



The impact of price discounts and calorie messaging on beverage consumption: A multi-site field study

J. Jane S. Jue ^{a,*}, Matthew J. Press ^{a,2}, Daniel McDonald ^{b,3}, Kevin G. Volpp ^a, David A. Asch ^a, Nandita Mitra ^c, Anthony C. Stanowski ^d, George Loewenstein ^e

^a Department of Veterans Affairs and the Leonard Davis Institute of Health Economics Center for Health Incentives and Behavioral Economics, 1301 Blockley Hall, 423 Guardian Drive, University of Pennsylvania, Philadelphia, PA 19104, USA

^b Department of Statistics, Carnegie Mellon University, Pittsburgh, PA 15213, USA

^c Department of Biostatistics and Epidemiology, Blockley Hall, 423 Guardian Drive, University of Pennsylvania, Philadelphia, PA 19104, USA

^d ARAMARK Healthcare, 1101 Market Street, Philadelphia, PA 19107, USA

^e Department of Social and Decision Science, Carnegie Mellon University, Pittsburgh, PA 15213-3890, USA

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ABSTRACT

Objectives. To examine the efficacy of alternative approaches for shifting consumers toward zero calorie beverages. We examined the effect of price discounts and novel presentations of calorie information on sales of beverages.

Methods. This prospective interrupted time-series quasi-experiment included three sites in Philadelphia, PA, Evanston, IL, and Detroit, MI. Each site received five interventions: (1) a 10% price discount on zero-calorie beverages; (2) the 10% discount plus discount messaging; (3) messaging comparing calorie information of sugared beverages with zero-calorie beverages; (4) messaging comparing exercise equivalent information; and (5) messaging comparing both calorie and exercise equivalent information. The main outcome was daily sales of bottled zero-calorie and sugared beverages. Data was collected from October 2009 until May 2010 and analyzed from May 2010 until May 2011.

Results. The overall analysis failed to demonstrate a consistent effect across all interventions. Two treatments had statistically significant effects: the discount plus discount messaging, with an increase in purchases of zero calorie beverages; and the calorie messaging intervention, with an increase in purchases of sugar-sweetened beverages. Individual site analysis results were similar.

Conclusions. The effects of price discounts and calorie messaging in different forms on beverage purchases were inconsistent and frequently small.

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Introduction

Rapidly rising health care costs and an increasing recognition of the connection between heart disease, diabetes, hypertension and obesity have resulted in the nation's obesity epidemic taking center stage as a public health concern. Poor nutrition and physical inactivity leading to obesity is one of the top preventable causes of death in the United States (Mokdad et al., 2004). As a result population-level policy and environmental interventions targeting diet and exercise behaviors are becoming more frequent. These include recent local and national policies

such as sugary beverage taxation and calorie-labeling on menus. McDonald's is now posting calories next to the price of all menu items, and New York City Mayor Michael Bloomberg has banned the sales of sugar-sweetened beverages in sizes larger than sixteen ounces. Yet, in many cases, the evidence is still mixed on the utility and success of these types of interventions at altering consumer behavior.

While some studies of calorie labeling suggest some modest impact (Chu et al., 2009; Milich et al., 1976; Roberto et al., 2010; Tandon et al., 2010), several studies investigating fast food purchases have found minimal impact of calorie labeling on calories purchased and consumed. (Downs et al., 2009; Dumanovsky et al., 2011; Elbel et al., 2009; Finkelstein et al., 2011; Harnack et al., 2008). In one study of an urban low-income population, many customers reported that they were influenced by calorie information postings, but data from meal receipts revealed no change in behavior (Elbel et al., 2009). In contrast, a study of calorie information posting in New York City found a 6% decline in calorie consumption following labeling, but this decline was due to changes in food rather than beverage purchases (Bollinger et al., 2010).

* Corresponding author at: 5200 Butler Pike, Plymouth Meeting, PA 19462, USA. Fax: +1 610 834 1275.

E-mail address: jjue@ecri.org (J.J.S. Jue).

¹ Present address: ECRI Institute Evidence-based Practice Center, ECRI Institute, 5200 Butler Pike, Plymouth Meeting, PA 19462, USA.

² Present address: Departments of Public Health and Medicine, Weill Cornell Medical College, New York, NY, USA.

³ Present address: Department of Statistics, Indiana University, Bloomington, IN, USA.

Some studies have found that raising the price of soft drinks is effective at reducing consumption with estimated effects of an 8–10% decrease in consumption for every 10% increase in price (Andrejeva et al., 2010; Block et al., 2010). However, there has been considerable political opposition to such taxes, as observed by legislative defeats in both New York City and Philadelphia, as well as the immense public outcry over Mayor Bloomberg's ban.

The objective of this study was to examine the efficacy of some alternative approaches intended to shift consumers toward zero-calorie beverages consumption. Specifically, we considered the impact of two simple visual presentations of calorie content: posters which emphasized the average number of calories in a typical beverage and/or the amount of physical activity required to burn those calories. One recent study presenting caloric information as physical activity equivalents found a modest effect on sugared beverage purchases (Bleich et al., 2012). In addition, we examined the impact of a price discount and a combination of a discount with explanatory messaging.

