

# Guiding Stars: the effect of a nutrition navigation program on consumer purchases at the supermarket<sup>1–5</sup>

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## ABSTRACT

**Background:** To improve diet quality and overall population health, the need to develop nutritional rating systems that are comprehensive in scope and easy for the consumer to understand and use at the point-of-purchase has emerged.

**Objective:** Our aim was to examine the effect of a comprehensive storewide supermarket point-of-purchase nutrition navigation intervention by using a shelf-label 3-tiered star icon on consumer food and beverage choices and their associated nutritional quality.

**Design:** By using a natural experiment design, purchasing data from 2006 to 2008 were obtained from a Northeast supermarket chain with 168 stores located in northern New England and New York and examined at preimplementation and at 1- and 2-y follow-up periods.

**Results:** The nutrition navigation system studied showed significant changes in food purchasing immediately after implementation, and these changes continued to be significant 1 and 2 y later. When the same 8-mo period (January–August) each year was compared, in 2006, 24.50% of items purchased earned a star rating; this proportion increased to 24.98% ( $P < 0.001$ ) and 25.89% ( $P < 0.0001$ ) at the 1- and 2-y follow-up periods, respectively. For a 4-wk period, 1 y after program implementation, consumers purchased significantly more ready-to-eat cereals with stars (eg, less added sugars and more dietary fiber) and fewer no-star, high-sugar, low-fiber cereals.

**Conclusion:** Increasing rates of obesity and declining diet quality for Americans strongly support the need for effective supermarket point-of-purchase programs, such as the Guiding Stars nutrition navigation program, that provide clear, concise, and simplified nutrition information to guide consumer food and beverage choices. *Am J Clin Nutr* doi: 10.3945/ajcn.2010.28450C.

## INTRODUCTION

Consumers are increasingly aware about food and its relation to health, with 6 in 10 individuals stating that diet and nutrition are very important to them (1). In a 2008 study examining consumer trends for nutrition and health, respondents stated that taste (89%) and nutrition (71%) were the 2 most important factors when making food choices, yet other than increasing fruit and vegetable intake, no other major dietary changes were reported (2). In fact, 7 of 10 respondents identified their diet as needing to be “somewhat” to “a lot” healthier. Consumer food choices and dietary intake are at odds with the importance placed on nutrition and awareness to improve overall diet quality.

It is estimated that shoppers spend 6 min on an average day grocery shopping (3) and look at a product on average for 13 s, 9

of which are spent on the final product chosen (4). Between one-half and two-thirds of purchasing decisions are made at the point of purchase (5). Consumer studies show that the average shopper arrives at the store undecided about what they will buy, looks at a fraction of the products, and becomes distracted by displays and packaging (6). In addition, health claims potentially mislead consumers about what is an overall nutritious food item and might contribute to negative behaviors and untoward health (7). In an effort to reduce “information clutter” at the point-of-purchase (POP) and to improve the diet quality and overall health of the public, numerous studies have underscored the need to develop nutritional rating systems that are comprehensive in scope and easy for the consumer to understand and use (8–10).

Choices made at the supermarket reflect what consumers choose to eat and thus affect health (11). A number of intervention strategies were tested in supermarket settings during the mid-1980s to the mid-1990s (12). The majority of these early supermarket interventions involved a pricing, merchandising, or targeted nutrition and health information campaign (13).

Those interventions reported limited influence on changing consumer purchasing and dietary behavior. No study to date has evaluated all food and beverages and implemented a storewide nutrition intervention aimed at guiding consumers to more nutritious food choices, at a glance, throughout the store. This

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article describes the effect of a supermarket POP nutrition navigation program on consumer food and beverage choices and associated nutritional quality.

## METHODS

### Study population

We used purchasing data from 2006 to 2008 obtained from a supermarket chain that was the first to fully implement a storewide nutrition navigation program in all of its 168 stores. This Northeast supermarket chain has stores located in Maine, New Hampshire, Vermont, Massachusetts, and northern New York. The geographic areas served ranged from metropolitan to rural locations. In 2007 their average shopper was female (74%), 53.5 y of age, had some post high school training/education, lived in a 2.5-member household, had a household income of \$52,566, made 1.8 trips to the store per week, and spent \$122 per week on groceries (85% of which was spent at the study supermarket) (Julie Greene, Hannaford Bros Co, personal communication, 9 June 2009).

### Nutrition navigation intervention

Guiding Stars is a nutrition navigation program that was first implemented storewide in September 2006. The program is driven by an algorithm that generates weighted scores based on points debited for *trans* fat, saturated fat, cholesterol, sodium, and added sugars and credited for vitamins and minerals, fiber, and whole grains (14, 15). More than 60,000 food and beverage grocery items are rated on the basis of nutrition criteria developed specifically for this program. If a product meets the inclusion criteria for earning 1, 2, or 3 stars, the star icons are displayed at the POP on the Universal Product Code shelf tag. Items prepared in the store, eg, meats and bakery items, carry the icon on the printed scale label. Accompanying educational materials, including kiosks, brochures, and signage, are placed throughout the supermarket.

