Impact of 'traffic-light' nutrition information on online food purchases in Australia

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Abstract

Objective: 'Traffic-light' nutrition labelling has been proposed as a potential tool for improving the diet of the population, yet there has been little published research on the impact of traffic-light nutrition labelling on purchases in a supermarket environment. This study examined changes to online consumer food purchases in response to the introduction of traffic-light nutrition information (TLNI).

Methods: The study consisted of a 10-week trial in a major Australian online grocery store. For the duration of the trial TLNI in the form of four colour-coded indicators representing the products' relative levels of fat, saturated fat, sugar and sodium content, was displayed on the product listing page of 53 of the retailer's own-brand products in five food categories (milk, bread, breakfast cereals, biscuits and frozen meals). The changes in sales before and after the introduction of TLNI were examined both within the intervention store and in a comparison store.

Results: TLNI had no discernible impact on sales, with the change in sales in the intervention store corresponding to changes in sales in the comparison store. No relationship was observed between changes in sales and the relative healthiness of products.

Conclusion and implications: This limited, short-term study found no evidence to support the notion that TLNI is likely to influence behaviour change. Further research is needed to examine the impact of providing TLNI in different contexts, for a longer duration and on more products, with and without complementary awareness and information campaigns.

Key words: nutrition labelling, online shopping, food purchases

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Governments around the world are actively seeking sustainable and cost-effective strategies to improve public health nutrition.[1] New forms of food labelling have been proposed as potential tools for improving the nutrition of the population,[2] and a number of different 'front-of-pack' nutrient signposting schemes have been developed[3] with the most suitable format vigorously debated.[4-6]

One of the most commonly proposed 'front-of-pack' labelling schemes is a 'traffic-light' labelling system that highlights the total fat, saturated fat, sugar and sodium content on the front panel of food packages, with each nutrient colour-coded as red, amber or green corresponding to high, medium or low levels of that nutrient.[7] In the United Kingdom (UK) in 2006, the Food Standard Agency (FSA) recommended the use of this format of traffic-light labelling in selected food categories,[7] and many UK supermarkets adopted traffic-light labelling as per the FSA guidelines. In Australia, a 2009 report by the National Preventative Health Taskforce recommended the implementation of a standardised front-of-pack nutrition labelling system,[8] and a 2011 review of food labelling law and policy commissioned by the Australia and New Zealand Food Regulation Ministerial Council recommended the introduction of front-of-pack traffic-light labelling[9]. While there have been numerous studies investigating consumer perceptions of front-of-pack nutrition labelling in Australia[6,10] and internationally,[5,11,12] there has been only limited evaluation of the effect of front-of-pack nutrient signposting on food purchases.[13,14] As governments, industry groups and organisations consider various policy options for addressing diet-related disease and the obesity epidemic in particular, evidence of the impact of nutrient signposting schemes is likely to be highly valuable in informing these decisions.

This paper reports the results of a study that aimed to investigate the impact of the introduction of traffic-light nutrition information (TLNI) on online consumer food purchases in Australia. The objectives of the study were to trial TLNI in a real-world food purchasing environment and to examine sales data to determine the degree to which the 'healthiness' of consumer purchases changed during the trial. The hypotheses were that sales of healthier products would increase and sales of less healthy products would decrease with the introduction of TLNI.

Methods

Study design

The study was conducted in conjunction with a major national supermarket chain in

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Australia (the Retailer). At the time of the study, in addition to a national network of supermarkets, the Retailer operated two online supermarkets where customers could purchase groceries via the Internet. These two online supermarkets sold the same set of products (including the full range of products sold in the Retailer's physical supermarkets) at the same prices but the two stores had differing website addresses, corporate branding and user interfaces. The study was conducted as a 10-week trial (8 October 2007 – 16 December 2007) on one of the online supermarkets (the 'intervention' store). The intervention store serviced customers in the Sydney metropolitan area only; whereas the other online supermarket (the 'comparison' store) serviced customers nationally. Prior to the trial study, neither of the online supermarkets provided product-level nutrition information for any of the products sold.

