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Stead, Martine

Mackintosh, Anne Marie

Findlay, Anne

Sparks, Leigh

Anderson, Annie S.

Barton, Karen L.

Eadie, Douglas

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Impact of a targeted direct marketing price promotion intervention (Buywell) on food purchasing behaviour by low income consumers: a randomised controlled trial

Authors

Martine Stead¹, Anne Marie MacKintosh¹, Anne Findlay², Leigh Sparks², Annie S. Anderson³, Karen Barton³ and Douglas Eadie¹

Addresses

1. Institute for Social Marketing, School of Health Sciences, University of Stirling, Stirling FK9 4LA, UK martine.stead@stir.ac.uk, a.m.mackintosh@stir.ac.uk, douglas.eadie@stir.ac.uk
2. Institute for Retail Studies, Stirling Management School, University of Stirling, Stirling FK9 4LA, UK a.m.findlay@stir.ac.uk, leigh.sparks@stir.ac.uk
3. Centre for Public Health Nutrition Research and Centre for Research into Cancer Prevention and Screening, University of Dundee, Ninewells Hospital and Medical School, Dundee DD1 9SY, UK a.s.anderson@dundee.ac.uk, k.barton@abertay.ac.uk

Corresponding author

Martine Stead, Institute for Social Marketing, School of Health Sciences, University of Stirling, Stirling FK9 4LA, UK

Email: martine.stead@stir.ac.uk Tel: 0044 (0)1786 467387. Fax: 0044 (0)1786 467400

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Abstract

Background

Price promotions are a promising intervention for encouraging healthier food purchasing. We sought to assess the impact of a targeted direct marketing price promotion combined with healthy eating advice and recipe suggestions on purchase of selected healthier foods by low income consumers.

Methods

We conducted a randomised controlled trial (n=53,367) of a direct marketing price promotion (Buywell) combined with healthy eating advice and recipe suggestions for low income consumers identified as 'less healthy' shoppers. Impact was assessed using electronic point of sale data for UK low income shoppers before, during and after the promotion.

Results

The proportion of customers buying promoted products in the intervention month increased by between 1.4% and 2.8% for four of the five products. When product switching was examined for semi-skimmed/skimmed milk, a modest increase (1%) was found in the intervention month of customers switching from full fat to low fat milk. This represented 8% of customers who previously bought only full fat milk. Effects were generally not sustained after the promotion period.

Conclusions

Short-term direct marketing price promotions combined with healthy eating advice and recipe suggestions targeted at low income consumers are feasible and can have a modest impact on short term food purchasing behaviour but further approaches are needed to help sustain these changes.

Keywords: Public health, nutrition, diet, health inequalities, marketing, promotion.

Introduction

Diet is a major modifiable risk factor for many cancers [1] and circulatory diseases [2, 3]. Obesity is a significant contributor to cardiovascular disease, diabetes and cancer, and continues to rise internationally [4] and in the UK [5]. Of particular concern are persistent inequalities in obesity, diet and health-related outcomes [6, 7]. Low income consumers in the UK and other European countries tend to have *lower* intakes of fruit, vegetables, wholegrain bread and cereals, fruit juice and oil-rich fish, and *higher* intakes of sugar, whole milk and processed meats compared to higher income consumers [8 -10].

Increasingly, attention has focussed on system-level interventions which modify the social environment in which food choices are made [11-13] and make healthier choices easier [14]. Access and price have been identified as barriers to healthier eating for some low income consumers [15-19], and the World Health Organization and various national governments have called for improved access to affordable healthy food for vulnerable groups [20-22]. If inequalities in diet are to be narrowed, it may be important to target prevention interventions primarily or specifically at these groups [23].