### Data collection and analysis

Two data sources were used to conduct the analyses: 1) company purchasing data and 2) a food and nutrient database. The purchasing data were aggregated for all items sold (number of units by grocery category) across the 168 supermarkets during the study period. Data for total units sold were reported weekly by a “star” or “no star” rating for each sales quarter from January 2006 through October 2008. The food and nutrition database was created exclusively for program development. For every food and beverage sold by the supermarket chain, all available information was entered from the product’s Nutrition Facts panel and ingredient list. For items not required to carry a label—eg, fresh produce, meat, and seafood—data were imported from the US Department of Agriculture National Nutrient Database by using ESHA version 9.0 Genesis SQL software (Salem, OR).

To answer our first question—“Did the proportion of foods purchased with stars increase post-Guiding Stars at 1- and 2-y follow-up periods?”—purchasing data files were used. Retail grocery sales in the Northeast are cyclical in nature, largely because of the seasonality that affects product variety and availability; therefore we used the same 8-mo period (January–

August) when conducting comparisons. This time frame also represents 8 full months before program implementation in September 2006. Purchasing data were also used to analyze changes by star rating level (eg, 0–3 stars).

Next, we wanted to understand the effect that purchasing changes might have on consumer dietary intake. To explore this, we focused on ready-to-eat cereals (RTECs) because the majority of Americans consume RTECs and purchasing is largely consistent from week to week. The purchasing data “units sold” variable for RTECs was merged with nutrient variables from the food and nutrition data set for analyses.

Purchasing data were imported from Microsoft Excel into SPSS 16.0 (SPSS Inc, Chicago, IL) for data analyses (16). Descriptive statistics (sums, means, ranges, percentages, and proportions) were produced via SPSS Proportions (eg, the proportion of items purchased with stars compared with the proportion without stars). Tests for trend were used to determine whether a proportion increased significantly over time. Pairwise comparisons were completed by using Bonferroni correction for multiple comparisons. Proportions were compared by using a Pearson chi-square test. Differences with  $P < 0.05$  were considered to be statistically significant.

## RESULTS

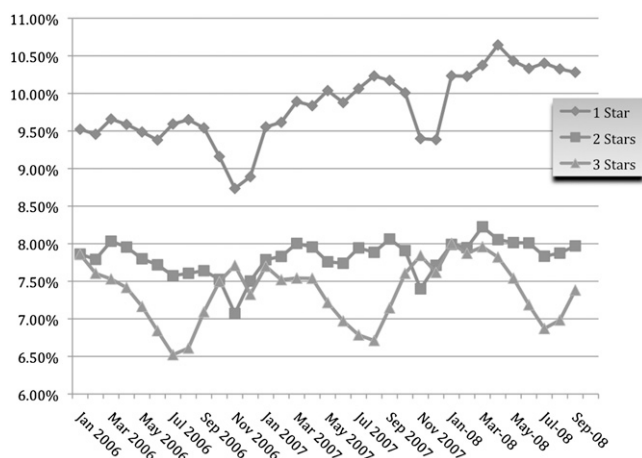
### Food and beverage purchases by star rating

Since Guiding Stars was implemented in September 2006 the proportion of products that qualify for the star icon(s) has remained relatively constant, with no significant changes: 2006 (25.13%), 2007 (24.89%), and 2008 (25.15%). Despite no increase in the proportion of products with stars, and a slight decrease in 2007, the proportion of products purchased with stars has steadily and significantly increased over 2 y. For the 8-mo period (January–August) in 2006, 24.50% of the items purchased earned a star rating, and this proportion increased to 24.98% ( $P < 0.001$ ) and 25.89% ( $P < 0.0001$ ) at the 1- and 2-y follow-up periods, respectively. The 1.39% increase translates into a trade-off of  $\approx 2.9$  million more items with stars being purchased monthly and the equivalent decrease for products without stars. When applied to a single nutrient, eg, sodium, which, on average, is 298 and 111 mg/serving for no-star and star products, respectively, this equates to a decrease of 542,329 g sodium sold during the study period. These increases are also observed for each of the 1-, 2-, and 3-star-rated products (**Figure 1**). When examining monthly changes in the proportion of items purchased by the star rating, we find that increases are noted for each month and continue to increase, with no declines, for each year of implementation. This was most significant for 1-star products, which, on average, increased significantly ( $P < 0.0001$ ) from 9.54 to 10.37% between 2006 and 2008. Although not as great in scope, purchasing increases in both 2-star (+0.22%;  $P < 0.05$ ) and 3-star (+0.34%;  $P < 0.01$ ) products were significant over the 2-y period.

