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## Review Article

# Reducing consumption of unhealthy foods and beverages through banning price promotions: what is the evidence and will it work?

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### Abstract

**Objective:** Increasing prevalence of overweight and obese people in England has led policymakers to consider regulating the use of price promotions on foods high in fat, sugar and salt content. In January 2019, the government opened a consultation programme for a policy proposal that significantly restricts the use of price promotions that can induce consumers to buy higher volumes of unhealthy foods and beverages. These proposed policies are the first of their kind in public health and are believed to reduce excess purchasing and, therefore, overconsumption of unhealthy products. This study summarises evidence relating price promotions to the purchasing of food and drink for home consumption and places it in the context of the proposed policy.

**Design:** Non-systematic review of quantitative analyses of price promotions in food and drink published in peer-reviewed journals and sighted by PubMed, ScienceDirect & EBSCOhost between 1980 and January 2018.

**Results:** While the impact of price promotions on sales has been of interest to marketing academics for a long time with modelling studies showing that its use has increased food and drink sales by 12–43%, it is only now being picked up in the public health sphere. However, existing evidence does not consider the effects of removing or restricting the use of price promotions across the food sector. In this commentary, we discuss existing evidence, how it deals with the complexity of shoppers' behaviour in reacting to price promotions on foods and, importantly, what can be learned from it in this policy context.

**Conclusions:** The current evidence base supports the notion that price promotions increase purchasing of unhealthy food, and while the proposed restriction policy is yet to be evaluated for consumption and health effects, there is arguably sufficient evidence to proceed. This evidence is not restricted to volume-based promotions. Close monitoring and proper evaluation should follow to provide empirical evidence of its intended and unintended effects.

**Keywords**  
Public health  
Price promotions  
Obesity  
Econometrics  
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Obesity is considered a global epidemic<sup>(1)</sup>. In England, the issue is particularly acute among children, with 30% of children aged 2–15 being overweight or obese<sup>(2)</sup>. In its recent update of the Childhood Obesity Strategy (Chapter Two), the Department of Health and Social

Care (DHSC) in England has set out a strategy to halve the rate of obesity among children within 12 years. Part of its action plan included a consultation of a policy to ban or considerably restrict volume-based price promotions (PP) and promotional placement of pre-packaged

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**Table 1** Share of take-home food and beverage sales volume purchased on price promotion across broad food groups in 2017\*

Food group	Share (%) of volume purchased on price promotion
All	32
Milk, eggs and bread	15
Fresh vegetables and salad	24
Starchy foods, e.g. pulses, pasta, rice	27
Fresh fruit	28
Fresh and frozen fish, red meat and white meat	37
Ready meals	42
Savoury snacks	49
Diet soft drinks	50
Biscuits, chocolate and confectionary	52
Regular soft drinks	59

\*Data source: Kantar FMCG Panel volume-weighted take-home purchases of foods and non-alcoholic beverages recorded from a nationally representative sample of approximately 30 000 British households annually.

high-fat, high-sugar and high-salt (HFSS) products<sup>(3,4)</sup>. If passed, such policy would add to the existing measures targeting obesity implemented in England in recent years, including the Soft Drink Industry Levy (2018), Sugar Reduction Programme via voluntary reformulation (2017) and strategies for healthier ‘out-of-home’ food provision<sup>(5–6)</sup>. While the results of the consultation (January–April 2019) are, at the time of writing, yet to be released by DHSC, we argue in this commentary that, while the evidence base on the effects of PP may be sufficient to proceed, it is not sufficiently developed to be conclusive on the effects of restrictive action. Since it is the first policy proposal of its kind, there is need for further evidence on how the proposed restrictions on PP could change consumer behaviour and benefit health.

### How frequent are price promotions in food retail?

PP incentivises customers to purchase through reductions below the recommended retail price. In the UK food retail sector, there are predominantly either total price reductions, or volume-based PP that encourage greater quantities to be purchased for the same cost (e.g. buy-one-get-one-free). Data on consumer expenditures (Table 1) show that, in 2017, a third of take-home purchases were made on PP, and products typically considered HFSS (e.g. regular soft drinks) were twice as likely to be bought on promotion in comparison to fruits and vegetables or starchy foods.