For the duration of the trial, a set of four traffic-light indicators were displayed alongside the product listing for a selection of products on the intervention store, indicating the products' relative levels of fat, saturated fat, sugar and sodium (Figure 1). The selected products included only the Retailer's own-brand products (n=53) in the following food categories: milk (10), bread (11), breakfast cereals (19), biscuits (7), and frozen meals (6). These food categories were selected for the trial because it was felt that products in these categories exhibited the broadest range of different nutrient profiles, thereby including a diversity of traffic-light indicators within each category. The trial was restricted to the Retailer's own-brand products because the Retailer advised that these products were the only option for intervention given the commercial constraints around labelling branded products. The nutrition criteria for the traffic-light indicators were based on the criteria recommended by the UK FSA,[15] adapted for the Australian environment[10] (Table 1). For the selected products, detailed nutrient information in the form of the nutrition information panel (NIP) and the traffic-light indicators was also added to the individual product pages. On the home page of the intervention store and on each of the selected category and product pages, a link was provided to a page providing information about the trial, an explanation of what the traffic-light indicators mean and how to interpret them, the criteria used for the traffic-light indicators, and general nutrition advice with a link to the Australian dietary guidelines.[16] No nutrition information was provided on the comparison store site during the trial period.

Data analysis and statistical methods

Sales data (measured in units sold per product) were collected for the 53 selected products for the intervention store and the comparison store. Data were collected for the 10-week duration of the trial (trial period) and a corresponding 10-week period

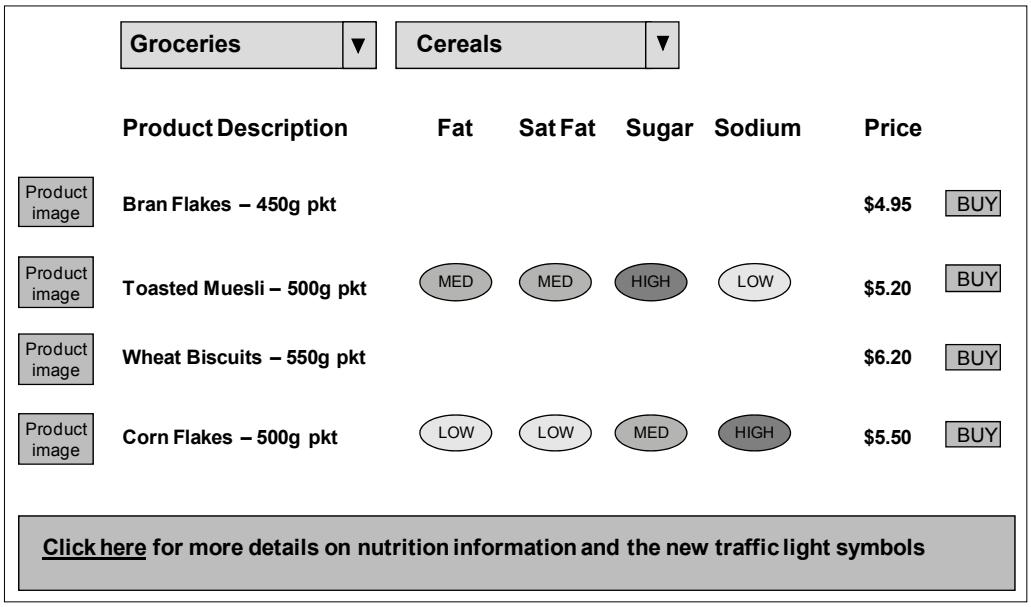

Figure 1: Illustration of the way in which traffic-light indicators were displayed on the product list page for the breakfast cereal category in the intervention store. Only the Retailer's own-brand products were signposted with traffic-light indicators.

Table 1: The nutrition criteria used to determine the traffic-light indicators of low ('green'), medium ('amber') and high ('red), based on UK FSA[15], adapted for the Australian environment[10].

Nutrient	Category	Low ('green') (per 100 g)	Medium ('amber') (per 100 g)	High ('red') (per 100 g)
Total fat	Food	≤3 g	3.1 g – 19.9 g	≥20 g
	Drink	≤1.5 g	1.6 g – 9.9 g	≥10g
Saturated fat	Food	≤1.5 g	1.6 g – 4.9 g	≥5 g
	Drink	≤0.75 g	0.76 g – 2.49 g	≥2.5 g
Sugar	Food	≤5 g	5.1 g – 14.9 g	≥15 g
	Drink	≤2.5 g	2.6 g – 7.4 g	≥7.5 g
Sodium	Food	≤120 mg	121 mg – 599 g	≥600 mg
	Drink	≤60 mg	61 mg – 299 g	≥300 mg

immediately preceding the trial (pre-trial period). The analyses of sales data from the comparison store were restricted to sales in New South Wales only in order to match the geographic region of the intervention store. The prices of products were equivalent in both stores throughout the analysis period. None of the selected products were on promotion or discounted in price in either store at any time during the analysis period.

