Implementation of a 2-for-1 Price Incentive for Fruits and Vegetables in a Grocery Retail Setting

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Background and Purpose. *There is growing interest in expanding healthy eating interventions in the retail setting. The purpose of this study was to evaluate the implementation of a successful 2-for-1 price incentive for fruits and vegetables (F&V), including frozen and canned, that took place in partnership with a large chain grocery retailer in Maine.* Intervention Approach. *A randomized controlled trial (RCT) pilot study was conducted in 2015–2016, followed by a larger RCT in 2016–2017, to assess whether a supermarket double-dollar F&V incentive increased purchases of these items.* Evaluation Methods. *A convergent, parallel mixed-methods design was used to examine barriers and facilitators to implementing the interventions, using six implementation outcomes: acceptability, adoption, appropriateness, feasibility, implementation fidelity, and perceived cost.* Results. *The intervention was deemed highly acceptable, appropriate, and feasible by shoppers, retailers, and researchers. The F&V discount had a high rate of initial adoption. There was a moderate degree of fidelity, which improved over time based on lessons learned from the pilot and applied to the subsequent RCT. Specific costs associated with implementation from the research perspective are reported.* Implications for Practice, Policy, and Research. *Partnerships between academic researchers and retailers can be an effective model for improving healthful*

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purchases among shoppers. These findings are relevant for investigators, public health advocates, and retailers interested in implementing similar grocery retail-based interventions.

Keywords: *nutrition; food retail; community intervention; price incentive; implementation science*

BACKGROUND

In the United States, nearly 60% of food is purchased at grocery stores. Despite the diversity of food products available in these settings, particularly fresh fruits and vegetables (F&V), only 12% of U.S. adults meet F&V intake recommendations (Lee-Kwan et al., 2017). The percent of youth meeting recommendations is even lower, with just 8.5% of high school students meeting fruit intake guidelines and 2.1% meeting vegetable recommendations (Moore et al., 2017). Barriers to purchasing, preparing, and consuming F&V include affordability and availability (Blisard et al., 2004; French et al., 2010), as well as time and convenience (Blisard et al., 2004). Given this confluence of factors, there is a growing body of literature devoted to interventions in the grocery retail setting (Martinez et al., 2018; Polacsek et al., 2018). Large grocery retailers are ideal locations to test multicomponent interventions targeting the complex factors associated with low F&V intake.

Despite growing interest in the field, few have evaluated the implementation process of grocery retail-based interventions (Blake et al., 2021a, 2021b). Understanding implementation challenges from the perspectives of grocery retailers, study participants, and researchers will help improve the effectiveness, innovation, and expansion of future programs. For example, researchers have cited challenges associated with working in grocery retail settings, including developing trusting relationships with retail staff; recruiting and retaining participants; modifying retailers' coupon and payment systems to allow for participant purchase tracking; and accessing and analyzing grocery retail data (Tin et al., 2007). There have also been challenges from the retailer's perspective. For example, grocery retailers, like other businesses, must meet reporting requirements and shareholder expectations. Thus, even if management supports efforts to encourage healthier purchases, they must be responsive to consumer demand and revenue considerations. A comprehensive overview of the grocery retailer's perspective in academic partnerships has been published elsewhere (Greene, 2020).

The purpose of this study was to evaluate the implementation of a successful 2-for-1 price incentive for F&V conducted in partnership with a large chain grocery retailer in Maine. A randomized controlled trial (RCT) pilot study was conducted in 2015–2016 (henceforth "RCT-1"; Polacsek et al., 2018) to assess the feasibility of conducting a larger scale future trial. Once feasibility was established, a larger RCT was conducted in 2016–2017 (henceforth "RCT-2"; Moran et al., 2019). Interim results from the implementation evaluation of RCT-1 informed the design and implementation of RCT-2. Partners for both trials were the same, as was the primary intervention. As such, we include both trials in the current evaluation for a richer understanding of the facilitators and barriers to such a grocery retail nutrition intervention. We are unaware of any secular trends that would warrant separating the trials for the purposes of the current evaluation. The components of the implementation evaluation were conceptualized during the design phase of both interventions, and the overall framework and analysis was finalized in 2020. The conceptualization, implementation, and evaluation of this effort reflect a long-standing, multisectoral collaboration between retail chain management, store management and staff, and academic researchers.

PURPOSE

Implementation science provides a deeper understanding of the facilitators and barriers underlying individual interventions and enables critical insights for adapting evidence-based approaches to new populations as well as scalability (Bauer et al., 2015). The aim of this study was to evaluate the implementation of RCT-1 and RCT-2 using the six implementation outcomes from the Proctor implementation framework (described in further detail below): acceptability, adoption, appropriateness, feasibility, implementation fidelity, and perceived cost. This framework allowed researchers to identify barriers to and facilitators of intervention implementation. Results from this evaluation are informative for investigators, public health advocates and policymakers, and retailers interested in implementing similar grocery retail-based interventions.

