

## RESEARCH

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**SUMMARY**

Most literature suggests that people can be influenced when choosing what to purchase or eat. Product availability, labelling and marketing, pricing, and portion size may all influence food choices. Environmental cues and the position of products on shelves, near checkouts, and in vending machines can also affect food choices and eating behaviours. Understanding the effects of these factors on human behaviour, and how they are affected by personal factors such as knowledge, values, motivations, and health goals, may provide avenues to nudge consumers towards healthy choices, and reinforce theoretical primers that support consumers to set appropriate goals for their well-being even when nudges promote consumption of less healthy foods.

**Key Words**

Food; choice; marketing; health; public health

## ABSTRACT

### Background

Globally, obesity is a major public health issue. The link between obesity and diet is multidimensional. Consumers may be unaware that they are being influenced to purchase or consume more than necessary for sustenance.

### Aim

To review the literature on factors that influence food consumption, choice, and purchasing.

### Method

We conducted a systematic review of the social science and medical literature. A comprehensive search of Business Source Complete; CINAHL Plus; MEDLINE; Psychology and Behavioral Sciences Collection; APA PsycInfo; and SocINDEX databases yielded 914 records, which we assessed for relevance. We assessed risk of bias using a quality assessment tool. Forty-five papers satisfied the inclusion and exclusion criteria.

### Conclusion

Five factors influence consumer choices. The majority of studies reviewed were laboratory experiments. Overall, the studies were of moderate quality. Most of the current evidence was based on limited follow-up of participants. However, we determined that consumers can be made aware of the factors that retailers and hospitality adopt to encourage greater consumption.

## BACKGROUND

Globally obesity rates are continuing to rise, which presents a major public health challenge.<sup>1</sup> Obesity-related mortality surpasses mortality from undernutrition in many countries.<sup>2</sup> The relationship between diet and obesity is complex and involves numerous social and environmental-obesity interactions.<sup>3,4</sup> Influences on human diets include changing societal norms, culture, and rituals that are linked to eating patterns.<sup>5</sup> Marketing is cited as driving the consumption of calorie-dense foods branded as “healthy”.<sup>6,7</sup> Education through improved health literacy is considered the best approach to reduce over consumption, however, it may not be the degree of nutritional knowledge that drives human dietary choices.<sup>8</sup>

Food choice decision-making relies on information processing and higher-order executive functions aligned with self-regulation and goal-directed behavior.<sup>8,9</sup> There is, however, evidence that the influences of habit, impulse, and environmental cues from sensory inputs may be even more important. Consumers may be unaware of how much they are influenced by cues from olfactory, visual, and auditory stimuli. Habits in turn are influenced by social context and norms.<sup>10-12</sup>

Various factors have been shown to differentially influence an individual’s dietary habits and eating behavior.<sup>13</sup> In addition to food cues, other environmental factors such as ambient lighting, or the presence and actions of others in the immediate environment, may also influence food choice and eating behaviour.<sup>14</sup> Compensatory strategies, where individuals indulge in culinary temptations anticipating that the calorie load will be offset later through exercise, may also influence eating behaviours.<sup>15</sup> Knowing when and how the consumer is influenced to purchase and consume food may help to generate strategies to promote healthy eating habits. This systematic review summarises the evidence from the literature on strategies deployed to influence choice of food.

## METHOD

### Search strategy and paper selection

We developed a search strategy to identify articles that discussed the implementation of behavioural economics (nudges), cues, or triggers that were designed to influence either food choice, food consumption, or food purchasing. We present the complete search strategy (Table 1). We sourced papers from the following databases: Business Source Complete; CINAHL Plus with Full Text; MEDLINE; Psychology and Behavioral Sciences Collection; APA PsycInfo; and SocINDEX with full text.

We ran the search strategy in May 2020 and again in March 2023 and yielded 914 records. After removal of duplicate records, two reviewers independently conducted a primary relevance assessment of title and abstract to identify papers relevant to the topic. Final inclusions for this stage were arrived at by consensus in instances where the two reviewers disagreed on inclusions. The full text of the remaining 129 records were evaluated independently by three reviewers who applied the inclusion and exclusion criteria (Table 2).

