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# Evaluation of a Supermarket Environmental Change Intervention: Findings from a Low-Fat Milk Couponing and Educational Marketing Pilot

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*The purpose of this study was to evaluate a multifaceted, collaborative approach to supermarket environmental change that included in-store couponing and educational marketing to increase low-fat milk purchasing across a 48-store supermarket chain serving predominately Hispanic customers. Point-of-sale (POS) and process data collected during the 16-week program implementation included in-store radio advertising, in-store signage, and POS coupons. POS data were analyzed by the coupon marketing partner, and a chi-square test was conducted to test for significant differences between groups. POS data indicated that 44,050 low-fat milk coupons were issued to traditional full-fat milk purchasing customers with a redemption rate of 5.3%. Of these, 42% became repeat low-fat milk purchasers (i.e., after initial purchase with coupon, customer re-purchased low-fat milk). Results from the chi-square test revealed significant differences in rates of purchase between those who received a coupon (5.87%) and those who did not (4.00%), ( $\chi^2 = 8.61, p = .0033$ ). Findings indicate that collaborative public health efforts between retail and marketing partners to*

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*engage supermarket customers in a multifaceted yet targeted intervention are feasible and can shift purchasing behaviors towards a healthy alternative. This study has implications for informing future environmental change supermarket strategies.*

*Keywords:* Policy, Systems, and Environmental Change (PSE), low-fat milk, nutrition, health promotion, coupon, supermarket intervention

## Introduction

Despite efforts to improve dairy consumption in the United States, only 14% of Americans consume the recommended three cups of dairy per day (Centers for Disease Control and Prevention, 2015). Recommendations further encourage the consumption of low-fat milk, which provides the same basic nutrients but with less saturated fat and fewer calories compared to whole milk (U.S. Department of Health and Human Services and U.S. Department of Agriculture, 2015). Yet, most recent sales data show that only 25% of milk sold in the United States is low-fat (U.S. Department of Agriculture Economic Research Service, 2019). Low-fat milk and other dairy foods are an important part of a nutrient-rich diet, providing critical nutrients including calcium, phosphorus, riboflavin, vitamin B<sub>12</sub>, protein, zinc, magnesium, selenium, potassium, vitamin A, and vitamin D. Furthermore, consuming recommended amounts of dairy is associated with lower risk of metabolic syndrome (Chen et al., 2015; Kim & Je, 2016; Shin et al., 2017).

Historically, approaches to shifting dietary choices have targeted individual behavior change, although more recent approaches emphasize a policy, systems, and environmental change (PSE) model (Frieden, 2010). By improving the food environment, for example, PSE efforts address the retail context and shift the default toward healthier selections (Bowen, Barrington, & Beresford, 2015; Escaron, Meinen, Nitzke, & Martinez-Donate, 2013; Frieden, 2010). To date, PSE efforts related to food environments have focused not only on the *location* of food retailers (Karpyn, Young, & Weiss, 2012) but also on wide-scale *educational outreach* (4-H and SNAP-Ed), on increased variety and *availability* of healthier products (Cannuscio et al., 2013; Odoms-Young, Zenk, Karpyn, Ayala, & Gittelsohn, 2012), and on examining how ‘better for you’ products are *marketed in-store* (Cohen, Collins, Hunter, Ghosh-Dastidar, & Dubowitz, 2015; Glanz, Bader, & Iyer, 2012). Such in-store marketing interventions are most aligned with the environmental change aspect of PSE, which has been defined to include visual or observable approaches to modify or enhance the built or physical food retail environment, and which may include economic, social, normative and message environments (California Department of Public Health, 2017).

The present study examines an in-store marketing, environmental change intervention that combines price reduction strategies (coupons) with product promotion and healthy educational marketing efforts (in-store radio messages, clings, and shelf tags) in a supermarket chain serving

predominately Hispanic customers. The integrative field-based approach sought to assess whether coupons affected low-fat milk sales among exclusive full-fat milk buyers in stores where a coordinated low-fat milk educational marketing campaign was also in place.