In order to compare changes in sales by the relative healthiness of the products, two different methods were used to categorise the healthiness of each product. Both methods used the product's traffic-light indicators as a means of classifying the product's healthiness. In the first method, products were classified based on their number of 'red' labels, with products with no 'red' labels distinguished from products with at least one 'red' label. In the second method, a healthiness score was calculated for each product based on the colours of the product's traffic-light indicators, with one point allocated for each 'green' label, two points for each 'amber' label and three points for each 'red' label, for a possible range over all four traffic-light labels of 4 to 12 points. Under this method, products scoring less than 7 points were classified as 'healthier', and products scoring 7 points or more were classified as 'less-healthy'.

The study utilised a within-subjects design, where product sales in the pre-trial period and the trial period were compared between conditions. Summative descriptive statistics were used to describe the data and within-subjects repeated measures analysis of variance (RM-ANOVA) was used to examine the association between product sales and stores, as well as product sales and healthiness of the product using both methods for classifying healthiness.

Results

Change in total sales

The total number of units sold, by category, during the pre-trial and trial periods across the intervention and comparison stores are shown in Table 2. For all 53 products investigated, the total number of units sold over the analysis period was substantially higher in the comparison store than the intervention store. In both stores, sales decreased from the pre-trial to the trial period in all categories except bread and biscuits. Due to the relatively low sales of breakfast cereals, biscuits and frozen meals, these categories were grouped together in the analyses that follow, with milk and bread retained as separate categories. As there was a large difference between sales in the intervention and comparison stores, only the interactions between product sales and stores are reported. A within-subjects RM-ANOVA showed that there was no significant interaction between product sales and stores as sales from both stores changed at a similar rate between the pre-trial and the trial periods over the three categories: milk ($F(1, 9)=0.56$, $p>0.05$); bread ($F(1, 10)=2.19$, $p>0.05$); and 'other products' ($F(1, 31)=2.81$, $p>0.05$).

Table 2: Total number of units sold by category during the pre-trial and trial periods across the intervention and comparison stores.

Category	Store	Units sold – Pre-trial period	Units sold – Trial period	Change in units sold (%)
Milk	Intervention	2,166	1,973	-8.9
	Comparison	17,053	15,625	-8.4
Bread	Intervention	1,050	1,112	5.9
	Comparison	9,511	10,150	6.7
Breakfast cereals	Intervention	443	420	-5.2
	Comparison	2,624	2,476	-5.6
Biscuits	Intervention	97	120	23.7
	Comparison	561	723	28.9
Frozen meals	Intervention	100	87	-13
	Comparison	299	279	-6.7
Total	Intervention	3,856	3,712	-3.7
	Comparison	30,048	29,253	-2.6

Table 3: The number of products in each category, classified according to their relative healthiness by two different methods.

Category	Total no of products	Products with no 'red' labels	Products with at least one 'red' label	Products classified as 'healthier'	Products classified as 'less healthy'
Milk	10	10	0	4	6
Bread	11	10	1	10	1
Breakfast cereals	19	11	8	8	11
Biscuits	7	2	5	3	4
Frozen meals	6	6	0	4	2
Total	53	39	14	29	24

Change in sales by healthiness of products

The numbers of products in each category, classified according to their relative healthiness, are shown in Table 3. Of the 53 products, 14 products had at least one 'red' label, although only one bread and no milk or frozen meal products had a 'red' label. Using the alternative classification method based on a points score (described in the methods section), 29 products were classified as 'healthier' and 24 products were classified as 'less-healthy'.

A within-subjects RM-ANOVA showed that, for the intervention store, there was no interaction between the presence of a 'red' label and the change in mean weekly product sales between the pre-trial period and the trial period for breads ($F(1,10)=0.2$, $p>0.05$) and 'other products' ($F(1, 31)=2.8$, $p>0.05$). The milk category was excluded from this analysis as there were no milk products with a red label. Similar results were obtained for the comparison store. This indicates that the changes in sales of products with 'red' labels were not significantly different to the changes in sales of products without 'red' labels. Similar results were obtained when the changes in sales were analysed based on the classification of products as 'healthier' and 'less-healthy'.