### Effect on RTECs

#### *Nutrition for RTECs by star rating*

To determine the potential program effect on changes in the nutrient profile of products purchased, we examined RTEC



**FIGURE 1.** Proportion of items with stars purchased before and after program implementation.

nutrients that were most likely to affect the product score and resultant star value. The nutrition profile for 0-, 1-, 2-, and 3-star RTECs sold in the participating supermarket chain ( $n = 257$ ) is presented in **Table 1**. No-star RTECs contain on average 12.5 g of added sugars and <1 g of dietary fiber compared with those earning 3 stars, which contain on average 1.0 g of added sugars and 7.5 g of dietary fiber. There was no significant difference in sodium values until a product earned 3 stars, and the sodium content declined 129% to 77 mg ( $P < 0.05$ ) on average per serving compared with 137 mg on average for 0- to 2-star cereals.

#### RTEC purchasing

The change in the purchasing of star compared with no-star RTECs after the program implementation and the potential effect on consumer nutrient intake is shown in **Table 2**. Total RTEC units purchased increased 5.98% for the same 4-wk sales period ending October 31 in both 2006 and 2007; cereals with stars increased 4.42% whereas those without stars increased 7.72%. Between 2007 and 2008 the total number of boxes of cereal purchased increased by 6.08%; however, there was a 6.47% increase in those with stars compared with a 5.51% increase in those without stars. Although no-star RTEC units sold had a greater effect on the overall increase between 2006 and 2007, this trend reversed in 2008 such that RTECs with stars further increased by 1.67% ( $P > 0.001$ ) whereas those without stars declined 2.21% ( $P > 0.001$ ) against their 2007 unit sale increase.

**TABLE 1**

Nutrient values of ready-to-eat cereal by star ratings<sup>1</sup>

	0 stars ( $n = 121$ )	1 star ( $n = 70$ )	2 stars ( $n = 55$ )	3 stars ( $n = 11$ )
Energy per serving (kcal)	135.4 ± 50.9	144.4 ± 45.1	153.2 ± 49.8	149.1 ± 50.3
Total sugars (g)	12.5 ± 6.9	10.2 ± 4.6	7.5 ± 4.4	1.0 ± 1.4
Energy from added sugars (%)	36.9 ± 18.3	28.3 ± 10.2	19.5 ± 7.8±	2.7 ± 3.3
Dietary fiber (g)	0.98 ± 0.93	3.3 ± 2.2	4.9 ± 2.6	7.5 ± 3.3
Sodium (mg)	182 ± 72.9	171 ± 64.3	166 ± 61.8	77 ± 56.4

<sup>1</sup> All values are means ± SDs.

#### The effect of purchasing on nutrients

Changes in RTEC purchases results in a significant decrease in added sugars and an increase in dietary fiber because of the shift in product choices (Table 2). Adjusting the RTEC units purchased by the 6.08% increase in total RTEC sales between 2007 and 2008 results in an increase of 5101 (stars) and a decrease of 7351 (no stars) RTEC units purchased compared with the same sales period 1 y earlier. This purchasing shift results in a net decrease of more than 60,000 g of added sugars and an increase of 19,474 g of dietary fiber sold for RTECs purchased during the study period. Extrapolated to a 1-y period, these changes would translate to a decrease of almost 725,000 g of added sugars and an increase of 233,000 g of dietary fiber sold that could be attributed to changes in RTEC purchases.

#### DISCUSSION

As obesity rates continue to rise and no significant improvements are noted for the diet quality of Americans, strategies to help the consumer to make more nutritious food and beverage choices at the POP are a major focus for public health, government, and private sector communities. The Guiding Stars nutrition navigation program was implemented with the goal of providing simplified nutrition information that could help guide better food and beverage choices “at-a-glance.” Our findings are similar to others, who have concluded that small population-level changes can significantly affect diet and health outcomes (17–19). For example, decreasing diastolic blood pressure by 2 mm Hg is associated with a 17% decrease of hypertension prevalence and a 6% decreased risk of coronary heart disease (18). And reducing sodium by 85 mg/serving across 12 popular breakfast cereals eliminated 235 tons of sodium from the Australian food supply (19). As with these studies, our results have the potential for a far-reaching, population-level effect.

We also show that the program evaluated not only was effective at bringing about changes in food purchasing immediately after implementation, but also continued to incrementally improve the purchasing of star-rated foods 1 and 2 y later. In addition, although product movement was the most significant for 1-star items, significant positive increases were also noted for the purchasing of 2- and 3-star products. Behavior change theories would posit that consumers who are not in the habit of choosing foods that receive stars (eg, items lower in sodium, added sugars, saturated fat, or with high positive nutrients) are more likely to move from 0- to 1-star items [eg, from whole milk (no star) to 2% milk (1 star)] (20). The tiered nature of the program follows a model of health behavior change and allows consumers to make incremental or staged changes to their diet.