By collaborating with academic, nonprofit, and industry partners, this research aligns with Extension's health and wellness priorities (Braun et al., 2014; Braun & Rodgers, 2018; Buys & Koukel, 2018) and makes three contributions. First, it serves as a large-scale pilot of a potentially sustainable environmental change strategy by providing valuable information about how in-store marketing and couponing campaigns can be integrated in partnership with industry, nonprofit, and academic sectors alongside health education outreach efforts, to achieve optimal health behavior change in real-world settings. Second, it describes how multiple in-store marketing approaches (e.g., couponing, clings, radio messages) for one product can be implemented across a large chain of supermarkets targeting Hispanic consumers. Finally, it provides an example of an assessment approach that describes how such integrated efforts affect consumer purchasing behavior for a targeted, healthy alternative product.

## Methods

### Intervention Design

**Targeted product.** Milk was selected as the targeted product with the goal of increasing the number of consumers who exclusively purchase whole milk to purchase low-fat milk options (1% or skim). The intervention was implemented across 48 stores. Product promotion activities included shelf tags and clings to market low-fat milk; in-store radio messages in Spanish and English; and, for eligible customers, a \$2 off low-fat or skim milk discount coupon printed at the register. All customers were exposed to the in-store marketing and promotion activities (i.e., shelf tags, clings, in-store radio), but only a random sample of customers was provided with a \$2 off low-fat milk coupon (described below). The coupons had a 6-week rolling expiration and were issued over a 16-week period. No competing price promotions on milk were implemented during the study timeframe.

**Random assignment.** To identify the pool of potential customers who could receive a coupon, Catalina Systems, a national company that works with supermarkets to operate grocery scanner systems used to distribute targeted coupons, used historical shopper-level purchase data (tracked through encrypted debit/credit cards) to identify shoppers who purchased full-fat or 2% milk in the past six months and did not buy 1% or skim milk during the past year. To ensure shoppers attended these stores on a regular basis, the pool of targeted shoppers was limited to those who shopped more than once over each consecutive eight-week period throughout the analysis timeframe. Just over 73,000 shoppers met the criteria (i.e., regular shoppers who were exclusive full-fat milk buyers) across all 48 stores. Among the shoppers meeting the criteria, 53,000 were randomly selected to receive a \$2 off coupon for low-fat milk during their next visit. The

remaining 20,000 customers did not receive coupons and served as a control group for this facet of the intervention.

## Evaluation Approach

The process evaluation design broadly followed the framework articulated by Baranowski and Stables (2000) and included the following components in reporting the study's design and findings: *context* (aspects of the environment of an intervention), *resources* (the materials or characteristics of agencies and implementers necessary to attain project goals) *implementation* (extent to which the program is implemented as designed), *reach* (extent to which an intervention component was received by the target group), *initial use* (extent to which a participant engaged in intervention activity; i.e., purchase low-fat milk), and *continued use* (extent to which a participant continued to engage in intervention activity). Initially, the partners (*resources*) collectively worked to finalize a clear description of the *context* and intervention, and to specify what constituted complete program delivery (*implementation*). Next, we identified collaborative, feasible, program delivery methods that would allow us to contain costs while effectively evaluating program delivery of both the couponing and educational marketing components. As described below, our process evaluation data collection activities included examination of photographs of in-store signage taken by store management and supplemented with on-site observations when needed (*implementation*), telephone interviews with dairy management (*implementation*), and overall recording of coupons distributed (*reach*), coupons redeemed (*initial use*), and customers' low-fat milk repurchase rates (*continued use*).

**Context.** All 48 stores in the Arizona-based supermarket chain were included in the study. Stores clustered around Phoenix and Tucson, two of the most populous cities in Arizona (U.S. Census Bureau, 2018), but also included Yuma and several smaller border communities. Stores offered a full range of ethnic and Hispanic food varieties, including fresh, frozen, deli, and prepared foods. In Arizona, the median income for Hispanic wage earners is \$20,000 as compared to \$31,800 for white non-Hispanic residents. Further, 38% of Hispanic children and 26% of adults live in poverty, double that of non-Hispanic whites (16% and 13%, respectively) (Pew Research Center, 2019). During the intervention period, Supplemental Nutrition Assistance Program (SNAP) sales across the supermarket chain ranged from 10%-30% of sales, averaging 26% by store. Of the literature available on milk consumption among Latino- and Hispanic-Americans, research indicates an increased likelihood to consume high-fat milk vs. low-fat milk (Ayala, Baquero, & Klinger, 2008; Delapa et al., 1990; Novotny et al., 2003; Wechsler & Wernick, 1992).