The public health rationale for the DHSC policy proposal follows from this frequent, on-promotion purchasing of unhealthy HFSS products. Even if the policy could be seen as anti-competitive in limiting this frequently used method of competition, regulation might be the only way to proceed as retailers are unlikely to reduce PP unilaterally on voluntary basis.

### What evidence exists on price promotions and food buying behaviour?

PP has been studied by researchers in public health, focusing on the nutritional impact of ‘point of sale’ health policies, and marketing, focussing on the sales and revenue impact of PP. The challenge is that existing research is conducted in a retail industry filled with promotions, where high variability in prices boosts purchasing through different consumer behavioural responses.

#### Public health

Seven reviews of public health literature considering the impact of price interventions on food consumption or nutrition have been published between 2014 and 2018<sup>(7–13)</sup>. These reviews find evidence, based on demand modelling, experimental methods and RCT, that financial incentives can result in changes in food purchasing behaviour. For example, Hartmann-Boyce *et al.*<sup>(9)</sup> focussed on RCT of in-store interventions to improve population health, finding discounts and subsidies to be effective in encouraging healthier food consumption. Policies to discourage less-healthy food consumption typically involve taxation (e.g. taxes on sugary drinks<sup>(14)</sup> or junk food<sup>(15)</sup>), which is increasingly implemented given the successful use of fiscal measures in other areas of public health such as tobacco and alcohol control<sup>(16,17)</sup>.

The systematic reviews on PP, however, do not cite any literature that discusses the removal of PP on unhealthy foods as a possible strategy, and while similarities exist with taxation as both increase prices, the two policies are different in their mechanisms for eliciting consumer and retailer responses and require further research from public health perspective.

#### Marketing

Marketing studies use highly disaggregated data from retailers or household expenditure panels to understand how PP influences consumer behaviour. This literature takes the perspective of ‘managers’ and explores ways to increase sales. The food or beverage categories used in these analyses do not distinguish between healthier or less healthy as this is not their purpose. The analysis relied upon by DHSC – finding that promotions that are more common on unhealthy products increase purchases by up to 22% – is in fact one of the very few to make use of the link between nutrition and sales data<sup>(18)</sup> to analyse the effect of PP.

Five relevant reviews<sup>(19–23)</sup> exist in the marketing literature on the impact of PP on food and drink sales. Van Heerde and Neslin<sup>(21,22)</sup> provided a thorough overview of the literature on the impact of PP on brand and category sales. Hawkes<sup>(19)</sup> review is the only discussion of the marketing literature from a nutrition perspective. Two meta-analyses have found that PP leads to significantly increased



sales for individual products<sup>(20,23)</sup>. Santini *et al.*<sup>(20)</sup> looked at both the short- and long-run effects of PP on sales volume and purchase incidence, and their meta-analysis of seventy-five studies concluded that PP increases purchase incidence and sales volume (with no average effect size provided). Bijmolt *et al.*<sup>(23)</sup> concluded from 198 elasticities that a 20% PP leads to a 73% increase in purchasing, on average.

### **Do increased sales as a result of price promotions lead to increased consumption?**

Considerable effort has gone into identifying how PP increases sales, or the ‘promotion bump’ as often referred to in the marketing literature. Generally, this is attributed to three forms of consumer reactions<sup>(19)</sup>:

1. Consumer switching: purchasing the same quantity but of a different brand. This has little effect on total nutritional consumption.
2. Increased purchasing: promotions causing purchases that otherwise would not have occurred, creating a potential increase in consumption quantity.
3. Stockpiling: increasing purchase quantity to take advantage of a promotion and avoid higher spending on off-promotion purchases in the future. This does not necessarily increase overall consumption, but there is a possibility that it does, notably if it induces a change in consumption habits. When stockpiling is effective, purchases that would otherwise have occurred at a later date are brought forward. This is referred to as ‘purchase acceleration’.