Marketing in particular has been advocated as assisting in delivering a strategy for dietary improvement [12, 21]. Recent UK government strategy [21, 24-25] has recommended harnessing marketing techniques such as product development, labelling and pricing in support of 'behaviour that builds health', and working with retail businesses which have the marketing expertise to influence purchasing habits. Various studies suggest that interventions in the supermarket setting using point-of-sale promotions, pricing, in-store signposting and product labelling, singly or in combination, are feasible to implement and have the potential to impact on customer purchasing behaviour [26-29].

Recent debate has focussed on financial incentives as a motivator to initiate change in health behaviours [11, 30-32], although this approach has not yet been demonstrated to produce consistently positive results in diet-related behaviours such as weight loss [33]. Financial incentives comprise food price promotions, subsidies, and rewards, and a recent review found that “*retail price promotions can influence purchasing patterns and promote overall greater consumption of the product, but this is highly dependent on the nature of the promotion (e.g. the depth of the discount, the shopper, and the specific food*” (p10) [34]. Recent studies in New Zealand and the Netherlands have demonstrated, using randomised controlled trial (RCT) methods, that price discounts for healthier foods can have a significant and sustained effect on food purchasing [35] and on fruit and vegetable purchases [36]. Although effects tend to be smaller than those obtained in more intensive interventions [37], marketing interventions potentially have a much wider reach and are relatively cost-effective [38].

Price promotions have been extensively applied and studied in retailing [39]. Technological developments have given rise to new and more targeted strategies, such as using data linked to loyalty schemes [40, 41] and customers’ history of purchasing to develop promotions targeted at individual customers [42]. Likewise, technology such as electronic point of sales (EPOS) systems offers a unique opportunity for assessing household food purchases which do not rely on participants’ memory or literacy, is not subject to recall or social bias, and places no direct burden on participants [43, 44]. The ability to develop and deliver promotions targeted at groups of customers on the basis of previous purchasing behaviour and other characteristics makes this a particularly promising, although underexplored, route for addressing health inequalities associated with food purchasing behaviour.

This study sought to assess the feasibility and impact of a targeted direct marketing price promotion intervention (Buywell) on food purchases by low income customers known not to be purchasing 'healthy' products at the time of the intervention.

Methods

Overview

The intervention comprised a direct marketing (ie. mailed out to customers' homes) price promotion combined with healthy eating advice and recipe suggestions. Working with a major UK food retailing group, we developed a price-based promotion combined with healthy eating advice and recipe suggestions for selected healthier products which was mailed to regular low income customers in May 2007. The impact was assessed by examining data on actual food purchases, using EPOS technology, for intervention (37,034) and control group (16,333) customers for two months before, one month during and three months after the intervention. A consumer survey was also conducted post-intervention with 3,706 customers; a brief summary of findings is reported elsewhere [45]. Ethical approval for the study was provided by University of Stirling Research Ethics Committee.

Identification, selection and randomisation of sample

Information held by the retailer from membership card data and linked EPOS transaction data was used to identify and select the study sample. The first step was to identify consumers who used the retailer for their main food shopping, defined by possession of a loyalty/membership card, proximity to a store in a town with few other major food retailers, and being categorised as in either of the top two customer spending categories, based on frequency of shopping and average number of items purchased per month.

The second step was to identify low income customers. Membership data held by the retail group did not record individual income or socio-economic status. However, based on their postcode and other data, all customers were assigned to a category within MosaicUK, a widely used geo-demographic classification scheme [46]. Three Mosaic categories including primarily disadvantaged customers were identified as the core target for the intervention.