Food consumption was the primary outcome measure for this review. We acknowledge that food attention is a key component of food cues especially for those seeking to manage their weight. Similarly, related processes such as motivation to eat, self-control intention, and food cravings are also factors in food choice decisions. Our review focuses only on consumption or food choice behaviours; we did not include studies alone that did not measure consumption.

### Quality assessment

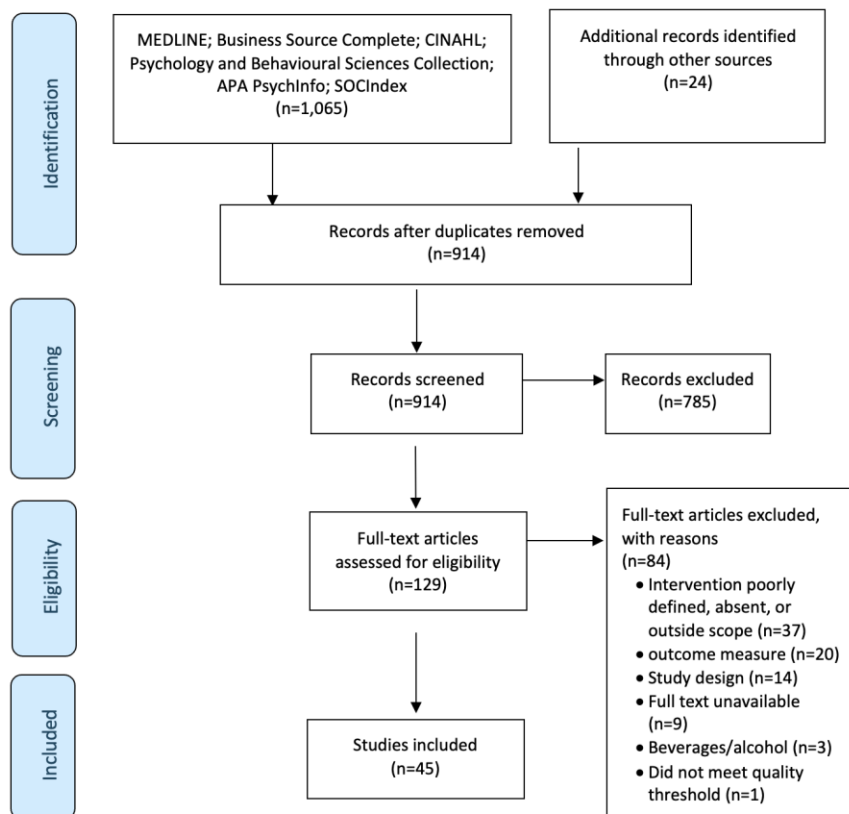
We assessed studies for inclusion using the quality assessment checklist as proposed by Downs and Black.<sup>16</sup> Three reviewers conducted the quality assessment and compared their results in case of disagreement; they used the checklist to calculate the overall quality, as well as the quality for the subgroups reporting, internal validity (bias and confounding), and external validity. The quality level threshold was set at 60 per cent positive answers in the quality assessment as a benchmark for quality.

## RESULTS

### Study selection

A total of 45 papers were included in the review after application of the inclusion and exclusion criteria (Figure 1).

Figure 1: PRISMA flow chart of paper selection for included studies



### Study characteristics

Forty-five publications reported a wide array of interventions. The scope of this review limited interventions to those that promoted food consumption. We identified five categories of intervention across the articles (as summarised in Tables 3a–3e):

1. Product presentation and portion size
2. Eating milieu
3. Sensory cues
4. Pricing and access
5. Marketing

We created these convenience groupings to categorise similar interventions and study objectives. Even within intervention categories, food consumption, purchasing intent, and food choice were measured inconsistently in the studies reviewed.