## Resources

**Collaborative partnership strategy.** The in-store couponing and educational marketing campaign was designed, implemented, and driven by the collective interests and resources of six partners: (1) Arizona-based supermarket chain (supermarket managers and dairy managers

across 48 stores), (2) American Heart Association, (3) Arizona State University (ASU), (4) Donna Levine Associates, Inc. (Chicago, IL), (5) Catalina Systems, and (6) The Food Trust (Philadelphia, PA). Partners worked collectively to develop a strategy that would (1) help to reduce caloric intake among high-risk populations (Hispanic populations in particular), (2) incorporate the American Heart Association's "Heart-Check" shelf tag program (see Figure 2; Johnson et al., 2015), (3) utilize the supermarket chain's existing Catalina point-of-sale (POS) systems to document POS analytics in cooperation with university and retailer partnerships, (4) be cost-neutral or profitable for the supermarket, and (5) be implemented feasibly in a relatively large sample of consumers and supermarket stores. Study methods were reviewed and determined exempt by the IRB of the Arizona State University.

**Development of educational marketing materials.** Shelf tags, clings, and coupon wording were designed by partners in collaboration with the American Heart Association and the supermarket chain's dietitian and tested at the community-level for general acceptability. Once drafted, materials were sent to Catalina Systems for alignment with their recommendations for placement, positioning, and optimized layout (see Figure 1). The coupons were then reviewed by the president of Donna Levine Associates, who served as the study's in-store marketing feasibility and implementation expert.

*Figure 1. Shelf Tag and Checkout Coupon*



**Implementation.** In-store radio messages, shelf tags, and clings were launched three weeks before the couponing effort to "prime" the consumer. The following in-store radio message was developed by the retail dietitian in conjunction with the research team: "Have you considered switching to 1% or Fat-Free Skim Milk? It has all the nutrition of regular milk with less calories and fat." The message ran in both English and Spanish, every two hours (per supermarket chain's policy for radio ads) according to the stores' radio cycle across the 40 stores. The remaining eight stores did not have the capacity for in-store radio. However, these stores were included in the analysis since the radio messages were only one aspect of the educational marketing campaign, and this study was intended to examine a multicomponent intervention across an entire supermarket chain.

Adherence to proper initial placement of shelf tags and clings was captured via photographs taken by the supermarket managers. Supermarket managers sent photos of the in-store placement of the shelf-tags and clings to the corporate dietitian who also shared copies ( $n = 43$ ) with the principal investigator by email. Stores not providing images ( $n = 5$ ) were visited in-person by the research team. The couponing effort began three weeks after the launch of the in-store radio messages, shelf tags, and clings. During the first three weeks of the couponing effort, a telephone survey of dairy managers was conducted at each store ( $n = 43$ ) to ascertain the dairy managers' awareness of (1) in-store radio messages being played, (2) use of clings, (3) use of shelf tags, and (4) milk coupons being offered.

**Reach, initial use, and continued use.** To measure coupon distribution and redemption as well as volume sales, the retail partner (Arizona-based supermarket chain) shared real-time coupon distribution and redemption data as well as corresponding POS data for volume purchased with the couponing partner (Catalina Systems). Reach was then assessed by measuring the number of coupons distributed. All transaction-related data were ultimately aggregated. Coupons were issued for 16 weeks and expired 6 weeks after issuance. Therefore, initial use was assessed by measuring the total number of coupons that were redeemed by eligible customers over the 22-week period. Continued use was assessed by measuring the repurchase rate of eligible customers who repurchased low-fat or skim milk after their initial purchase with a coupon during a period that extended 10 weeks after the last coupon expired (32 weeks).

## Analysis

Coupon data were analyzed by the couponing firm through a restricted partner agreement and included reports of the number of coupons distributed (16 weeks), the redemption rate and the average volume purchased during the intervention (22 weeks), and the overall repurchase rate during the extended 10-week period. For those who made repeat purchases, analyses examined the average volume per repeat purchase, the average number of trips per repeat purchase, and the overall percentage of repeat purchases. A chi-square test was conducted based on the results provided by Catalina Systems to determine whether the purchasing differences between those receiving coupons and those not receiving coupons were statistically significant. Statistical testing beyond that conducted by the couponing firm was conducted using SAS Version 9.4.

