Blueprint for halving obesity: rapid review

Positioning interventions for reducing obesity

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Contents

Summary table

Title	[Altering the availability or proximity of food, alcohol, and tobacco products to change their selection and consumption](#)	[Restricting checkout, end-of-aisle, and store entrance sales of food and drinks high in fat, salt, and sugar (HFSS): impact assessment (IA)](#)			
Author and year	Hollands et al. (2019)	Department of Health & Social Care, HM Government (2020)			
Type of study	Cochrane review and meta-analysis	Impact assessment			
Outcome variable	Mean energy consumption	Calorie consumption			
Treatment	Lower proximity of food products (placed farther away)	HFSS food and drink in a narrow list excluding small and micro businesses	HFSS food and drink contributing to children's diets and childhood obesity excluding small and micro businesses	HFSS food and drink items contributing to children's diets and childhood obesity excluding micro businesses	HFSS food and drink items in the full list excluding small and micro businesses
Control	Higher proximity of food products (placed nearer)	No intervention			

Magnitude of effect (Adults)	-38kcal (*p*>0.05)	52kcal	60kcal	61kcal	67kcal
Magnitude of effect (Children)	Not available	57kcal	67kcal	67kcal	73kcal
Notes	For modelling the impact of this policy, the effect size highlighted in the green column was used.				

Rapid umbrella review

Background

Product placement is a common marketing practice implemented in stores and supermarkets. It has been found that locations of products in prominent locations have a nudging effect and positively impacts purchases of products. However, this marketing technique is often seen to disproportionately promote unhealthy food and beverage options, evident from the fact that less than 1% of the products in prominent locations were either fruits or vegetables. Moreover, 70% of all the products placed in these locations contributed significantly to children's sugar and calorie intake.

Placement or positioning technique includes positioning or placement of products at:

- Prominent locations: Checkout, end of aisle, entrance, standalone islands, eye level, top or bottom shelves.
- Co-adjacent placement: healthy/unhealthy products placed next to each other in varying proportions.

Objective

To summarise the best available evidence for the effect of restrictions on prominent positioning or placement interventions on energy intake or body weight. Examples of such interventions could include interventions such as a restriction on placement of HFSS foods at end-of-aisle or at checkouts.

Methods

We aimed to identify reviews that include quantitative research synthesis (ie, meta-analysis or a government impact assessment) of the effectiveness of restrictions on prominent positioning on outcomes relevant to calorie consumption, energy intake, weight loss or obesity. If more than one review was identified that answers our research question, we aimed to identify the review that was reflective of the best evidence, based on (a) year published and (b) quality of review.

Eligibility criteria

Types of review. To be eligible for inclusion, articles were required to use systematic review methodology (ie, use of systematic search and inclusion strategy to identify all available studies) with randomised control trials and include quantitative data synthesis (ie, meta-analysis) of multiple studies that examined the effect of restrictive prominent positioning or placement on outcomes relevant to calorie consumption, energy intake, weight loss or obesity.

If the search did not identify any studies where a meta-analysis had been conducted due to heterogeneity of outcomes of interest, we intended to include reviews with narrative synthesis or impact assessments from government departments. We did not set inclusion criteria on the number or type of databases searched in the reviews.

We selected a single review that best represented our research question. If more than one review was identified, we assessed the quality and selected the one with the highest rating (taking into account year of publication). In case of the absence of a single review with a meta-analysis, we included an impact assessment.

Participants. To be eligible for inclusion, articles could examine the effect of restrictive prominent positioning or placement interventions on adults or children. We report the findings for children and adults in this report.

Intervention. Reviews were required to synthesise interventions that manipulated placement or positioning of food products in a retail setting.

Comparator. The comparators were individuals who were exposed to a larger portion size of the food product.

Outcomes. To be eligible for inclusion, reviews needed to include either clinical (eg, weight, BMI, % fat change) or behavioural outcomes (including, but not limited to: eating behaviour, food diaries). Reviews that only included measures of intentions/plans for future behaviour were excluded due to evidence of the gap between intended and actual eating behaviour.

Information sources and article selection

The search strategy was designed to identify syntheses of research evidence such as systematic reviews between the year 2010 and the date of search. Initial keywords were identified via a scoping review of relevant papers and reports as well as via MEDLINE using the MeSH function. A search was performed in MEDLINE and the Cochrane Database of Systematic Reviews. We searched grey literature using Google Scholar and Google to identify relevant reports. The search was run in March 2023.