Discussion

The results of this short-term study, on a small selection of products, indicate that the presence of online TLNI did not have a discernible impact on online food purchases. The changes in sales from the pre-trial period to the trial period in the intervention store corresponded to changes in sales in the comparison store, with no observed relationship between changes in sales and the relative healthiness of products (measured in various ways).

This is the first peer-reviewed study to use supermarket sales data to analyse the impact of the introduction of TLNI on supermarket food purchases in the Australian context. The key strength of using supermarket sales data is that it reflects people's actual purchasing behaviour in the 'real-world', rather than intended behaviour.[17] The study design enabled a 'before and after' comparison of sales in the intervention store as well as a comparison to corresponding sales in the comparison store. The use of such tightly-matched comparison data is highly valuable in this context as it reduces the potential confounding of the results due to factors such as seasonality and product life cycle effects. Furthermore, the online shopping environment is less subject to change compared to the physical supermarket environment, providing a more stable context in which to examine the impact of specific interventions such as the one in this study. A further strength of this study is that it demonstrates the feasibility of working with large supermarket retailers to conduct public health research.

The study has several limitations that limit the extent to which the results can be generalised. First, the study is conducted in an online shopping context, and it is reasonable to expect that food purchasing behaviour differs in an online compared to a physical supermarket context. For example, in an online context, people may tend to purchase food products with which they are familiar, whereas they may be more likely to browse more extensively in a physical setting. Furthermore, the demographics of online grocery shoppers (the majority of whom are typically highly-educated, relatively wealthy females less than 55 years of age[18]) do not reflect the demographics of the population as a whole. Due to their demographic characteristics, it is likely that online grocery shoppers are more health-conscious than the population as a whole, and any effects of TLNI upon the already health conscious are likely to be minimal. Indeed, it may be more important to focus on different consumers where there might be more opportunity to shift behaviours. A second key limitation of the study is that it involved only a small set of products, all of which were the Retailer's own-brand products, with relatively small sales volumes. This may have limited the extent to which customers noticed the TLNI. Furthermore, the factors influencing the purchase of a supermarket's own-brand products are likely to be different to those influencing purchases of a broader product set. Thirdly, the study was only able to assess the short-term impact (10 weeks) of TLNI on sales. It is possible that consumers take longer than this to adjust their habits and that the impact of the TLNI could be different over a longer period of time and if reinforced through several media. In addition, despite the use of comparison data, the analyses were not able to account for all factors influencing sales (e.g. taste, mood, convenience, price, habitual behaviour and pleasure).[11] A further potential confounder was that, in addition to the inclusion of TLNI, the NIP was also made available for the selected products on the intervention store. Changes in sales of products that did not receive TLNI during the trial period were also not assessed.

The results of this study can be compared with the large body of research that shows that changes to nutrition labelling alone can be expected to have only modest effects on the healthiness of consumer food choices.[19] It is consistent with results from the UK,[14] which indicated no relationship between changes in sales and the healthiness of products in response to TLNI in a supermarket environment. However, the results contrast with the results of a recent study in the United States context [13] that showed shifts in supermarket sales towards healthier products in response to a form of nutrient signposting (the Guiding Stars program) that indicated healthier products. It is not clear on the reasons for these contrasting results, but it is noted that the Guiding Stars program incorporated a large number of products and the program was accompanied by extensive educational materials. Qualitative analyses of the use of nutrient signposting in different contexts are likely to be valuable in explaining the contrasting results.[11]

It is clear that further research is needed to examine the impact of TLNI and other forms of nutrition signposting in other contexts, especially in light of the increased recognition that considerable national differences exist in both understanding and use of front-of-pack nutrition information.[12] Studies should be designed to include a higher proportion of labelled products across the full product range in an environment with a higher volume of sales, and should aim to minimise the effects of potential confounders.

Conclusions

In this age of increasingly-processed foods with diverse nutrition-related marketing, there is considerable government interest in a standardised front-of-pack nutrient signposting scheme that can better inform consumers. Beyond simply providing information, the extent to which an improved nutrition labelling scheme will influence people to choose healthier foods is open to question; and this limited, short-term trial found no evidence to indicate that it would. It is possible that a nutrient signposting scheme which is on all foods and beverages and is accompanied by an awareness and information campaign may influence food choices but this would need to be evaluated. It may be useful for advocates of different front-of-pack labelling formats to focus on the potential benefits of their preferred schemes with respect to informing consumers while further evaluations of other potential impacts are conducted.

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