METHODS

Intervention Approach

The interdisciplinary team of academic researchers partnered with a large chain grocery retailer to implement and evaluate two evidence-based, 2-for-1 F&V pricing incentive interventions for the purchase of fresh,

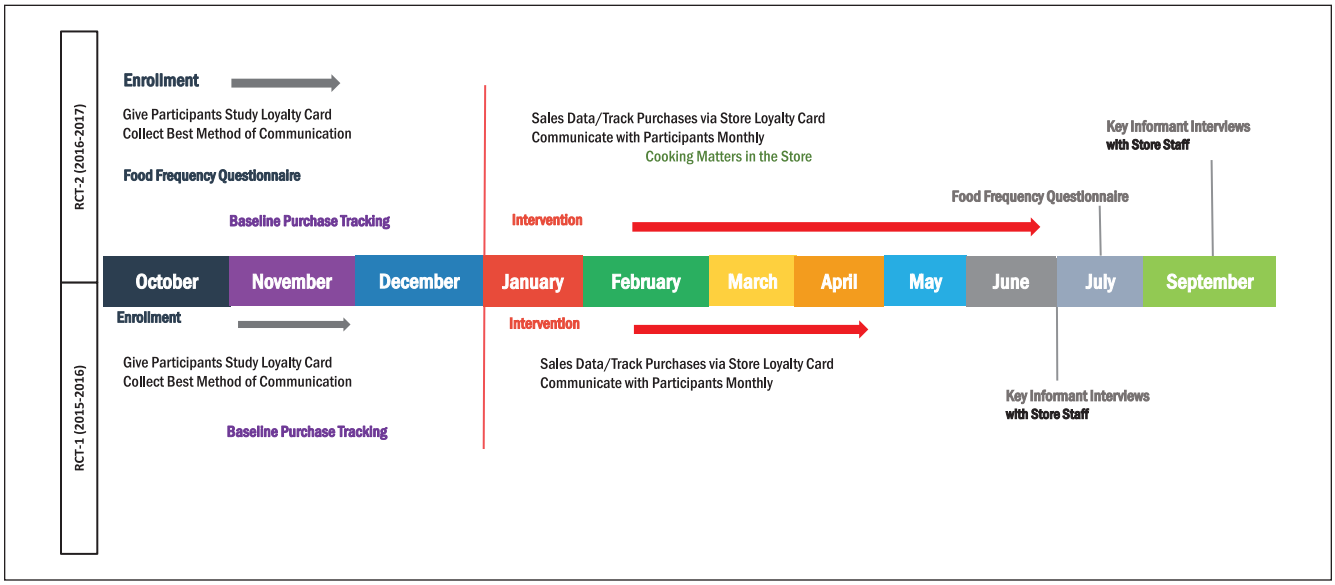

FIGURE 1 Timeline Depicting the Implementation of a Pilot Study (RCT-1) and Subsequent, Larger Trial (RCT-2) to Assess Whether a Supermarket 2-for-1 Fruit and Vegetable Incentive Increased Purchases of These Items in a Grocery Retail Setting in Maine

frozen, and canned F&V, which was modeled after successful interventions at farmers' markets (Olsho et al., 2016). The grocery retail partner has a long-standing commitment to health and wellness, including being the first chain to develop a storewide nutrition shelf-tag rating system in 2006 ("Guiding Stars"). The retailer offers on-site dietitians, and retail programs use in-store displays and signage to feature healthful and affordable recipes.

RCT-1 was conducted in 2015–2016, followed by RCT-2 in 2016–2017 (see Figure 1 for implementation timeline). Both studies were conducted in stores in rural Maine, selected for customer bases with high participation in the Supplemental Nutrition Assistance Program (SNAP).

Detailed information about both studies has been published previously (Polacsek et al., 2018; Moran et al., 2019). In brief, both studies were RCTs, and all study participants received a 5% discount on their purchases as an incentive to participate. Enrollment criteria included that participants already purchased groceries at the study store at least 50% of the time. Participants in the intervention group received an additional 2-for-1 F&V discount, up to $10 off per shopping trip. All fresh, frozen, and canned F&V were eligible for the 2-for-1 discount if they met criteria based on the Guiding Stars program. Guiding Stars provides foods star ratings based on the USDA Dietary Guidelines for Americans standards (U.S. Department of Agriculture and U.S. Department of Health and Human Services, 2020). One star indicates good nutritional quality, two stars are better, and three stars are best. All fresh and two- and three-star frozen and canned F&V were eligible.