## Results

### Implementation

After examining photos of the in-store placement of educational marketing materials, it was determined that all but five stores initially set up their marketing materials according to protocol. Photos included images of shelf tags on shelves ( $n = 43$ ; see Figure 2) and clings on dairy cases ( $n = 36$ , the remaining seven stores did not have cases where clings were feasible; see Figure 3). While the radio messages played throughout the store, the shelf tags and clings were displayed

only in areas where milk was available. The last five stores required in-person visits and observations to confirm materials were displayed as requested. A telephone survey of dairy managers revealed that 12 of 43 managers were aware of the store using radio messages, and 26 indicated they were aware the store was offering milk coupons.

**Figure 2. In-Store Shelf Cling**



**Figure 3. In-Store Shelf Tag**



### Reach, Initial Use, and Continued Use

Reach was assessed by measuring the number of coupons distributed. Of the 53,000 customers in the experimental group, 44,050 were provided a coupon over the 16-week period. Initial use was assessed by measuring the total number of coupons that were redeemed by eligible customers in the experimental group ( $n = 44,050$ ) over a 22-week period (16-week distribution plus 6-week expiration). The frequency of coupons redeemed totaled 2,334, or 5.3% of total coupons distributed. Results from the chi-square test showed that those who received a coupon purchased low-fat milk at a higher rate (5.87%) than those who did not receive a coupon (4.00%), ( $\chi^2 = 8.61, p = .0033$ ). Continued use was assessed by measuring the total number of eligible customers who repurchased low-fat or skim milk after their initial purchase with a coupon, up to 32 weeks. Of the 2,334 customers who initially purchased low-fat milk during the 22-week period, 42% repurchased low-fat or skim milk during the extended 10-week period, totaling 980 repeat purchasers. Among repeat purchasers, 57.7% made two or more repeat purchases totaling 565 consistent repeat purchasers. For all participants who made repeat purchases, the average volume per repeat purchaser was 3.24 gallons.

### Discussion

Our study demonstrates the feasibility of implementing a multifaceted marketing campaign to shift consumer purchases from full-fat to low-fat milk using product coupons and in-store

educational messages. Findings revealed that 5.87% of exclusive high-fat milk customers that received a low-fat milk coupon purchased lower fat milk, and 42% of those that made a low-fat purchase went on to re-purchase low-fat milk without a coupon. The project is an example of an evaluation of an integrative and collaborative approach to implementation of an environmental change pilot and may serve to inform future projects seeking to shift default purchasing toward healthy, under-consumed foods.

### **Partnerships and Environmental Change Initiatives in Extension**

The advancement of community-based partnerships and collaborations is a long-standing pillar of the work done by Cooperative Extension. For example, the Extension Committee on Organization and Policy's (ECOP) 2014 Framework for Health and Wellness (i.e., integration of nutrition, health, and environment systems and health literacy) identifies and connects the six key priorities of extension with actionable objectives (Braun et al., 2014). Specifically, the model depicts how support for health policy issues education, and integrated nutrition, health, environment, and agricultural sciences, requires progress on indicators to build and grow community-collaborations focused on health, while working to advance the achievement of healthy environments and safe, affordable food. Together, according to the model, these efforts contribute to community support for healthy lifestyles and ultimately increases the number of Americans who are healthy at every stage of life.

In alignment with efforts to advance community partnerships to improve health and wellness, Cooperative Extension programs nationally have advanced their understanding of the role of PSE efforts in achieving behavior change objectives. In-store marketing efforts are an example of environmental change in the context of PSE and are typically characterized by manipulation of one or more of the 4 P's (Price, Promotion, Placement, and Product), often affecting the food retail environment in a way that drives the public in conscious and unconscious ways toward certain foods and brands (Armstrong, Adam, Denize, & Kotler, 2014; Zimmerman, 2011). A review of in-store marketing approaches by Glanz et al. (2012) identified six available public health-oriented studies that focused on in-store couponing as a way to promote healthy eating and, like our study, found that couponing efforts often increase product sales. However, the review also pointed out that the sustainability of such efforts may be limited given cost considerations, including the expense associated with funding and distributing coupons. The present pilot study provides one example of how partnerships with the dairy industry, supermarkets or nonprofit organization efforts like American Heart Associations' Heart-Check program may reduce costs and improve the potential for sustained efforts when common objectives are identified and aligned.