### Product presentation and portion size

In 16 papers interventions targeted position or presentation of products (n=10), portion or serving size (n=3), and influences of packaging and labelling (n=3). Product presentation and portion size are particularly strong influences as they may have a normative influence on food consumption and purchase, with individuals relying on these cues to make judgements about appropriate consumption size.<sup>17</sup>

Two studies found that a product's name, packaging, and labelling influence food choices.<sup>18,19</sup> Consumers' experience and response to a product can be influenced by how much they "like" a label or concept and by the inclusion of label claims such as high-protein, low-fat, made with stevia and all-natural.<sup>19</sup> Irmak et al. (2011) found that changing a product's name influenced dieters' food choice and consumption, but not non-dieters' food choice and consumption.<sup>18</sup> Dieters perceived foods with "healthy" names as "less tasty" and consumed less of these. In contrast, Theben et al. (2020) reported that attitude towards purchasing a food product was not influenced by the colour of the packaging and health claims.<sup>20</sup>

Three studies found that portion or serving size directly influence food consumption and purchasing.<sup>21–23</sup> Reducing portion sizes of French fries in an on-campus restaurant experiment in Belgium resulted in a 9.1 per cent decrease in consumption during the intervention phase, but no change in satiety and caloric intake.<sup>21</sup> van Kleef et al. (2014) found that a perceptual cue of a smaller unit size decreased indulgent food consumption, with 23 per cent less chocolate eaten when presented in a smaller unit size.<sup>22</sup> The effect was more pronounced when the chocolate was served unwrapped. Petit et al. (2018) observed that creating the illusion of a larger portion by presenting food in a smaller container resulted in higher purchase intentions, but a decrease in the size of the portion that they served themselves.<sup>23</sup>

Ten studies reported that availability and positioning of healthy foods influenced food consumption and food purchasing.<sup>24-35</sup> Results from seven studies applying mechanical Turk and laboratory experiments found that lateral display pattern of healthy and unhealthy items influenced choice. Placing healthy items on the left-hand side of unhealthy items in printed or digital displays led to enhanced preference of the healthy options.<sup>24</sup> Keller et al. (2015) found that placing a snack bar with the lowest calorie content in the middle of a 3-choice display led to it being selected three times more often.<sup>25</sup> van Kleef et al. (2012) found that consumers felt more freedom in choice when healthy snacks were displayed at top shelves compared to lower shelves.<sup>26</sup>

Placing healthy food items at the point of purchase, such as checkouts, can lead to an increase in sales of these items.<sup>25-27</sup> Repositioning of these foods did not affect the purchase of other healthy and less healthy foods, suggesting that these food items were not replacing other item purchases. Kroese et al. (2016) conducted a study in three snack shops at a train station in the Netherlands and found that placing healthier snacks at the point of purchase (near the cash register) and moving unhealthy snacks to the back of the shop increased healthy snack purchase but did not decrease unhealthy snack purchase.<sup>28</sup> Disclosing this to the consumers had no effect.<sup>29</sup>

The sequence of serving food items can influence food choice.<sup>30,31</sup> Flores et al. (2019) found that when selecting food in sequence in a buffet setting, individuals are influenced by the first food item they see.<sup>30</sup> When individuals see an indulgent dish first, lower-calorie items are subsequently selected resulting in a decreased overall calorie intake. However, this effect is negated under high cognitive load. In an ad libitum buffet setting involving male university students, placing vegetables and fruit at the front of the serving sequence and in separate bowls led to a reduction in the total energy of self-served meals, but had no significant effect on the total amount of self-served food.<sup>31</sup>

Spatial positioning on a pictorial-style menu can influence food choice.<sup>32,33</sup> Keegan et al. (2019) found that, irrespective of dietary restraint, participants chose the healthier option when the food cue was presented separately from other unhealthy food cues.<sup>32</sup> Presenting food items separately may trigger different cognitive processing and activate the weight control goal. Placing items in the default position (automatic or standard default) on a menu, or at the beginning or end of their category can increase the frequency of selection of the food items.<sup>33,34</sup>

Friis et al. (2017) found that placing plants and herbs intentionally, so that study participants could be visually exposed to them when interacting with the eating area and creating an odour of herbs and allowing participants to freely use the provided fresh herbs (basil, parsley) as part of their meals led to decreased total energy intake accompanied by decreased meat intake.<sup>35</sup>

