.61 (179.19)	<0.001	203.24 (172.82)	203.24 (182.67)
Food and Beverage ($/month)	192.64 (166.34)	195.81 (167.58)	180.32 (160.85)	<0.001	182.36 (155.56)	182.36 (163.74)
Fruits, Vegetables, Nuts, & Legumes ($/month)	23.00 (24.20)	23.27 (24.47)	21.98 (23.10)	<0.001	22.02 (23.21)	22.02 (23.25)
Fruits, Vegetables, Nuts, & Legumes w/No Added Sugar, Salt, or Fat ($/month)	18.09 (20.36)	18.26 (20.58)	17.43 (19.47)	<0.001	17.41 (19.70)	17.41 (19.53)
Candy, Chocolate & Gum ($/month)	2.63 (4.99)	2.67 (5.02)	2.48 (4.86)	<0.001	2.50 (4.82)	2.50 (4.89)
Dessert & Sweet Snacks ($/month)	16.52 (18.64)	16.79 (18.81)	15.46 (17.92)	<0.001	15.61 (17.77)	15.61 (18.12)
Processed Meats & Seafood ($/month)	16.58 (19.46)	16.75 (19.59)	15.92 (18.96)	<0.001	15.98 (18.88)	15.98 (19.07)
Salty Snacks ($/month)	10.75 (13.68)	10.95 (13.80)	9.97 (13.17)	<0.001	10.10 (12.91)	10.10 (13.36)
Sugar-Sweetened Beverages ($/month)	22.31 (27.72)	22.71 (27.95)	20.76 (26.71)	<0.001	20.96 (26.25)	20.96 (26.97)
Sweeteners & Toppings ($/month)	1.71 (3.25)	1.72 (3.26)	1.69 (3.22)	0.114	1.68 (3.23)	1.68 (3.20)
Total Energy (kcal) Purchased	56,858 (51,432)	57,408 (51,637)	54,720 (50,569)	<0.001	54,958 (49,556)	54,958 (51,095)
% Energy from Carbohydrates	55.41 (16.30)	55.49 (16.15)	55.12 (16.86)	<0.001	55.21 (16.51)	55.21 (16.80)
% Energy from Protein	9.28 (4.27)	9.31 (4.23)	9.18 (4.43)	<0.001	9.23 (4.25)	9.23 (4.46)
% Energy from Saturated Fat	11.87 (5.20)	11.90 (5.17)	11.79 (5.32)	<0.001	11.81 (5.15)	11.81 (5.35)
% Energy from Sugar	30.97 (17.33)	31.00 (17.27)	30.81 (17.53)	0.035	30.83 (17.37)	30.83 (17.56)
% Energy from Total Fat	36.98 (14.72)	36.86 (14.55)	37.44 (15.37)	<0.001	37.28 (15.06)	37.28 (15.26)

Fiber (g) to Carb (g) Ratio	0.05 (0.03)	0.04 (0.03)	0.05 (0.03)	<0.001	0.05 (0.03)	0.05 (0.03)
Fiber (g) per 1000 kcal	5.98 (4.73)	5.96 (4.63)	6.07 (5.11)	<0.001	6.04 (5.04)	6.04 (5.02)
Sodium (mg) per 1000 kcal	1.82 (3.22)	1.82 (3.15)	1.85 (3.45)	0.006	1.84 (3.64)	1.84 (3.30)
No. Pre-index Months	8.45 (3.03)	8.31 (3.07)	8.96 (2.80)	<0.001	8.84 (2.85)	8.84 (2.87)
No. Transactions	5.28 (4.03)	5.30 (4.02)	5.17 (4.06)	<0.001	5.15 (3.95)	5.15 (4.05)
Transactions Inc. >1 Tender Type	1.37 (1.76)	1.34 (1.72)	1.49 (1.89)	<0.001	1.45 (1.85)	1.45 (1.83)
Coupons (% Transactions)	2.09 (5.32)	1.99 (5.08)	2.47 (6.13)	<0.001	2.31 (6.25)	2.31 (5.56)
No. SNAP Episodes	2.33 (2.51)	2.23 (2.45)	2.71 (2.71)	<0.001	2.59 (2.69)	2.59 (2.61)
WIC Use (Past 3 Months)	11.72 (32.16)	11.34 (31.71)	13.17 (33.82)	<0.001	12.82 (33.43)	12.82 (33.43)

Source: Authors' analysis of data from a supermarket chain in North Carolina, October 2019 to December 2020.

Notes: Estimates represent the shopper-month means and standard deviations during the pre-index period. P-values were obtained from bivariate generalized estimating equations, clustered at the shopper ID-level to account for repeated measurements.