**Integrative marketing.** Our study is one of only four major multi-component supermarket interventions to date to focus exclusively on the promotion of low-fat milk (Finnell & John, 2018; Reger, Wootan, & Booth-Butterfield, 1999; Reger, Wootan, Booth-Butterfield, & Smith,

1998). Prior low-fat milk promotion efforts have largely focused on social marketing aspects of the work and have neglected price reduction strategies. For example, work by Finnell and John (2018) found a net 1.5% increase (from 10% to 11.5% market share) in 1% milk sales at the store level after a 12-week social marketing intervention in Oklahoma City, OK. Reger et al.'s (1999) study found larger effects, with self-reported increases in low-fat milk purchasing from 29% before the paid advertising campaign to 46% upon completion. An even earlier study in West Virginia (Reger et al., 1998) found that a media campaign complemented with community-based nutrition education resulted in a significant increase in low-fat milk sales. In our study, the added effect of the coupon plus in-store marketing intervention resulted in 1.87% greater low-fat milk sales among exclusive full-fat milk purchasers. With the in-store marketing approach alone, milk sales increased by 4%. Our results are consistent with prior research in that they reveal a willingness on the part of the consumer to switch from high-fat to low-fat options (Finnell & John, 2018; Reger et al., 1998, 1999) and suggest that in-store educational messages are also effective at increasing purchasing of targeted healthy items.

**Repeat purchasing.** As a result of our collaboration with Catalina Systems, we were able to examine the rate of repurchases among those who purchased low-fat milk once, and nearly half of those who purchased low-fat milk once purchased the product again. Our findings represent a novel contribution to the field as we could not identify prior studies that reported repeat low-fat milk purchasing rates for individuals who exclusively purchased whole fat milk prior to any intervention.

While our research did not focus on the rationale for repeat purchasing from the perspective of the buyer, prior research may provide some insight. One study by Weiss et al. (2015) documented substantial differences in perceptions of the taste of full-fat and whole milk as compared to actual preferences during blind taste tests. In this study, consumers were asked to taste blind-samples of skim, 1%, and 2% milk and determine the type of milk. Results showed that 81% of whole milk buyers incorrectly identified low-fat milk as whole milk, and 70% of whole milk drinkers and 65% of 2% milk drinkers considered switching to low-fat milk after tasting the product (Weiss et al., 2015). This may explain the repeat low-fat milk purchasing, reinforcing the notion that once consumers taste low-fat milk, it is found to be an acceptable alternative to whole milk.

**Collaborative approach to implementation.** Our collaborative partnership was an intentional strategy used to address challenges related to implementing supermarket interventions that are identified in the literature. For instance, in their process evaluation of a 4-month multicomponent supermarket study in Baltimore City, Lee et al. (2015) used shelf tags and nutritional education alongside community events and taste tests to promote multiple products, including dairy items. Such an approach is similar to several other studies that examined food marketing and environmental changes in stores serving underserved communities (Baquero, Linnan, Laraia, & Ayala, 2014; Curran et al., 2005; Gittelsohn et al. 2010; Rosecrans et al.,

2008). In their assessment, Lee et al. (2015) found that the limited availability of store management created implementation hurdles. This issue, coupled with complications of employee attrition and the large number of products included in the intervention (condiments and spreads [49 items], fruit and vegetables [93 items], dairy products [63 items], etc.) made program promotion difficult, and at times, compromised implementation fidelity (Lee et al., 2015). While store-owner buy-in was sufficient, the authors recommend that future studies seek buy-in from managers and retailers alike. Our approach, which was not without limitations, achieved strong collaborations at the retailer level and with supermarket managers to ensure high program implementation fidelity.