Screening

Due to the rapid nature of the reviews, a single reviewer screened titles and abstracts and discussed any uncertainty with a second reviewer. For relevant titles/abstracts, the full text was retrieved for full text review. One reviewer reviewed the full texts and discussed uncertainties with a second reviewer.

Assessment of methodological quality

All relevant reviews were critically appraised by two reviewers individually using the JBI Critical Appraisal Checklist for Systematic Reviews and Research Syntheses. We selected the highest quality and up-to-date review for data extraction. Suitability to our research question was also taken into account when selecting the final review for extraction.

Data extraction

The JBI Data Extraction Form for Review for Systematic Reviews and Research Syntheses was used for data extraction for the final included review. Extracted characteristics included:

- Review characteristics: author/year, objectives, participants (characteristics, total number), setting/context, interventions of interest, date range of included studies, detailed description of the included studies (number/type/country of origin), appraisal instrument and rating, type of review/method of analyses and outcomes.

- Results: findings of the review and comments.

Results

[Hollands et al. (2019)](#) assessed the impact on consumption and selection of altering the proximity of food products. It included all settings such as retail, restaurants and cafes.

Two systematic reviews – [Shaw et al. (2020)](#) and [Whitehead et al. (2021)](#) were identified for this rapid review in order to account for all the different retail locations covered by it. Due to heterogeneity in study designs, outcome measures, and exposure/interventions in the included studies, the reviews did not include a meta-analysis, instead providing a sense of the directional effect of restrictive promotions and placements on outcomes of interest to this rapid review.

The meta-analysis in Hollands et al. (2019) was used to estimate the effect size of restrictive positioning/placement interventions; we also included results from a UK Government impact assessment as well: [DHSC impact assessment on restrictive positioning (2020)](#).

What studies did the review include?

The studies included in the reviews are detailed below:

- [Hollands et al. (2019)](#) included studies that were RCTs or cluster RCTs with between-participants (parallel) or within-participants (cross-over) designs, conducted in laboratory or field settings. All non-randomised studies were excluded.
- [Shaw et al. (2020)](#) included studies that were RCTs (intervention studies) with between-subjects (parallel group) or within-subjects (cross-over) designs, conducted in laboratory or field settings (supermarkets and convenience stores) with adults (18+) from high-income countries. This review also includes observational studies along with intervention studies. Results for both have been reported separately.
- [Whitehead et al. (2021)](#) included studies that examined intervention/exposure that altered positioning or placement of products in retail, out-of-home and online settings.
- Both systematic reviews used a vote counting method as described in the Cochrane Handbook to summarise direction of effect.

All papers identified that several studies included in the review had a high risk of bias.

What were the systematic review methods?

The authors of the three reviews were comprehensive in their search for studies and two searched nine databases each while Hollands et al. (2019) searched eight databases, with some of them being common between the two. Between the three reviews they covered nineteen databases. They were Applied Social Sciences Index and Abstracts (ASSIA); Business Source Complete; Cochrane Central Register of Controlled Trials (CENTRAL); Cochrane Database of Systematic Reviews; DARE; EBSCOhost; EconLit; Embase; Emerald Insight; MEDLINE; PsycINFO; SAGE Business Cases; Science Citation Index Expanded; Science Direct; Scopus; Social Sciences Citation Index; Trials Register of Promoting Health Interventions; Web of Science Core Collection; and World Advertising Research Centre.

Hollands et al. (2019) used varying timelines of searches (in one case as far back as 1806 onwards) until July 2018. Whitehead et al. (2021) searched databases from inception till May 2020 while Shaw et al. (2020) filtered out articles published between January 2005 and February 2019. Subsequent to running the searches, both papers assessed the risk of bias score. Following this, summary tables were created for the included studies in the review.

In addition to these databases, Hollands et al. (2019) also searched for grey literature – Open Grey, Conference Proceedings Citation Index – Social Science & Humanities and Science). In addition, trial registers of WHO, ClinicalTrials.gov and websites of key organisations like USA Centers for Disease Control and Prevention (CDC), EU Platform for Action on Diet, Physical Activity and Health (EU PADPAH), International Obesity Task Force and UK Department of Health were searched.