Each participant received a study card at enrollment (from the grocery chain's existing loyalty program), which allowed researchers to track intervention condition, store purchases, and discount redemption using a scannable barcode. At checkout, the study card was scanned by the cashier to ensure appropriate discounts, and participants' purchases were tracked at the item level using universal product codes (UPCs) or price look-up (PLU) codes, which are unique product identifiers (Franckle et al., 2017). For intervention participants receiving the program's 2-for-1 F&V discount, a coupon printed (via a Catalina coupon system; http:/www.catalina.com) after the cashier finished scanning all items and pressed "total." The cashier then scanned the coupon before payment, allowing the participant to see the discount amount, and immediately receive it.

Participants received monthly communication via text message reminding them to use their study card. RCT-2 also incorporated a nutrition education component, in partnership with Cooking Matters, and a sustainability partnership with a statewide food bank provider and SNAP-Ed. Participants were invited to attend one of 12 station-style nutrition education events offered at the retail location during a 3-month period. Both RCT-1 and RCT-2 demonstrated significant increases in spending

on F&V in the intervention arm compared with the control arm (Polacsek et al., 2018; Moran et al., 2019).

Evaluation Methods

A convergent, parallel mixed-methods design (Creswell & Plano Clark, 2009) was used to examine barriers and facilitators to implementing the interventions, using classifications proposed by Proctor and colleagues (2011). The Proctor framework is an established framework within the field of implementation science that identifies eight implementation outcomes used for conceptualizing and evaluating facilitators and barriers to successful intervention implementation: acceptability, adoption, appropriateness, feasibility, implementation fidelity, perceived implementation cost, reach, and sustainability (Proctor et al., 2011). For the current evaluation, we did not assess *reach* or *sustainability* (real-world sustainability and reach were immeasurable because of the studies' time-limited nature and targeted recruitment).

The University of New England's Institutional Review Board provided human subjects approval for both studies. A comprehensive overview of evaluation outcomes, indicators, data sources, and measures is presented in Table 1. Data sources and outcome measures are described in further detail below.

Data Sources. Data sources for the implementation evaluation included sales data, participant exit surveys, retailer key informant interviews, participant communication logs, and research meeting minutes and log. Methods for each were as follows.

Sales data: Item-level scanner data were obtained for all transactions at the study stores in the same manner during both studies. Items purchased as part of a single shopping trip were grouped via a transaction identification number, and transactions were linked to study participants through their unique study ID number (located on their study loyalty card). There were 604 (41.8%) eligible frozen and canned products and 842 (58.2%) eligible fresh products. Sales data were pulled yearly from the retailer's third-party data warehouse. More frequent data pulls were cost prohibitive. SAS software (SAS Institute Inc., 2013) was used to calculate basic descriptive statistics of sales data. These data were used to assess Adoption, Implementation Fidelity, and Cost.

Participant exit surveys: These were collected from RCT-2 participants within 6 weeks of the end of the intervention using Qualtrics (2019). The exit survey used questions from validated surveys, as well as questions designed for this study, including satisfaction with the study and coupon redemption process. Responses to exit survey questions were used to assess Acceptability and Implementation Fidelity.

Retailer key informant interviews: After RCT-1 was completed, six supermarket staff were interviewed (one store manager, one customer service manager, one assistant customer service manager, two service leaders/shift managers, and one associate/cashier) about their experiences implementing the intervention. Likewise, a total of seven supermarket staff were interviewed following RCT-2 (four managers and three cashiers). Interviews were conducted in person by two graduate student researchers in June–July 2016 (RCT-1) and September–October 2017 (RCT-2). Interviews were held in a private conference room at the study store (managers) or in a quiet space near the register (cashiers) and lasted approximately 10–30 minutes each. Interviews were recorded with permission and transcribed by a research assistant. Findings were used to assess Appropriateness, Feasibility, and Implementation Fidelity.

Participant communication logs: A log of monthly communications with participants was maintained for both RCT-1 and RCT-2. The studies used a low-cost multimessaging platform service to facilitate two-way communication with participants (Clickatell). Both text and email messages from participants arrived to the study team via email, which allowed real-time resolution to participant questions or challenges (e.g., lost card and card not working), and provided a platform for study staff to regularly encourage participants to use their study card. Participant communication contributed to the assessment of Acceptability.

Research meeting minutes and log: The study team archived meeting minutes and a research log that tracked challenges and lessons learned. Meetings took place biweekly during both studies. These records were used to assess Appropriateness and Implementation Feasibility.