Methods

This was an interrupted time-series multi-site quasi-experiment with five different interventions. The sites for the study were three hospitals located in Philadelphia, PA (Site A); Detroit, MI (Site B); and Evanston, IL (Site C). The first two are urban settings, and the latter is suburban. A fourth site, a suburban site, was excluded before study analysis due to an inability to obtain daily sales data. The interventions were conducted in the hospitals' cafeterias and convenience shops operated by ARAMARK food services. Site A included two cafeterias and two convenience shops; Site B, one cafeteria; and Site C, one cafeteria and one convenience shop. At all three sites, the cafeterias and shops are used by patients, families, and staff. At Site A, the registers were computerized to take bar scans, so recording was automatic, and the discounts were automatically added or removed, depending on the phase of the intervention. At Sites B and C, cash registers were adjusted to charge appropriate discounts as well as record sales of bottled zero-calorie and sugared beverages. Staff entered purchases manually and were trained to correctly ring up the beverages. Periodic spot-checking to confirm reliability was performed. It was not possible to collect either individual or site-specific demographic data on customers served at the sites.

The data were collected over 30 weeks, from October 27, 2009 to May 23, 2010. The two interventions involving price discounts occurred from November 5, 2009 to December 22, 2010. The three calorie messaging interventions were implemented from February 16, 2010 to May 23, 2010. Several periods of non-intervention data were captured: (1) baseline data before the first and third interventions and after the fifth intervention, and (2) washout periods between interventions lasting 1–2 weeks (Fig. 1). During the washout

periods, prices reverted to baseline, and all messaging posters and signs were removed.

The two price interventions investigated the effect of discounting the price of zero-calorie beverages. The specific interventions were (1) a 10% price discount on all zero-calorie bottled beverages, with prices labeled accordingly, and (2) a 10% price discount on all zero-calorie bottled beverages plus messaging that explained the reason for the discount. Messaging consisted of colorful marketing posters, flyers, and signs displayed prominently in the cafeteria. These promoted the 10% price discount with the message, "Lighten up for less – 10% off all zero-calorie bottled beverages and water," as shown in Appendix A. The size of the discount was chosen through discussion with the food service provider and to conform to previous studies. The average price discount for a zero-calorie beverage was \$0.13.

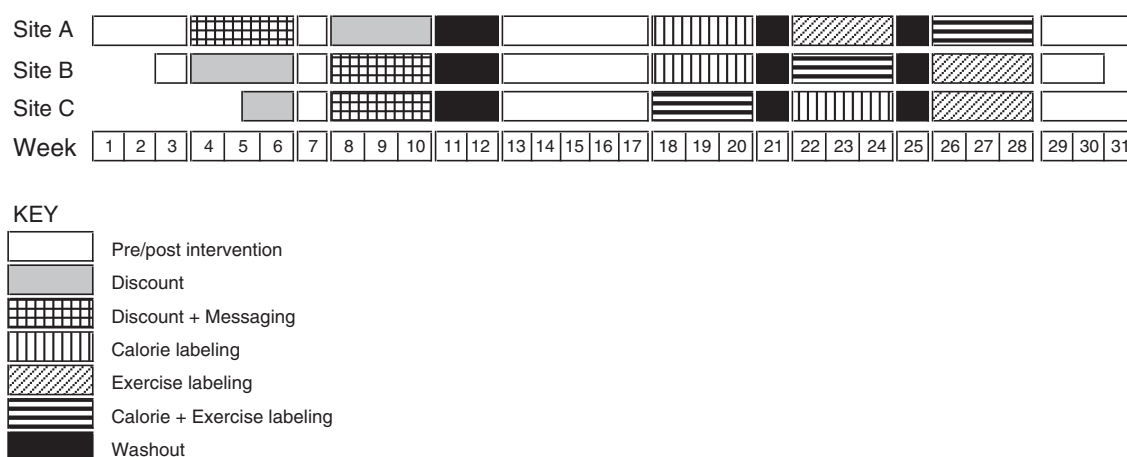
The three calorie messaging interventions examined the impact of alternative visual calorie messaging on the purchase of bottled beverages. Like the price discount messaging, the calorie messaging interventions were also delivered in posters, flyers, and signs prominently displayed which promoted switching to zero-calorie beverages by providing information about (1) the caloric content in sugared beverages (e.g. 260 calories in a 20 ounce soda), (2) the amount of time one would need to spend on a treadmill to burn the calories in a sugared beverage (e.g. 50 minutes to burn off the 260 calories in a 20-ounce soda), and (3) a combination (Appendix A). Both displays used the average calories in the bottled sugared beverages sold across the sites (260 calories). Exercise equivalents were estimated based on an average weight person (160 lbs) walking briskly (at 3 mph).

All messaging posters were developed by the ARAMARK marketing team in conjunction with the research team. The research team developed the messaging to influence behavior and the marketing team applied their experience to select appropriate images and wording. The posters were vetted internally by the research team, but no pretesting of the posters was performed.

Analysis

Data were analyzed from May 2010 until May 2011. Daily sales of bottled sugared beverages and zero-calorie beverages during all times within the study were measured. Bottled sugared beverages were defined as beverages that were sweetened with sugar (including sucrose, fructose, corn syrup), and included regular soft drinks and iced teas. Bottled zero-calorie beverages were defined as beverages that contained no calories per serving and included diet soft drinks, diet teas, and water. Since the items of interest were bottled sugared beverages and zero-calorie beverages, a number of other beverages were excluded (e.g. juices, milk, and coffee). Fountain-dispensed beverages were also excluded because of the inability to discern the type of beverage purchased.

The sales of both sugared and zero-calorie bottled beverages during the intervention periods were compared to the baseline periods. It was hypothesized that the interventions would cause a decrease in sugared beverage sales



Due to a data collection error, data from the pre-intervention period was missing from Sites B and C and from part of the first intervention were missing from Site C.

Fig. 1. Study timeline for price discounts with and without messaging and calorie- and exercise equivalent messaging, in Philadelphia, PA, Detroit, MI and Evanston, IL, October 2009–May 2010.

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