Statistical analysis: Statistical analysis of the results of included studies was done using a series of random-effects and fixed-effect models to estimate summary effect sizes as SMDs with 95% confidence intervals. The statistical analysis involved the following stages:

- Stage 1: conduct separate meta-analyses for each product type (food, alcohol, and tobacco) and, within each product type, conduct separate meta-analyses for (i) availability interventions and (ii) proximity interventions.

Then for each meta-analysis:

- Stage 2: conduct a meta-regression analysis with study characteristics (including summary risk of bias) as covariates.
- Stage 3: conduct a meta-regression analysis with intervention characteristics as covariates.
- Stage 4: conduct a meta-regression analysis with participant characteristics as covariates.

Due to heterogeneity in study designs, exposures/interventions and outcomes, Shaw et al. (2020) and Whitehead et al. (2021) did not implement a meta-analysis. A vote-counting method as per Cochrane's advice for accurate vote counting was followed. To do this, in each study, all relevant findings were aggregated of the outcomes and labelled as an increase or decrease where 70% or more of the outcomes were in the same direction, or inconsistent where this threshold was not met.

The DHSC impact assessment of health benefits of restricting location promotions used a market sizing approach to estimate the reduction in calories purchased as a result of a restriction on location promotions. The market sizing method is based on the flow diagram in figure 1.
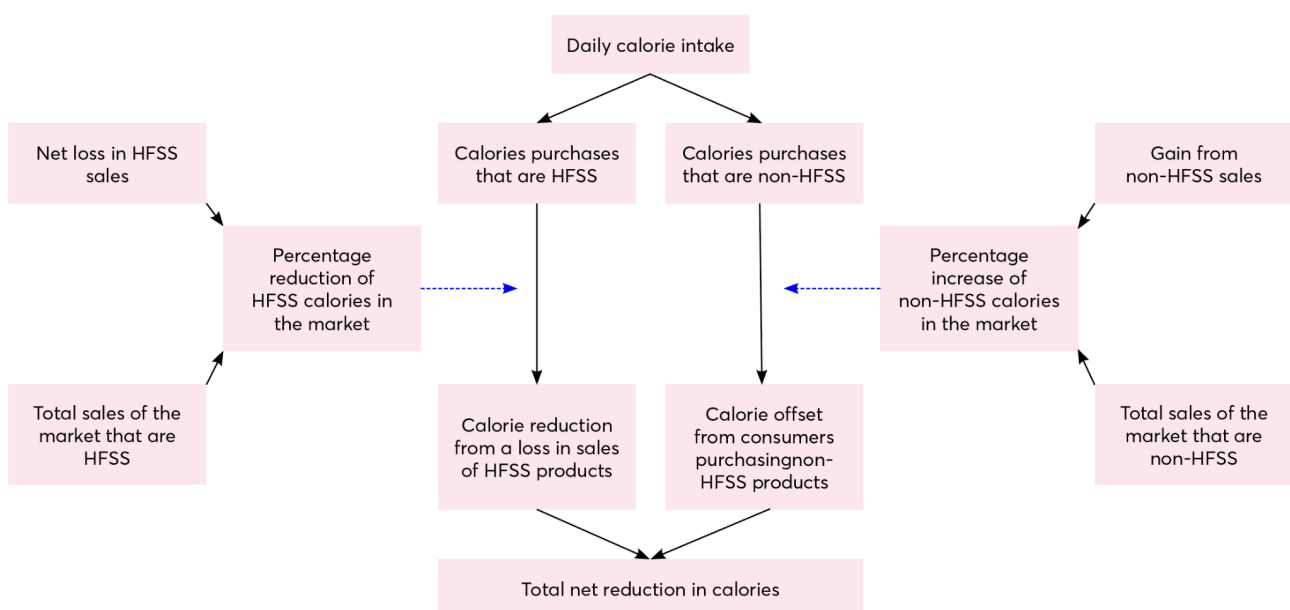

Figure 1: Market sizing approach

What did the review find?

This is a non-exhaustive summary of the review findings. Please see the original articles for more detail missing in the review.

Hollands et al. (2019) included a systematic review and meta-analysis on the effect of manipulating distance of a product from a set point. It was found that mean energy intake on an average snack occasion would be -38kcal (18.9%) with lower proximity (CI: -53kcal to -23kcal). Some of the studies included had a high risk of bias and publication bias.