Another study by Polacsek et al. (2018) encountered different implementation issues. Their objective was to determine whether a supermarket double-dollar fruit and vegetable (F&V) incentive increased F&V purchases among low-income families. Similar to our study, Polacsek et al. (2018) used coupons issued at the point-of-sale; however, instead of adopting a coupon “good for future purchases” approach, they created same-day coupons, which the researchers intended customers to use at the time of purchase. These materials (same-day coupons) did not integrate smoothly with shoppers’ habits or previous experiences with the POS coupons, and the design put the onus of responsibility on the cashiers, which resulted in many of the coupons being handed to the customer for future use instead of same-day. By collaborating with an established POS coupon company already working with the retailer and supermarket staff at the retailer-level, our study was integrated smoothly at the shopper- and retailer-level as was evidenced by the coupon redemption rate (5.3%), addressing limitations previously encountered by Lee et al. (2015) and Polacsek et al. (2018).

### **Strengths and Limitations**

Process data identified several promising approaches to ascertaining program implementation in-store. Images from retail partners coupled with dairy manager data identified gaps in understanding how to maximize resources and interests for study implementation and measurement that integrate easily and efficiently within real-world settings.

#### **Strengths**

**Collaborative partners.** Working in partnership with industry, nonprofit, academic, and retail experts allowed our multi-component intervention to maximize its reach. Interests on the part of all partners were addressed through the intervention. The American Heart Association aligned its Heart-Check program with the low-fat healthy product campaign, the supermarket chain and its dietitian offered healthier products at decreased prices, and the academic partners collected data to better understand how to operationalize a large-scale product promotion and couponing intervention across a store chain.

The partnership with Catalina Systems was instrumental to our study design and allowed easy access to historic shopper data and weekly sales data and provided a mechanism to issue coupons without having to implement an external couponing system. Further, management and staff were already familiar with how Catalina Systems generated coupons as well as how to distribute them to the customer and were open to maximizing their investment in the partnership.

The supermarket dietitian was also heavily invested in this program and played an integral role in the coordination of the effort, including engaging the range of partners involved in the program. The dietitian had strong relationships with the American Heart Association because of engagement in the “Heart-Check” shelf tag program and had experience in implementing nutrition shelf tag programs. Further, the in-store dietitian supported in-store implementation.

**Cost management.** In-kind efforts, including the time each partner spent on the project, the cost of data collection via the automated coupon system, and the design costs for the shelf tags and coupon images reduced implementation costs, and partnership agreements were leveraged so that work could meet multiple objectives simultaneously. Our example demonstrates how mutual benefit can motivate partners to dedicate time and resources to implement healthy initiatives at the community, store, and individual levels.

### **Limitations**

**Chain-wide intervention.** Challenges in study design whereby both shoppers who received and did not receive coupons were exposed to in-store marketing efforts limit our ability to interpret what portion of the increase in milk sales would have occurred absent any intervention. However, contamination of the intervention across a chain is always possible since consumers can shop in more than one store location. Our intervention also faced logistical challenges regarding the need for different sizes and placement of shelf tags and timing of in-store radio spots due to store-specific technology and radio advertising.

**Tracking purchases.** Another challenge encountered stems from the fact that the supermarket chain implementing the intervention did not have a loyalty card. Thus, the only method to track individual customers’ purchases over time was through electronic card data. This meant that customers paying with cash were ineligible for the intervention. Because our intervention was collaborative, our data collection efforts were reliant on the POS systems in place at each supermarket, which in turn were utilized by Catalina Systems to provide weekly redemption information to study partners. While this process was effective for our partnership, the number of steps in the process could present challenges for future studies.

**Generalizability.** Milk prices are regulated throughout the United States, and certain states do not allow stores to use coupons to discount milk below cost (i.e., California). Therefore, the generalizability of results from the current study may be limited by state. Further, our targeted customer base was predominately Hispanic, which likely limits generalizability to other ethnic

groups. However, results from the process evaluation show generalizable promise in other ways. For instance, many supermarket studies have focused on the in-store promotion of more than one item (e.g., fruits *and* vegetables) but limited the number of stores in which these items were promoted (e.g., one to four stores) (Baquero et al., 2014; Olstad et al., 2016; Polacsek et al., 2018). Because our intervention was scaled to an entire chain, it demonstrates feasibility at a systems level. Further, because study partners worked in collaboration, implementation efforts were achieved through existing infrastructure and did not require the use of additional tracking mechanisms (e.g., customized loyalty card, same-day coupons).