The final step was to identify consumers whose current food purchasing behaviour had the potential to be shifted in a 'healthier' direction. The most practicable strategy was to identify those who could currently be defined as purchasers of 'healthier' foods and exclude them from the sample. All food product categories stocked by the retail group were examined, and 90 were identified which were low in fat, sugar and sodium according to the UK Food Standards Agency 'traffic lights' scheme [47]. From these, 20 of the most commonly purchased product categories were identified to serve as indicators of 'healthier' shopping. The indicators were based on the 35 item healthy eating indicator shopping basket tool (HEISB) [48]. These included low fat dairy products (milk, yoghurt, spreading fats) and wholegrain products (brown and wholemeal breads, wholegrain breakfast cereals, wholegrain rice and pasta, beans and peas). Fresh vegetables and fruits (n=15) included in the HEISB were not used because formative work indicated they were not a reliable indicator of purchasing patterns from the retail group because these items were occasionally bought elsewhere (e.g. produce markets). Healthier' purchasers were arbitrarily defined as those who had bought a wide selection of these items, defined as at least 8 (40%), of the healthy eating indicator foods within the last week, and these were removed from the sample.

The retail group applied the three criteria of regular food shopping, low income Mosaic group and less-healthy purchasing to its customer database for the time period immediately prior to the intervention. This yielded a sample group of 53,367 adults aged 31-65 which was then randomised by the retail group on a 70:30 allocation ratio to intervention (n=37,034) or control group (n=16,333). The rationale was to reach as large a customer group as the retail group could afford (the costs of price promotions being borne by the retailer in reduced profits), whilst ensuring a sufficiently large control group.

The intervention

Formative focus group research (six focus groups, n=34) was conducted with a sample of target group consumers to inform the intervention design. Findings suggested that older and female shoppers were more likely to use price promotions, and that although customers were fairly conservative in their shopping habits, they felt their meals sometimes lacked variety. This suggested that there was potential for a promotion comprising offers on basic food products which could be combined to make a meal, especially if linked to recipe ideas and if separate coupons were provided to maximise choice and minimise waste. Informed by this research, a direct mail promotion was developed incorporating healthy eating advice and two suggested recipes which were analysed for nutritional content and piloted by nutritionists. The final promotion contained two separate offers, both branded with the caption 'Healthy eating made easier' and accompanied by general healthy eating advice. The five products on which price promotions were offered were low fat beef mince, skinless chicken, any fresh vegetables, ready-to-eat sauce (two different flavours, both assessed as meeting health criteria), and skimmed/semi-skimmed milk (Figure 1).

The promotion was mailed from 7th-28th May, 2007. The time of the year was chosen to avoid other key periods of promotional activity such as Christmas and Easter.

EPOS data analysis

The primary outcome of the study was the purchase of the promoted products, using EPOS data. The outcome measures of interest were uptake of the promotion for each of the promotion products and product switching. Anonymised EPOS data were supplied from March to August (with May as the promotion month) by the retailer by transaction. Recorded purchases of the promoted products were the primary outcome measure. Data were aggregated by customer membership card number to give customer-based data and 'basket' combination data which were compared from month to month. EPOS data are classified by a sequence of main and sub-categories, with every individual product of a given size having a unique code. There were more than 150,000 products on the retailer's product list, although this included non-food items and items not currently on sale. Codes were obtained for the promotion products and entered to identify purchase of these products.

Uptake of the promoted products was analysed in terms of the number and proportion of customers buying each of the products, compared with the control group. Chi-square tests were used to test whether uptake of products, by the intervention group in the promotion month, could have occurred by chance. Two tests were conducted for all promotion products. Firstly, differences between control and intervention groups were tested. Secondly, differences were examined between transactions in the promotion month (May) and the average uptake for each product for the months excluding the promotion. This accounts for seasonal variation in uptake of products.

Product switching is an important part of the uptake of any promotion [49] and can have different dimensions: health switching (e.g. from full fat to semi-skimmed milk), brand switching (e.g. from a branded product to retailer brand), and pack size switching (from the size usually bought to the size included in the offer). In public health terms, only the first form of switching, from a less to more healthy variant, is meaningful [50]. Within this paper, information on switching is presented for milk, where less healthy variants could be clearly identified within the data. Because of the way products were categorised by the retailer in the EPOS data, it was more difficult to identify less healthy variants for the meat products included in the promotion.