### **Eating milieu**

Environmental cues and the behaviours of people in the immediate environment (social influence) also influence food choice, food consumption, and purchasing.<sup>36-43</sup>

Popularity cues and setting norms for specific context can influence consumers to consume or purchase healthier products and not so for regular products.<sup>36,39</sup> In a virtual supermarket study, when products in different categories were communicated to the participants as being popular (popularity cue), consumers were more likely to choose healthier products when these are combined with a popularity cue.<sup>36</sup> Otto et al. (2020) found that setting norms for specific contexts (provincial norms) can nudge consumers to purchase lower-calorie food.<sup>37</sup> Liu et al. (2019) observed that food advertisements that contained multiple people eating the advertised food products received greater attention from participants, who self-reported greater social support and purchase intention upon seeing these images.<sup>38</sup>

Hock et al. (2018) found that exposure to crowded environments—regardless of the number of people as long as they were in close proximity—led to increased calorie consumption.<sup>39</sup> Crowding increased distraction and may have hampered consumers' ability to process information effectively. Individuals presented with different options selected and consumed higher-calorie items, but tended to eat more of the same food item when presented with only one option.<sup>39</sup> In contrast, Bellisle et al. (2009) found that eating group meals led to less intense satiety than other settings leading to lower energy and food intake, and that there were no differences between unrestrained and restrained eaters.<sup>40</sup>

There is some evidence that increased availability of healthier options in work settings can lead to healthier food purchase.<sup>41</sup> The presence of health-evoking posters or images of Giacometti sculptures (extremely tall and slender figurines) in a naturalistic setting resulted in significantly greater purchase of healthier snacks from a vending machine as compared to a pleasure-evoking fun fair poster or no poster. However, overall more unhealthy snacks were purchased from vending machines.<sup>42</sup> Vermote et al. (2020) found that food triangle posters coupled with “green heart” icons above fruits stands, substitution, and social norm messages resulted in increased fruit purchase after 35 weeks from baseline.<sup>43</sup> In contrast, Thomas et al. (2011) found that person-specific factors and environmental cues did not predict the likelihood that an eating event would be characterised by overeating.<sup>44</sup>

### Sensory cues

Studies that reported on the influence of cues targeting sensory pathways reported mixed findings. One study found that shining bright light on healthy food items resulted in a higher proportion of participants opting for the healthy option than when ambient light was deployed.<sup>45</sup> In another study, however, food purchases or duration of eating time were not significantly different in “relaxed” (soft music and lighting) and “typical” environments.<sup>46</sup>

Some studies have reported that olfactory cues influence food choices. In one study, exposure to a scented odour resulted in increased choice of a fruity dessert over a dessert without fruit (brownie).<sup>47</sup> Gaillet et al. (2013) found that participants exposed to melon scent were more likely than control participants to choose starters with vegetables, but not main courses or desserts with fruit and vegetables.<sup>48</sup> Indulgent olfactory food cues can activate diet goals in restrained eaters, resulting in

reduced intended indulgent food consumption consistent with counteractive-control theory.<sup>49</sup> Another study found that a warm ambient odour (eg, cedarwood) versus a cool ambient odour (eg, eucalyptus) reduced the amount of calories consumed and also led to increased choice of lower-calorie food options.<sup>50</sup> However, not all studies report an effect of odour priming on food choices. Mors et al. (2018) found that odour priming affected the participant's mood, but not food choices.<sup>51</sup>

### **Pricing and access**

Price is an important factor in food choice, especially for low-income consumers.<sup>52</sup> Three articles that fulfilled our search criteria reported on the role of food availability or ease of access. This included the use of behavioural economic interventions of food bundling and price discounting in various settings.

Carroll et al. (2018) conducted an artefactual field experiment in a simulated small grocery store and found that cognitive load affected purchasing behaviours. Displaying food bundles resulted in increased fruit and vegetable purchasing. However, discounted bundles were more effective in the absence of cognitive load, while non-discounted bundles were more effective when shoppers were under cognitive load.<sup>53</sup> Therefore, when cognitive resources are constrained, unhealthy options are more likely to be selected.