Implementation Outcome Measures. Definitions for each of the classifications proposed by Proctor and colleagues (2011), and associated measures used are described as follows. Specific interview and survey questions with response options, where applicable, are listed in Table 1:

Acceptability (participants, retail staff): The perception among stakeholders that the innovation is agreeable or satisfactory was measured by (a) the *participant exit survey*, which asked about overall satisfaction with the F&V discount process; (b) *participant communications*, which were reviewed and categorized into relevant themes (e.g., "gratitude"); and (c) *key informant interviews* with retail staff regarding likes, dislikes, and recommendations.

TABLE 1
Evaluation Outcomes, Indicators, Data Sources, and Measures From a Supermarket 2-for-1 Fruit and Vegetable Incentive Program in a Grocery Retail Setting in Maine

Evaluation outcome	*Definition*	*Indicator*	*Data source*	*Measures*
Acceptability *(of the intervention)*	Perception among stakeholders that innovation is agreeable, palatable, or satisfactory	Participant perceptions	Participant exit survey	Overall, how satisfied were you with the fruit and vegetable discount process? (4-point Likert-scale: "Not at all satisfied" to "Extremely satisfied")
			Participant communications log	(unsolicited) Participant perceptions regarding the program
		Retailer perceptions	Key informant interviews	Thinking specifically about the 5% discount and the fruit and vegetable coupons, can you identify anything you liked about the program? Is there anything you disliked? (Cashier interview)
				Thinking specifically about the 5% discount and the double bucks fruit and vegetable coupons, can you identify anything you liked about the program? Is there anything you disliked? (Manager interview)
				If you had the option, would you recommend continuing the program at your store? Why or why not? (Manager interview)
Adoption *(of F&V discount)*	Intention, initial decision, or action to try or employ an innovation	Use of loyalty card	Sales data	% of participants who used loyalty card at least once during the study period
		Redemption rate	Sales data	% of eligible transactions with a coupon redeemed
Appropriateness *(of F&V discount)*	Perceived fit, relevance, or compatibility of innovation for a given setting	Retailer perceptions	Key informant interviews	Thinking specifically about the 5% discount and the fruit and vegetable coupons . . . Which components did you think worked? Is there anything you . . . thought didn't work? (Cashier interview)
				Thinking specifically about the 5% discount and the double bucks fruit and vegetable coupons . . . Which components did you think worked? Is there anything you. . .thought didn't work? (Manager interview)
				Were there any unforeseen consequences, positive or negative, that resulted from your work on the fruit and vegetable incentive program? (Cashier interview)
				Were there any unforeseen consequences, positive or negative, that resulted from your work with the program? (Manager interview)
		Researcher perceptions	Research meeting minutes and log	Themes identified and summarized from meeting minutes, emails, and manuscript revisions

(continued)

TABLE 1 (CONTINUED)

Evaluation outcome	*Definition*	*Indicator*	*Data source*	*Measures*
Feasibility *(of intervention)*	Extent to which an innovation can be successfully used or carried out within a given setting	Integration of discount into retailer's system	Key informant interviews	Are there any additional resources we could have provided to help you better implement fruit and vegetable incentive program*?* (Manager interview) Based on your experience, is there anything we could do to better support you or your staff in the future? (Manager interview)
		Managing and analyzing grocery sales data	Research meeting minutes and log	Themes identified and summarized from meeting minutes, emails, and manuscript revisions
Implementation fidelity *(by retailer)*	Degree to which intervention was implemented as intended	Retailer perceptions	Key informant interviews (staff training, turnover)	How did you communicate about the incentives and check-out process for the fruit and vegetable incentive program? (Manager interview) Do you have any ideas about how to better communicate about this type of program in the future? (Manager interview) Based on your experience, is there anything we could do to make the incentive easier to implement or to better support you in the future? (Cashier interview)
		Participant perceptions	Participant exit survey	Were you ever handed a coupon for fruits and vegetables to redeem at a future time? (responses: Yes, No, Unsure) If yes: How many times did this happen? How many coupons did you redeem later?
Implementation cost	Cost impact of implementation effort	Monthly cost per customer	Key informant interviews	How would you gauge the time and effort required to implement the fruit and vegetable incentive program? (Manager interview) For this study, we covered the cost of the 5% overall discount and the fruit and vegetable double bucks discount. Other than these costs, can you identify any other costs that were incurred implementing the program? (Manager interview)
			Sales data and program budget	Cost calculations of incentives and researcher time from research budget
Reach	Integration of practice within a service setting and its subsystems	(n/a)	(n/a)	
Sustainability	Extent to which innovation is maintained in ongoing operations	(n/a)	(n/a)	

Note. F&V = fruits and vegetables

Adoption (participants): The intention, initial decision, or action to try to employ an innovation, was measured using *sales data* by calculating the (a) use of the study loyalty card and (b) F&V discount redemption rate (percent of eligible transaction where a coupon was redeemed).