Results

Over 4 million transactions per month were recorded on the retailer-supplied database. Nearly all (99.6%) of the study group made purchases with the retail group at the start of the study, falling slightly to 92.6% still making purchases with the retail group by the end of the six month study period. The mean number of items purchased per customer over the study period ranged between 83 and 92 (Table 1).

Uptake

Figure 2 illustrates uptake of the promoted products by both groups over the study period. There was wide variation in the proportions regularly buying each product. Whilst over 60% bought vegetables, the other four products were less commonly purchased. For example, only around 40% regularly bought skinless chicken and fewer than 5% bought ready-to-eat sauce. For four of the five promoted products, there was a small upward spike, ranging from 1.4% to 2.8%, in the proportion of intervention customers purchasing the product in May, the intervention month (Figure 2A): semi-skimmed/skimmed milk (33.2% to 34.6%), lean steak mince (9.7% to 12.5%), skinless chicken breasts (6.3% to

8.2%), and ready-to-eat sauce (1.4% to 2.8%). Figure 2B illustrates that the proportion of control customers purchasing each of the five promoted products remained consistent in the month of the intervention, reflecting the constancy of purchasing patterns for most shoppers. Vegetable purchases increased by only 0.2% among intervention customers in May, but decreased by 0.8% among control group customers; following the promotion, vegetable purchases decreased in both the intervention and the control group, perhaps reflecting seasonality. For each of the five products, the promotion month showed a significantly higher ($p < 0.001$) value, for the intervention group, than would have been expected on the basis of average uptake in the other months. Similarly, when compared with the control sample, the promotion values for each of the products were significantly higher ($p < 0.001$) than expected values. The exception was skimmed and semi-skimmed milk, significant at $p < 0.05$. No significant difference was found between the control and intervention groups for the other months. The increase in the proportion of intervention customers purchasing four of the promoted products was generally not sustained beyond the intervention, with the number of customers purchasing each product reverting to pre-intervention levels or lower from June onwards, again perhaps reflecting seasonal patterns in purchasing.

Further analyses were conducted to explore whether the promotion widened the customer base for the promoted products, as the data above suggest, or simply encouraged existing customers for the products to buy more than usual. Analysis of the mean number of promoted products purchased per customer each month indicated that this did not tend to vary over the study period (for example, the mean number of low fat beef mince items bought per customer was between 1.28 and 1.30 per month, including May). This suggests that the increase in uptake was explained primarily by a widening of the customer base – i.e. introducing new customers to the promoted products – rather than by

existing customers buying more of a product than they would usually. Overall, the data indicate that the intervention month was associated with an increase in the customer base for most of the promoted products.

Product switching

Table 2 profiles the intervention customers, who purchased the promoted milk in May, in terms of continuing customers, new customers and customers who switched brand or switched to lower fat milk. Pack-size switching was not relevant because the promotion was not restricted to specific pack sizes. One third (n=12,399, 33%) of all intervention customers bought the promoted skimmed/semi-skimmed retailer brand milk during the promotion period. Most of these (n=10,072, 81%) were continuing customers who had purchased skimmed/semi-skimmed retailer brand milk in the month prior to the intervention, while almost a fifth (n=2,327, 19%) were customers who had switched from buying full fat only, switched from a different brand or were new to purchasing milk at the retail group. As a proportion of all intervention customers, the numbers taking up the promoted milk, either as a result of switching or new purchases, appear small, representing 1% (n=464) switching to healthier milk, 1% (n=262) switching brand and 4% (n=1,601) new customers. However, from a health perspective, the key target group for the milk promotion is customers who previously purchased only the full fat variety of milk. The EPOS analysis showed that 6,034 intervention customers purchased only the full fat milk in April i.e. before the intervention. Therefore, the 464 customers who switched to a healthier variety of milk during the intervention month represent 8% of the target group.