Abbreviations: HH = Healthy Helping; SD = Standard Deviation; SNAP = Supplemental Nutrition Assistance Program; WIC = Special Supplemental Nutrition Program for Women, Infants, and Children

Appendix Exhibit A5. Full Regression Output for FVNL Spending ($) in Weighted Sample

	Estimate	Standard Error	P	Lower 95% CI	Upper 95% CI
Intercept	8.6847	0.2335	<0.001	8.2271	9.1422
Healthy Helping Enrollment	-1.6369	0.1405	<0.001	-1.9123	-1.3614
Time (before or after index date)	-6.3632	0.1831	<0.001	-6.7220	-6.0044
Time*Healthy Helping Enrollment	26.9447	0.2148	<0.001	26.5238	27.3656
Month and Year of Observation					
October 2019 (Ref)	0.0000	0.0000	0.000	0.0000	0.0000
November 2019	1.4840	0.1221	<0.001	1.2446	1.7234
December 2019	0.0153	0.1206	0.899	-0.2210	0.2517
January 2020	0.2782	0.1278	0.029	0.0278	0.5286
February 2020	0.3709	0.1342	0.006	0.1079	0.6340
March 2020	3.8141	0.1416	<0.001	3.5365	4.0916
April 2020	6.1921	0.1524	<0.001	5.8934	6.4908
May 2020	7.1653	0.1583	<0.001	6.8550	7.4756
June 2020	7.4701	0.1522	<0.001	7.1718	7.7683
July 2020	7.8054	0.1452	<0.001	7.5208	8.0900
August 2020	5.3558	0.1500	<0.001	5.0617	5.6499
September 2020	7.8492	0.1765	<0.001	7.5033	8.1951
October 2020	10.0143	0.2643	<0.001	9.4963	10.5322
November 2020	10.2102	0.2752	<0.001	9.6707	10.7496
December 2020	16.0053	0.2845	<0.001	15.4476	16.5630
Follow-up time, months	2.6611	0.0486	<0.001	2.5658	2.7564
WIC Use (Past 3 mos.)	8.2771	0.1661	<0.001	7.9516	8.6027
Urbanicity					
Urban	0.0000	0.0000	0.0000	0.0000	0.0000
Suburban	-1.5038	0.3201	<0.001	-2.1312	-0.8764
Rural	-1.6581	0.2895	<0.001	-2.2255	-1.0907

Source: Authors' analysis of data from a supermarket chain in North Carolina, October 2019 to December 2020.

Notes: Models include data from 19,722 Healthy Helping enrollees (208,601 shopper-months) and 86,034 control shoppers (804,481 shopper-months). Estimates presented are from a linear mixed model with the above terms. Models include random intercepts for most frequent store and shopper ID.

Abbreviations: CI = Confidence Interval; WIC = Special Supplemental Nutrition Program for Women, Infants, & Children

Appendix Exhibit A6. Sensitivity Analysis of Changes in Spending among Healthy Helping Enrollees Relative to Controls (Unweighted)

Variable	Estimate	95% CI	P
Total Spending ($/month)	54.32	52.98, 55.65	<0.001
Food and Beverage (FB) Spending			
Dollars Spent ($/month)	52.51	51.30, 53.71	<0.001
Fruits, Vegetables, Nuts & Legumes			
Dollars Spent ($/month)	27.20	27.00, 27.40	<0.001
Relative Share of FB Spending (%)	13.80	13.68, 13.91	<0.001
Volume (oz)	241.6	239.7, 243.4	<0.001
Fruits, Vegetables, Nuts, & Legumes w/No Added Sugar, Salt, or Fat			
Dollars Spent ($/month)	25.74	25.57, 25.91	<0.001
Relative Share of FB Spending (%)	13.69	13.58, 13.80	<0.001
Candy, Chocolate & Gum (CCG)			
Dollars Spent ($/month)	0.45	0.41, 0.50	<0.001
Relative Share of FB Spending (%)	-0.17	-0.21, -0.12	<0.001
Dessert & Sweet Snacks			
Dollars Spent ($/month)	2.42	2.27, 2.57	<0.001
Relative Share of FB Spending (%)	-1.68	-1.78, -1.58	<0.001
Processed Meats & Seafood			
Dollars Spent ($/month)	2.58	2.42, 2.75	<0.001
Relative Share of FB Spending (%)	-1.44	-1.53, -1.36	<0.001
Salty Snacks			
Dollars Spent ($/month)	1.45	1.34, 1.56	<0.001
Relative Share of FB Spending (%)	-0.90	-0.97, -0.83	<0.001
Sugar-Sweetened Beverages			
Dollars Spent ($/month)	2.54	2.34, 2.74	<0.001
Relative Share of FB Spending (%)	-2.52	-2.64, -2.39	<0.001
Sweeteners & Toppings			
Dollars Spent ($/month)	0.29	0.26, 0.32	<0.001
Relative Share of FB Spending (%)	-0.19	-0.22, -0.16	<0.001

Source: Authors' analysis of data from a supermarket chain in North Carolina, October 2019 to December 2020.

Notes: Models include data from 28,898 Healthy Helping enrollees (236,714 shopper-months) and 162,748 control shoppers (1,024,942 shopper-months). Estimates are from linear mixed models with terms for Healthy Helping (1/0), time (before HH = 0, during = 1) and a HH-by-time product term. Models are also adjusted for month and year, WIC use, urbanicity of most frequent store, and duration of follow-up, with the shopper-month as the unit of analysis. Models include random intercepts for most frequent store and shopper ID.

1.   McGuire S. Scientific report of the 2015 dietary guidelines advisory committee. Washington, dc: Us departments of agriculture and health and human services, 2015. Adv Nutr. 2016;7(1):202-4.
2.   Poti JM, Mendez MA, Ng SW, Popkin BM. Is the degree of food processing and convenience linked with the nutritional quality of foods purchased by US households? Am J Clin Nutr. 2015;101(6):1251-62.
3.   NC House Bill 1043: 2020 COVID-19 Recovery Act, (2020).