Because we partnered with a coupon marketing firm, proprietary issues prevented full access to raw data. As a result, we were unable to track certain purchasing patterns (e.g., overall low-fat milk purchases). Despite these analytic limitations, our reliance on the coupon marketing firm's data analytics provides a model that can be used in the industry to measure the impact of promotions, making the findings more relevant for retailers who are key partners in these public-private partnerships and whose buy-in is critical for the success of such partnerships.

### **Contributions of the Current Study**

As Extension leaders, researchers, and practitioners continue to struggle to help families achieve a healthy and balanced diet, there is a need to build an evidence base for how to sell more-nutritious foods, and fewer low-nutrient, high-calorie food/beverage products in a profitable or cost-neutral way (Braverman, 2019). Increasingly, industry methods (e.g., electronic supermarket sales data, inventory data, and loyalty card output) are being used in public health research to determine consumer behavior and shopping patterns, and examples of PSE approaches and their evaluation are important for future implementation efforts. Our collaboration with Catalina Systems enabled us to identify customers who were exclusive full-fat milk buyers using historic shopper data, which in turn allowed us to target customers who would most benefit from receiving a low-fat milk coupon. Additionally, our study offers concrete guidance for the rate of return of coupons in this category (5.3%). Such data are informative, particularly when interventions are fiscally constrained, and redemption rates are used to drive decisions around depth of issuance.

### **Future Research**

To sustainably shift the purchasing patterns of supermarket customers towards healthier options (i.e., low-fat milk), multifaceted efforts should be employed. The current study demonstrated that it is feasible to engage multiple stakeholders, including retail and coupon marketing partners, to successfully implement a couponing campaign where a coordinated low-fat milk promotional in-store marketing campaign was in place. Future couponing interventions should extend the findings from the current study by (1) expanding beyond one product (low-fat milk) to include multiple products (whole-grain foods, lower-sodium items, or low-fat dairy in other forms such as cheese or yogurt), (2) identifying customers on multiple attributes using historic

shopper data, and (3) advancing a collaborative-based model that includes Extension partners and is responsive to the real-world social and physical contexts in which the study takes place. This intervention and evaluation demonstrate the feasibility of such a collaboration, however, by including more than one product, it is possible to pre-identify customers on more than one attribute (e.g., inclusion criteria = exclusive low produce buyers, exclusive sugar cereal buyers, exclusive high-fat milk buyers, and high salty snack buyers). Within a SNAP or WIC context for example, stores in partnership with social science researchers and health advocates could broaden the impact of the intervention by targeting specific bundles of products with coupons tailored to a specific customers' purchasing history. In their systematic review of grocery store interventions, Escaron et al., (2013) found that efforts to address both supply- and demand-sides of grocery interventions hold most promise, suggesting that the approaches tested here may provide even greater impact when coupled with supply-side (i.e., product availability, depth of stock) interventions, such as those targeting smaller stores.

### **Conclusion**

The 2015-2020 Dietary Guidelines and the Institute of Medicine (IOM) recommend that collaborative multicomponent studies explore how to improve food environments to make it easier for the public to shift their dietary habits towards more healthful options (Koplan, Liverman, & Kraak, 2005; U.S. Department of Health and Human Services and U.S. Department of Agriculture, 2015). At the same time, Cooperative Extension through its work with SNAP-Ed and the Expanded Food and Nutrition Education Program (EFNEP) are advancing efforts to target PSE changes in order to address disparities in health and diet among those at greatest risk for diet-related disease (Braun et al., 2014; Cates et al., 2014; National Institute of Food and Agriculture [NIFA], 2017).

Our study found several elements that positively contributed to the project's feasibility of implementation. First is the development of strong, collaborative relationships with academic, nonprofit, and industry partners to utilize different types of capital (knowledge, social, economic) available within the partner network (e.g., registered dietitian who was affiliated with the supermarket chain participating as both nutrition consultant and implementation expert). Second is low-cost program monitoring methods, including photos, telephone interviews with dairy managers, and pre-existing data tracking systems. Third, evaluation demonstrated that the use of couponing in addition to in-store messaging resulted in 1.87% higher product sales suggesting that coupons add success to shifting purchasing toward healthier products, both in the shorter- and longer-term with repeat purchasing likely (58%). By supporting the work of retailers and promoting the consumption of low-fat, high protein foods, such as milk, our study provides an example of a public-health informed evaluation of a collaborative program to improve food environments and affecting positive health behavior change in real-world settings.

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