Appropriateness (retail staff, researchers): The perceived fit, relevance, or compatibility of an innovation for a given setting, was measured through *key informant interviews* with retail staff about which components of the discount program worked well (or not), and unforeseen consequences (positive or negative) of the incentive program. The *research meeting minutes & log* were reviewed for themes related to researcher perceptions of Appropriateness.

Feasibility (retail staff, researchers): The extent to which an innovation can be successfully used or carried out within a given setting, was measured using the *research meeting minutes and log*, and findings from the *key informant interviews* with retail staff about their experience with the intervention and need for additional resources or support.

Implementation Fidelity (participants, retail staff): The degree to which the intervention was implemented as intended, was measured using *key informant interviews* with retail staff about communications, staff training and support, and implementation of the intervention. *Participant exit survey* questions assessed Fidelity from the participant perspective, including how often participants were handed a study coupon to redeem at a future time.

Implementation Cost (retail staff, researchers): The cost impact of the implementation effort from the researchers' perspective was measured using *sales data* and a description of research team and program staff effort. Total monthly costs associated with the intervention implementation were calculated using participant incentive costs (5% on all purchases) and F&V discounts redeemed and divided by number of intervention months. Research team effort was described but not quantified due to limited generalizability to other research locations and/or institutions. Responses to the *key informant interviews* with retail staff were summarized to present the retailer perspective on cost.

RESULTS

A total of 1,006 shoppers were enrolled in the two studies (RCT-1 $n = 401$; RCT-2 $n = 605$). In RCT-1 and RCT-2, respectively, 22% and 32% participated in SNAP. In both studies, most household primary shoppers were non-Hispanic, White, and female. As described above, results specific to the implementation evaluation were derived from participant exit surveys ($n = 396$), retailer key informant interviews ($n = 13$), participant communications log ($n = 142$ messages), and via biweekly meeting minutes and sales data from the respective study periods. The response rate for the exit survey was 66%. Results for each implementation outcome are described as follows:

Acceptability: Key informant interviews with retail staff demonstrated high favorability. Interviews revealed that they: wanted to continue offering this program; liked that they were promoting healthy foods—it was the first promotion for F&V they had done in the store; wished more customers and staff could participate; and, consistently heard positive feedback from customers about the program. *Participant communications* also demonstrated support for the intervention. Of the 142 unsolicited messages received from participants, communications were categorized as: (a) Study-related technical assistance ($n = 60$); (b) Program implementation issues ($n = 50$); or (c) Expressions of gratitude ($n = 30$). Most technical assistance and implementation issues were minor and easily resolved (e.g., lost card), and many participants expressed appreciation for the discounts, including asking to continue the program when it ended. Further details are presented in Table 2. Responses to the *Participant exit survey* demonstrated that 85% of respondents reported being very or extremely satisfied with the F&V discount process.

Adoption: Overall, 95% of participants used the study loyalty card at least once during the RCT-1 study period. There was a higher coupon redemption rate during RCT-2 than during RCT-1 (82% vs. 53%).

Appropriateness: Overall, researchers and key informants deemed the intervention to be appropriate. *Meeting minutes and the research log* documented recruitment and enrollment success; the biggest factor in this success was the retailer's permission to recruit shoppers in the store lobby. Researchers learned how to approach participants in a way that encouraged engagement by emphasizing immediate benefits of study participation. Enrollment occurred during varying times of day and days of the week, and coincided with monthly SNAP benefit-issuance, which researchers expected would increase the likelihood of inclusion of SNAP participants. Since participants already shopped at the study store, the intervention already fit their regular shopping behaviors; it did not require them to visit a venue they were not already visiting. *Key informant interview* data also demonstrated that retail staff felt the study provided a positive service to customers; that participants were doing more of their shopping at the store because of the discount; liked that discounts were not just for fresh produce,

TABLE 2
Participant Communications (*N* = 142), Characterized by Theme, From a Supermarket 2-for-1 Fruit and Vegetable Incentive Program in a Grocery Retail Setting in Maine

Theme	*N*	*Details*
Study-related technical assistance	62	Messages included: • 14 conversations pertained to the survey links not working • 45 e-gift card technical issues (not received yet or in spam folder) • 3 questions about study process
Program implementation-related issues	50	Messages included: • 21 lost discount cards • 10 checkout at the store issues • 17 other technical issues (wrong phone #, wrong email etc.) • 2 asked to be removed due to too many messages
Unsolicited expression of gratitude	30	Sample quotes: • "Thank you for this fantastic experience! Not only have you helped us be aware of our purchases you have helped us establish a better budget!!! We have saved money in a time that was important for us to do so. Thank you for including us." • "Thank you for the gift certificate for taking the survey. I will be sorry when your program ends, I have saved our family of 4 a lot of money. I appreciate the opportunity to be a part of your study. I'd be curious to know what my data reveals about our eating habits. Thank you" • "Thank you so very much for the opportunity to save on my groceries for the past year and for the $30 gift card. It has been a huge help to our family. I look forward to learning how you made out with the study."

but also for frozen and canned; and liked that staff could participate in the study and wished more staff registered.