From a health perspective, understanding the relative effects of the last two categories is crucial, particularly whether the ‘additional’ purchases are stockpiled for later use or consumed.

For households, the frequency with which goods are purchased is important: infrequent ‘impulse’ purchases are likely for immediate consumption, but for frequently purchased goods, stockpiling can make the effects less straightforward. Stockpiling creates the opportunity to save the customer money, but it may also lead to unintended consumption. For example, a repeat customer of cola may buy one bottle per week, but with a two-for-one promotion, they might buy two, intending to save money by avoiding future purchases. Once the extra bottle is in the house, it is drunk at a faster rate. If next week the potentially avoided purchase is still made, overall consumption has increased. The increased purchase can, therefore, be decomposed into ‘purchase acceleration’ – a successful use of stockpiling in which future purchases are avoided – and ‘increased consumption’.

Table 2 presents the decomposition of the ‘promotion bump’ into primary demand increases (i.e. increased consumption and purchase acceleration) and secondary

demand (i.e. switching brands). It is clear that the ‘promotion bump’ varies a great deal depending on the product: 33–87% of these increases using the unit sales decomposition approach are increases of category sales, of which 10–56% are consumption increases (i.e. buying more altogether), and 9–69% purchase acceleration due to stockpiling. The key evidence, however, comes from two counterfactual analyses<sup>(24,25)</sup> that are most appropriate from a methodological point of view. These studies conclude that consumption increases of 12–43% occur as a result of promotions.

The product range studied is clearly restricted, which makes generalisation of these estimates difficult, although Nijs *et al.*<sup>(26)</sup>, who used a large range ( $n$  560) of products, found (without a decomposition analysis) that promotions lead to an increase in primary demand for more than half (58%) of these products. Importantly, these results are not restricted to volume-based promotions, but include simple price reductions as well. At present the DHSC’s proposal mentions volume-based promotion only which is a small part of PP as a marketing strategy.

While increases in primary demand due to promotions appear prominent, we must question whether increased purchasing necessarily leads to increased consumption – which is what leads to detrimental effects on public health<sup>(19)</sup>. There is some evidence in behavioural and economics research that actual consumption rates can be affected by stockpiled food (or inventory)<sup>(27)</sup>. This is through a number of mechanisms, including uncertainty about future prices<sup>(28–30)</sup>, scarcity – concerns of running out before the next shop would reduce consumption rates<sup>(31,32)</sup>, increased storage costs – stockpiling leads to crowded kitchens and pantries, increasing holding costs and the desire to consume<sup>(33)</sup>, replacement costs – when prices fluctuate, stockpiled goods are replaced only when on promotion<sup>(33)</sup> and convenience – the presence of food in the kitchen, in the fridge or on counter tops<sup>(27,34,35)</sup>.

### **What is the evidence relating to a restrictive policy on price promotions?**

This evidence, together with Public Health England’s estimated ‘effect’ from PP of up to 22% increase in purchases, presents a rationale for intervening to reduce PP on unhealthy foods<sup>(17)</sup>. However, these methods still do not answer the question at hand: ‘what if PP on unhealthy foods was restricted or banned altogether?’ Without a direct evidence, it is difficult, *ex ante*, to quantify the potential benefits, as well as identify the potential risks from unknown consumer and retailer response, because:

- Existing evidence largely ignores a crucial aspect of PP: their efficacy relies on their repeated use (i.e. consumers may expect PP and factor this into their purchasing decisions). In the current retail markets, PP

**Table 2** Product-level sales increases associated with price promotions: decomposition into primary (purchase acceleration and increased consumption) and secondary effects\*