Table 3 shows that only 36% (n=169) of those who had switched to a healthier variety of milk continued to purchase the skimmed/semi-skimmed variety in the month immediately after the promotion ended. Retention of the healthier purchase behaviour continued to

decline in subsequent months. Only 17% (n=81) of those who switched to the healthier milk sustained their healthier milk purchasing in each of the three months after the promotion completed; these customers represent 1% of the target group of 6,034 intervention customers who had purchased only full-fat milk in April prior to the intervention. Retention declined similarly among those who switched brand of milk and among new customers, with 23% (n=61) of brand switchers and 22% (n=348) of new customers continuing to purchase the skimmed/semi-skimmed retailer brand milk in each of the three months after the promotion.

Discussion

This large randomised trial shows that it is feasible to develop and implement a direct marketing price promotion intervention targeted at low income consumers not currently buying healthy food. Customers who lived in disadvantaged postcode areas and with less 'healthy' current food purchasing patterns were able to be identified by matching EPOS data and customer membership data. These customers were then targeted with price promotion offers, combined with healthy eating advice and recipe suggestions, informed by consumer research insights into their shopping habits and preferences. If nutrition interventions are to have an impact on dietary inequalities, more intensive and targeted efforts directed at those most in need of support are required. Technological innovations and the development of sophisticated marketing databases provide a means not only of identifying the customers most in need of support but also of developing, delivering and evaluating interventions specifically for them.

Two key findings emerge from our results. Firstly, there appears to have been a modest and short-lived impact of the intervention on uptake of the promoted products, with the increase in intervention customers buying products in the intervention month ranging from

1.4% to 2.8% for four of the five products. Increased uptake was accounted for primarily by a widening of the customer base rather than by an increased number of purchases by existing customers. If the intervention had only encouraged additional purchasing of the promoted items by customers who already bought them, the contribution to influencing purchasing behaviour in a healthier direction would have been of less significance.

Secondly, the intervention appears to have been associated with a small increase in health switching for milk. This increase in lower fat milk was modest, 1% of all intervention customers. However, among the key target group for the milk promotion from a health perspective, 8% switched to a healthier variant of milk in the intervention month, suggesting that price promotions can encourage trial of healthy variants. This is an important target food given the higher consumption of full fat milk by low income groups [51]. Switching tended to be short-lived, with only 36% continuing to do so immediately after the promotion ended, and only 17% sustaining their healthier milk purchasing in each of the three months after the promotion completed (1% of the target group). Studies of price promotions in the retail literature confirm that effects are typically short-lived [52].

One of the main strengths of the study was its size, over 50,000 low income customers across the UK. The large sample and geographical spread mean that the results are potentially generalisable to the wider UK low income population, although not necessarily to more affluent UK populations or to low income shoppers in other countries. The commitment and support of the retail group enabled the research team to access large numbers of customers and to profile them in terms of postcode level of disadvantage and food purchasing behaviour, enabling those most 'at risk' to be identified for participation in the intervention. The retail group also allowed the research team direct access to the

EPOS data, rather than, as is the case in some studies, having the research team dependent on the retailer or a third party to conduct the analysis.

Analysing the EPOS dataset was challenging because of the vast amount of data generated and because products were not necessarily categorised within the database on the basis of nutrition attributes but according to criteria such as shelf order, making it time-consuming to locate all products of interest for analysis. Another challenge was that the price promotion covered several product categories spread across the retail outlet. While price promotion effects have been extensively studied in the retail literature, the challenge of a promotion such as the current one which links products placed at different locations of the store has been less well researched. Findings from disparate studies suggest that product categorisation is important in shaping the likelihood of healthy food purchasing [53] and that location of the products in their correct categories promotes greater likelihood of purchase [54].