Feasibility: Key informant interview data revealed that retail staff believed the study loyalty card was generally easy to use and did not require extensive training, and the 5% discount was sufficiently large to incentivize use of the loyalty card. They also felt they had support from the corporate level and from the study team and knew who to contact with questions, with prompt responses. The *Research Log* revealed initial challenges related to communicating with participants (e.g., large group emails were rejected by servers, and the need for cell phone carrier information). The log also cataloged that participants often did not answer both weekly and monthly income and SNAP usage questions on enrollment surveys. Another challenge was that participants' mailing addresses were not collected at enrollment, so if the study loyalty card needed to be replaced, replacement(s) were left at the store's customer service counter. *Research team meeting minutes* documented the ease in generating study IDs through the retailer's existing loyalty website. The minutes also showed the major challenges of managing the retailer's data, including cleaning, categorizing, merging with UPC code databases, adding 10 to 20,000 new items periodically, and preparing for analyses. Data management was perceived as labor-intensive from the researcher perspective: two research assistants spent approximately 1 year completing these tasks initially, with additional time required annually for data cleaning and categorizing new items thereafter.

Implementation fidelity: Key informant interviews indicated that while there was high fidelity overall, there were challenges associated with the provision of the F&V discounts. The discounts were provided via a coupon that printed at check out, a different process than typically used for coupons. The key barriers related to coupon redemption fell into two main categories: (a) human errors and (b) technology problems (e.g., coupon machines breaking). In addition, the barcodes on the 5% discount card could be difficult to scan and started to wear after a few months. The most frequent coupon redemption barriers and subsequent solutions are depicted in Figure 2; additional details regarding the coupon redemption process and suggestions for improvement are in Online Appendix A.

Contrary to the intent to provide same-day redemption, fifty-eight percent (58%) of respondents on the