Shaw et al. (2020) and Whitehead et al. (2021) were predominantly a narrative synthesis of the evidence available and did not include a meta-analysis due to heterogeneity in the outcome measures in the included studies. They however gave a directional sense of the effect. Both reviews found that restrictive interventions that removed unhealthy products from prominent locations were associated with a reduction in their sales or an improvement in reported dietary quality due to consumption of healthier alternatives.

Impact assessment carried out by the DHSC has found that restrictions on prominent positioning of HFSS foods can on average reduce 69kcal from a person's diet.

Moreover, a large-scale quasi-experimental study in the UK by Ejlerskov et al. (2018) found that one of the restrictive positioning interventions – removal of unhealthy food from checkouts was associated with an immediate reduction in purchase of sugar confectionery, chocolates and crisps by 17.3%. A sustained effect was seen one year post implementation where the reduction in purchase was 15.5%. The comparison was a counterfactual. This study also found that there was a statistically significant effect of 75.3% -79.5% reduction in purchase of on-the-go common checkout foods. A field trial in US convenience stores by Liu et al. (2018) found that featuring packaged healthier food in prominent positions increased sales by 34.5% and a reduction in sales of healthier food by 12.9% when unhealthier options were placed in prominent positions.

Table 1: Characteristics of Hollands et al. (2019) meta-analysis

Total number of studies	Total sample size	Country (Number of studies)	Age range	Intervention and comparison	Magnitude of effect in SD (95% CI)	Magnitude of effect in terms of calorie intake	Quality of evidence (GRADE)[1]
12	1,098	High-income countries (lab and field settings); Most studies from USA	Adults (16+ yrs) and Children (3 yrs to 6 yrs)	Intervention: larger-sized portions, package, individual unit or item of tableware Comparison: smaller-sized portions, package, individual unit or item of tableware	Outcome of interest: ***Consumption*** Effect size: SMD -0.60 (95% CI -0.84 to -0.36, *p*< 0.001)	Mean energy intake on an average snack occasion would be -38kcal (18.9%) with lower proximity (CI: -53kcal to -23kcal)	Low
1	41	High-income countries (lab and field settings); Most studies from USA	Adults (16+ yrs) and Children (3 yrs to 6 yrs)	Intervention: larger-sized portions, package, individual unit or item of tableware Comparison: smaller-sized portions, package, individual unit or item of tableware	Outcome of interest: ***Selection*** Effect size: SMD -0.65 (95% CI -1.29 to -0.01, *p*=0.045)	Mean energy selected on an average snack occasion would be -41kcal (20.5%) with lower proximity (CI: -81kcal to -1kcal)	Very low

[1] *GRADE = Grading of Recommendations, Assessment, Development and Evaluations

Table 2: Characteristics and results from the other papers considered in the review

Source	Total number of studies	Type of study	Total sample size	Settings	Age range	Intervention and comparison	Direction/votes	Quality of evidence (GRADE)[2]
Shaw et al. (2020)	17	Observational	13,769	1,487 food stores (supermarkets and convenience stores)	Adults and children	Availability and positioning strategies	Positive	Low to moderate
Whitehead et al. (2021)	22	Intervention	40,571	289 food stores (supermarkets and convenience stores)	Adults and children	Availability and positioning strategies	Positive	Low to moderate
DHSC (2020)	1	Impact assessment	-	Retail environment	Adults and children	Restrictive intervention on positional promotions	Overall: 69kcal Adults: 72.7kcal Children: 67kcal	Moderate to high

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[2] *GRADE = Grading of Recommendations, Assessment, Development and Evaluations

Ejlerskov et al. (2018)	1	Quasi-experimental	30,000 +	Retail environment (large supermarkets in the UK)	Adults and children	Restrictive intervention on positional promotions at checkout, end-of-aisle and special islands	Reduction in purchase of sugar confectionery, chocolates and crisps by 17.3% and 15.5% one year post implementation	High
Liu et al. (2018)	1	Experimental	n/a	Retail environment (Convenience store chain in US)	Adults and children	Positioning of healthier foods	Healthier food in prominent positions increased sales by 34.5% and when less healthy food was featured in prominent positions, it reduced sales of healthier food by 12.9%	High