**TABLE 2**  
Change in select nutrients in ready-to-eat cereals (RTECs) sold between 2007 and 2008

	RTECs with stars	RTECs without stars
No. of units purchased	5101 <sup>1</sup>	−7351 <sup>2</sup>
Mean added sugars per product (g)	6.2	12.5
Total added sugars in RTECs sold (g)	31,626	−91,888
Mean dietary fiber per product (g)	5.23	0.98
Total dietary fiber in RTECs sold (g)	26,678	−7204

<sup>1</sup> Adjusted for total cereal unit sale increase [6.47% (total star unit increase) − 6.08% (total unit increase) × 1,294,053 (total units sold)].

<sup>2</sup> Adjusted for total cereal unit sale increase [5.51% (total star unit increase) − 6.08% (total unit increase) × 1,294,053 (total units sold)].

In addition to the theoretical underpinnings of behavior change, recent research has concluded that consumers prefer, understand, and will use systems that use a simple icon and tiered approach when compared with a single icon or too much information via multiple competing ratings (21, 22). It has been suggested that, although consumers say that they want more information, too much information has been associated with poor choices (23) and information overload that can lead to the consumer doing nothing at all (24). A study comparing nutrition rating systems in Europe, which used mock symbols, concluded that the Traffic Light nutrition rating system, which uses a 3-tier (eg, red, yellow, green) symbol and a 3-star icon, were preferred to programs with more than 3 rating levels, too many numbers or scores, or a single-icon program (21). In 2009, another study confirmed that Australian consumers overwhelmingly preferred the Traffic Light and that they were 5 times more likely to pick the “healthier” food options when compared with General Daily Allowance logos (22). Taking this research one step further, we show that a simple tiered nutrition guidance program at the POP can help consumers to incrementally alter their food and beverage choices. Consumer marketing POP research would contend that a simple icon program cuts through the clutter and distractions at the POP and allows the consumer to narrow the choices that they will spend 13 s evaluating. On the basis of our findings and those of others, comprehensive, but simply to understand, POP programs may be effective population-level nutrition intervention strategies.

Although individual dietary intake was not measured for this study, if we use RTECs as one example, our results present an approximation for changes in individual dietary intake, specifically, a reduction in added sugars and an increase in dietary fiber. Previous research that used grocery store receipts collected by study participants over a 6-wk period was used to examine food group purchases and described differences in purchasing by income, race/ethnicity, and family composition (25). Furthermore, Ransley et al (26) show that supermarket register receipts accurately predicted dietary intake. Using receipts as data, they reported that 90% of household dollars spent on food were at the supermarket and that 90% of energy and 76% of fat purchased at the supermarket was consumed, as validated by 4-d food diaries. In addition, this method was also precise enough to detect differences in the energy and fat content of purchases between households with lean and overweight individuals (27). Supermarket sales data and/or register receipts appear to provide an objective means to approximate dietary intake and may provide more cost-effective methods for collecting dietary data in large

population-based studies, such as the one that we have conducted. Although we focused on one grocery category to examine changes in purchasing and the effect on associated nutrients, this type of analysis should be 1) replicated across more grocery categories, 2) across different time periods, and 3) combined with individual dietary data and/or relevant biomarkers.

This study is not without limitations. This program was implemented as a natural experiment, and secular trends may be captured in our results. However, it is important to note that no changes to company or store merchandising (eg, end-of-aisle displays with star products) or marketing (eg, highlights in sales flyers) strategies were made during the first 2 y of program implementation. In addition, the supermarket chain does not issue shopper “loyalty” cards to track household purchases and collect demographics. Building on our encouraging results, future research that uses linked household demographic and purchasing habits can help us to better understand which characteristics are most predictive of POP nutrition navigation program use and associated changes. Increasing rates of obesity and declining diet quality for Americans strongly support the need for effective supermarket POP programs, such as the Guiding Stars, that can provide clear, concise, and simplified nutrition information to help guide consumer food and beverage choices.

The authors’ responsibilities were as follows—LAS: had full access to all the data in the study, takes responsibility for the integrity of the data and the accuracy of the data analysis, and was responsible for acquisition of data; LAS and LAK: responsible for study concept and design, analysis and interpretation of data, study supervision, and drafting of the manuscript; LAS and LF: provided statistical expertise; and LAS, LAK, and LF: critically revised the manuscript for important intellectual content. All authors received honoraria for participation in the Guiding Stars Licensing Company, formally Hannaford Inc, scientific advisory board. No other board or consultancy assignments were held by any of the authors between 2004 and 2009.

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