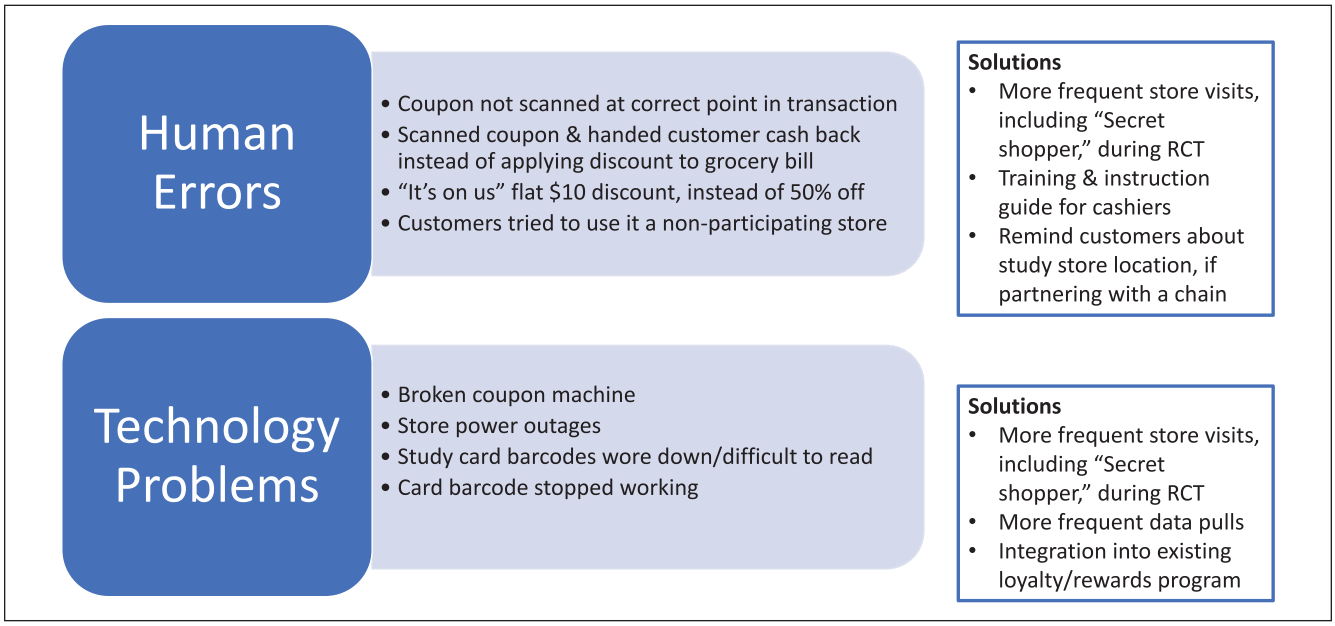

FIGURE 2 Key Barriers and Solutions Related to Coupon Redemption During a 2-for-1 Price Incentive Intervention for Fruits and Vegetables in Partnership With a Large Chain Grocery Retailer in Maine

Participant Exit Survey reported having been handed at least one coupon to redeem later. The number ranged from 1 to 50 per participant during the study period, with an average of two coupons per participant among the 393 respondents who answered that question. Ninety percent (90%) of these respondents reported redeeming at least some of those coupons. In response to why coupons were not redeemed at a future date, most of those who answered this question (66%, $n = 9$) reported having forgotten.

Implementation cost (researcher perspective): Total monthly costs associated with the coupon redemption were calculated using the *sales data* from both studies and averaged US$16.05 per participant per month for RCT-1 and US$13.31 for RCT-2. Additional costs included research team time. We do not quantify the cost of research program staff here because salaries are location- and institution-specific and therefore not generalizable. However, a description of research team and program staff effort required for program implementation is provided in Online Appendix B to aid in others' planning efforts. Other program costs included the minimal cost of participant communications, and institution-specific costs for sales data storage (i.e., 10 TB of data storage required for 4 years of sales data from the 180-store chain). *Key informant interviews* demonstrated retail staff believed the intervention was low-cost since it did not require significant investment on their side (e.g., existing loyalty system, research budget covered the cost of incentives). As mentioned earlier, this study was unable to measure financial costs or benefits incurred by the retailer due to the proprietary nature of that information.

DISCUSSION AND IMPLICATIONS FOR PRACTICE, POLICY, AND RESEARCH

Few comprehensive implementation evaluations have been conducted in grocery retail interventions. This study applies a comprehensive implementation evaluation framework, which allows for the identification of key barriers to and facilitators of a successful grocery retail nutrition intervention. Overall, we found the intervention was highly acceptable, appropriate, and feasible, and the F&V discount had a high rate of initial adoption. There was a moderate degree of fidelity, which improved over time, based on lessons learned from RCT-1 that were applied to RCT-2, and partial costs associated with implementation from the research perspective were calculated.

Based on these findings, five key lessons from the implementation evaluation were identified that could guide future public health efforts in this area:

Key lesson #1: It is possible to design an effective retail intervention that is viewed as appropriate, feasible and acceptable by multiple stakeholders, including shoppers, retail staff and research team members.

The evaluated interventions were successful with respect to their impact on F&V purchasing, and implementation data revealed high ratings across evaluation outcomes among study participants, researchers, and retail staff. These results demonstrate feasibility and potential benefit to stakeholders. We learned that store and corporate staff believed the intervention would bring customers into the store, benefited store staff who participated, and made them feel good about the healthy products they were promoting. The 5% discount on the study loyalty card was generally easy to use and sufficiently large to maintain participation. The retail chain's marketing emphasized health and community well-being; therefore, our program's goals fit well into their brand. Facilitating recruitment and enrollment, study staff learned to approach participants by emphasizing the immediate benefits of participation—same-day redemption of incentives.

Key lesson #2: Multisectoral relationships, collaboration, and frequent communication facilitate success.

The long-standing relationship between retailer and academic partners, the retail partner's commitment to health and wellness, and engagement with stakeholders from multiple sectors throughout the process of conceptualizing and implementing the intervention were critical. The retailer was engaged and supportive. The F&V discount helped the retailer meet health promotion goals and fit into brand optics. Any price discount for healthy foods that is provided to a store's customers is likely to be viewed positively by shoppers and retail staff. Corporate partners assisted with plans to operationalize study and coupon redemption procedures, and the acquisition of sales data. The retailer's existing loyalty system was used, facilitating purchase tracking and provision of discounts. The study recruited participants in the store setting, which added legitimacy and helped support a successful study enrollment.

Frequent store visits and communication by research staff during the intervention were also important, allowing for relationship building with store staff. As noted throughout the study findings, retail partner staff went above and beyond to make the programs a success and were genuinely interested in the outcomes.

Key lesson #3: Lessons learned during RCT-1 facilitated greater success in RCT-2.