Author	Date	Product category	Increased consumption (%)	Purchase acceleration (%)	Combined (primary) (%)	Switching (secondary) (%)
Unit sales decomposition approach						
Teunter <sup>(40)</sup>	2002	Soft drinks	27	38	<b>65</b>	34
		Fruit juice	17	58	<b>75</b>	25
		Ground coffee	14	48	<b>62</b>	39
		Potato chips	46	41	<b>87</b>	13
		Candy bars	10	63	<b>73</b>	27
		Pasta	14	47	<b>61</b>	39
		Average	21	46	<b>67</b>	33
Van Heerde <i>et al.</i> <sup>(41)</sup>	2003	Eleven products (as in Bell <i>et al.</i> )			<b>33</b>	67
Sun <i>et al.</i> <sup>(42)</sup>	2003	Ketchup			<b>44</b>	56
Van Heerde <i>et al.</i> <sup>(43)</sup>	2004	Tuna	31	38	<b>69</b>	31
		Peanut butter	33	24	<b>57</b>	43
		Average	35	32	<b>67</b>	33
Nair <i>et al.</i> <sup>(44)</sup>	2005	Orange juice			<b>92</b>	8
Ailawadi <i>et al.</i> <sup>(45)</sup>	2007	Yoghurt (average across brands)	56	9	<b>65</b>	35
		Ketchup (average across brands)	39	18	<b>57</b>	44
		Tuna	29	43	<b>72</b>	28
Chan <i>et al.</i> <sup>(38)</sup>	2008	Beverage			<b>52</b>	48
Ebling and Klapper <sup>(46)</sup>	2010	Spread			<b>50</b>	50
		Dessert			<b>74</b>	26
Counterfactual analysis						
Ailawadi and Neslin <sup>(24)</sup>	1998	Yoghurt	35			
Sun <sup>(25)</sup>	2005	Ketchup	12			
		Yoghurt	43	18	<b>61</b>	39
		Tuna	33	25	<b>58</b>	42

Combined (primary) values are the sum of increased consumption and purchase acceleration where they are separately reported in bold.

\*With the exception of Nijs *et al.*<sup>(26)</sup> and Teunter (2002)<sup>(40)</sup>, which were conducted in the Netherlands, all studies used US consumer scanner data.

is frequent and shoppers are likely to stockpile during sales and delay purchases when they are not on<sup>(21)</sup>.

- Consumers respond asymmetrically to price changes<sup>(36)</sup> meaning that the effect of price increase is not necessarily the opposite of the effect of a discount.
- Few studies have looked at what happens to the demand for a product once a promotion is withdrawn (rather than added)<sup>(25)</sup>. But removing all promotions on similar products with no promoted substitutes available altogether has never been addressed.
- The effects of this policy depend on the response from retailers who will act to maintain profitability. Will the new pricing strategy be a switch to pre-regulation non-promotional prices? Or a regular low price? It could be that if retailers reduce their regular, everyday prices enough, the policy will have little effect.

There are techniques that allow researchers to deal with these dynamic difficulties. Structural demand estimation<sup>(25,37–39)</sup> can identify the effect of price expectations on current purchasing and consumption decisions. These are difficult to implement but workable. Without their use, the analysis will overestimate the consumption effects of PP. In simplest terms, this is because there is

no incentive to stockpile if shoppers know the price will be the same in a week's time; people can better plan their purchasing, allowing them to take control of their diets. The extent to which this occurs, as well as retailer response, could be estimated through dynamic structural modelling.

### What can we conclude for current policy?

Existing evidence suggests that PP might lead to significant increases in purchases that, in turn, can lead to greater consumption and likely overconsumption, but the evidence is not sufficient to know the extent to which banning or significantly restricting promotions would reduce consumption. This requires more studies to simulate the effects of promotions removal. On the other hand, this is not new in public health policies, especially major government initiatives that are often based on a combination of evidence related to the problem and its solutions (e.g. public indoor smoking ban). It is rare to have *a priori* direct evidence on policy impact, especially if the scope for an experimental investigation is limited.

Given the seriousness of adult and childhood obesity, it is clear that the usual playbook of individual-focused



interventions and policies has not worked. More radical and structural policy initiatives that rely less on consumer agency might, therefore, be exactly what we need, even if the evidence is less-than-perfect. In this instance, the rationale and logic for the policy of restricting PP is clear. The evidence of intended and unintended consequences is of utmost importance and should be carefully monitored and evaluated when a policy is implemented. However, the lack of direct evidence now should not cause a missed opportunity.

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