Since the survey was carried out, considerable expertise and familiarity with 'Big Data' has been gained and its usefulness much more widely recognised. Using loyalty card data linked to EPOS transactions requires customers to remember to use their identifier each time they buy in the store. However, as noted in the Introduction, EPOS analysis has a number of advantages for evaluation purposes in that it is not subject to recall or social bias and places no direct burden on participants [43, 44]. This makes it a particularly useful method for evaluating outcomes among obese populations, among whom there is a particular problem of giving socially desirable responses in dietary research [55, 56], and among populations with varying levels of literacy [43]. Given the complexity and cost of conducting large-scale dietary and consumer behaviour surveys, EPOS data analysis

provides a cost-effective means of evaluating population-level interventions and policies [44].

Purchase behaviour does not necessarily reflect actual dietary intake; we do not know the extent to which individuals in a household consumed the purchased products. However, Eyles and colleagues [43] found that, when electronic sales data were compared with repeated 24-hour dietary intake recalls, modest correlations were observed between household purchases and individual intakes for percentage energy from saturated and total fat, carbohydrate, protein and sugar, and that purchase data were a reasonably reliable surrogate measure for certain nutrient intakes. In other words, sales data can serve as a useful proxy for dietary impact. The type of effect found in the Buywell study, if enlarged to a wider product range (for example, main sources of saturated fat), could make an important contribution to changes in disease risk. Current modelling data at population level suggest that even modest changes in diet are important. For example, Flores-Mateo and colleagues [57] suggest that reducing salt consumption by one g/day, reducing saturated fat and trans fat by 1% and 0.5% of energy intake respectively, and increasing fruit and vegetable intake by one portion per day could result in approximately 13,850 fewer UK CVD deaths per year, while it has been estimated that reducing dietary salt intake by 3g per day would prevent 30,000 cardiovascular events with savings worth at least £40 million a year in the UK [58].

The positive changes in food purchasing behaviour reported here are generally modest in scale. That the impact was restricted to the intervention period was not surprising; it might have been expected that sustained changes in purchasing behaviour could not be achieved with such a short intervention, and the short-lived impact is in line with effects reported in retailing studies [52]. However, it is encouraging that a short-term and relatively

small-scale promotion – a one-off price promotion combined with healthy eating advice and recipe suggestions - was nonetheless able to trigger changes in purchasing behaviour in a small proportion of the target group. This suggests that a longer-term and more multi-faceted intervention may be capable of producing more lasting effects. Hawkes [34] suggests that healthy eating interventions based on financial incentives may be most effective when implemented as part of a wider and integrated package of mutually-reinforcing activities rather than in isolation. A review of financial incentives in the USA noted that financial incentives might be more effective when combined with nutrition education (as the current study has done, although the information/education element was limited in our study to brief messages about the value of calcium to teeth and bone development and guidance regarding young children and milk consumption), and also with components to address access [59].

Overall, the study demonstrates that it is possible for public health researchers and nutritionists to engage with food retailers to develop and implement healthy eating interventions in real world settings. We have shown that a direct marketing intervention targeted at individual consumers on the basis of past purchasing behaviour and other characteristics can have a short-term and modest impact on uptake of healthier food products. We have also shown that it is possible to engage with and stimulate change, albeit of short duration, among low-income consumers experiencing dietary inequalities. Effects of such interventions may be sustained and/or reinforced by longer-term and more multi-faceted approaches.

List of abbreviations

RCT - randomised controlled trial

EPOS - electronic point of sale

HEISB - healthy eating indicator shopping basket tool

Competing Interests

All authors declare that they have no competing interests.

Authors' contributions

MS was the PI and took the lead in writing the paper which was revised by all authors.

AMM contributed to study design and data analysis, and led the consumer survey. AF and

LS conducted the EPOS analysis. ASA and KB developed the intervention recipes and

advised on selection of promotion foods and identification of target group. DE conducted

the consumer research and contributed to study design.

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Figure Legends:

Figure 1 Content of the promotion

Figure 2

Changes in proportions of customers buying the promoted products

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Figures

Tables

customers who switched to the promoted milk or were new to the promoted milk in May.