Adoption of coupon redemption was much higher than in a typical coupon redemption program, such as at farmer's markets (Afshin et al., 2017) or with a typical Catalina coupon that is handed to a customer for future redemption (Didero et al., 2021). This was likely because the program was intentionally designed for same-day, at-checkout redemption, providing an immediate benefit (which required a commitment of corporate resources to modify the coupon printing software). However, key barriers to implementing the program arose related to the F&V incentive redemption process. We refined participant communications and conducted weekly visits to the store during RCT-2 to address checkout issues and regularly communicated with store managers and staff. While these barriers were partially overcome in RCT-2, our study could not objectively determine the number of times human error occurred, nor were all technology problems identified or tracked. These issues almost certainly resulted in lower redemption rates.

Identifying alternative means of providing shopper discounts less prone to problems will be critical for implementing this type of intervention on a larger scale. The study's retail partner has recently adopted a loyalty program that tracks participants through either their cell phone or a loyalty number entered at checkout, facilitating easier provision of discounts and incentives. However, there still are many chains and smaller grocery retailers utilizing Catalina or similar coupon systems, given the costly and time-consuming transition to more sophisticated technology. The need for a seamless checkout and coupon redemption process is paramount to the success of any program studying financial incentives for healthy foods.

Key lesson #4—Research team capacity for working with sales data is critical.

There were challenges related to working with sales data, including the need for expertise in handling the data, and cost and infrastructure required to store it. This process was time consuming and resource intensive. As such, it is recommended that researchers have access to institutional or grant funding and with well-established capacity for managing and analyzing large, complex, and continually changing datasets. Broadly speaking, specific variables and data fields that are available to researchers are likely determined by the retailer's data management systems and/or what they are willing to share. The fields we have found to be most useful are described in Online Appendix B which can be used as a starting point for discussions with retailers.

Key lesson #5—Several specific areas were identified for future research.

Evaluation components, while intended to measure the totality of the intervention, mainly captured the

F&V incentive components of the intervention. Future work should additionally focus evaluation efforts on the nutrition education and communication aspects of the intervention, in addition to considering the role that point-of-sale technology and visibility of the discount (e.g., printed coupons vs. integration into a sale) plays in shopper uptake.

Where feasible (i.e., not proprietary), researchers should consider collecting additional cost details from the retailer. Retail staff did not perceive cost to be high because incentives and discounts were provided by the research team (using grant funding). Even if the retailer covered these costs, it is possible that incentives and discounts attract more customers, or increase sales sufficiently to cover the cost of the discount. However, without a more detailed analysis of the costs to the retailer, it is hard to know whether this type of intervention could be sustained without external funding. Measuring potential benefits to the retailer, such as increased purchases and profit margins on items that were incentivized during the study period, will help answer these questions.

Finally, future research could consider using a community-based participatory research (CBPR) approach. A CBPR approach where researchers partner with the retailer and the communities they serve, could be particularly useful for conceptualizing intervention components, interpreting study findings, and identifying meaningful next steps—particularly when conducting the study in a racially and economically diverse location.

Strengths of this evaluation include the use of data collected during two sequential and similar studies, taking place over 2 years. Another major strength was the use of objective sales data to assess the implementation outcomes of adoption and cost. The use of transaction level data has been a major facilitator of these interventions (compared with other methods of assessing changes in purchasing behaviors, such as customer self-report or collecting receipts). Overall, this evaluation used a mixed-methods approach, drawing on a variety of other qualitative and quantitative sources that helped triangulate findings. Qualitative data allowed for nuanced understanding of implementation facilitators and barriers that would otherwise not have been possible to explore. Limitations include the fact that findings may not be generalizable to settings where other technologies are used for customer loyalty programs and coupon redemption, and to other types of retail locations, such as small grocers, or in other types of communities. The present trials were conducted in rural Maine; future work should a priori assess cultural appropriateness and acceptability of retail interventions in diverse communities. Finally, we assessed intervention cost from the perspective of the researcher. Quantifying other retailer costs were beyond the scope of this study due to the proprietary nature of that information.

As research in the retail setting becomes increasingly common, implementation evaluation can benefit from the use of standardized implementation outcome measures, such as those included in the Proctor and colleagues' framework. While previous studies have found that pricing interventions may be feasible and supported by both retail staff and customers (Blake and other studies), our study includes findings for implementing multicomponent interventions, their relative implementation success, and the detail necessary for replication and improvement. These findings can help guide researchers, public health advocates, policymakers, and retailers interested in implementing similar grocery retail-based interventions.

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Supplemental Material

Supplemental material for this article is available at https://journals.sagepub.com/home/hpp.

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