Hagen et al. (2017) observed that increased unhealthy food choices were made and larger portion sizes were consumed when participants were served than when the participants served themselves.<sup>54</sup> The authors concluded that being less involved in portion choice and the physical act of being served are associated with consumers abdicating their personal responsibility for what they eat.

A study conducted with university students observed that size labels affect size judgements, and actual and perceived consumption. Consumers can continue to eat large sizes of meals that are labelled as small and feel that they have not consumed much.<sup>5</sup>

### **Marketing**

Thirteen papers investigated the influence of cues and priming on food choice, consumption, and purchasing. Most reported that cues and priming influence food choice, consumption, and purchasing.<sup>56-68</sup>

Exposure to diet-congruent cues in food-tempting environments can reinstate diet goals and lead to controlled eating. In one study, customers of a grocery store were handed a recipe flyer that did or didn't contain a health and diet prime.<sup>56</sup> The health prime reduced the purchases of high-calorie snacks among overweight consumers by 75 per cent. No conscious awareness of the prime was necessary for these effects.

In another study, priming by viewing fruit and vegetable advertisements, affected participants' preference between fruits and other sweet snacks.<sup>57</sup> The findings revealed that a prime, which

promoted fruit and vegetable consumption, without appealing to healthiness, could activate a goal of healthier eating independent of dietary restraint status, as measured by food preference. The effect of the prime was effective in more educated participants with some hunger.

Papies et al. (2010) observed that restrained eaters overate when exposed to attractive food cues with the opportunity to eat free meat snacks, however, activating their diet goal by priming with dieting reduced their eating behaviour. Unrestrained eaters were not affected by the priming manipulation.<sup>58</sup> These results are consistent with the goal conflict theory, which suggests that the cues were able to direct behaviour by activating one of two competing goals, an eating goal and a diet goal.

Food advertising that promotes snacking, fun, happiness, and excitement directly contributes to increased food intake that is independent of hunger.<sup>59</sup> Men and restrained eaters were affected more strongly, with both groups consuming approximately more after exposure to snack advertisements versus nutrition advertisements or no food advertisements. Low inhibitory control, in combination with being overweight, makes participants especially vulnerable for environmental food cues. Nederkroon (2014) observed that high-impulsive and overweight individuals purchased more calories from snack products from the supermarket when they were advertised than lean high-impulsive individuals.<sup>60</sup>

When presented with fitness cues that associate a product with the concept of fitness, restrained eaters increased their consumption of dietary-permitted food, but decreased their physical activity post-consumption, choosing to substitute the food for physical activity.<sup>61</sup> In another study, researchers found that perceiving a physical activity as fun versus as exercise positively influenced participants' choice of a healthy snack, while those who perceived it as exercise tended to compensate for their physical activity by choosing hedonic rather than utilitarian food products.<sup>62</sup>

Motivational messages, direct priming of health goals, as well as responsibility and status primes can all influence consumers' choices and steer them towards healthier food options.<sup>63</sup> Sihvonen and Luomala (2017) found that the success of priming greatly depended on the underlying values of the consumers such as achievement, conservation, and universalism, which play an important role in how goal priming works.<sup>63</sup> Other factors are also important in determining the effect of motivational cues on consumers. Priming with cue-to-action messages may specifically increase healthy choices of familiar foods.<sup>64</sup> Other data suggest that healthy eating, when imposed, may make consumers hungrier than when freely choosing to eat healthy.<sup>65</sup>

Boland et al. (2013) investigated whether activating health goals either by laboratory priming techniques or through advertisements could help people regulate food intake later in the day, when self-regulation resources are typically depleted. Participants completed goal activation tasks in the morning or afternoon while they had a snack food available for consumption. The activation of health goals resulted in decreased snack food consumption in the afternoons but not the mornings.<sup>66</sup>



Pre-exposure effect states that consumption of tempting food is decreased after one is exposed to tempting food cues in a context of a task that discourages food consumption. One study found that dieters pre-exposed to diet-congruent food cues controlled their energy intake when tempted by palatable food.<sup>67</sup> Another study conducted in university labs in Belgium and Greece engaged participants in a scrabble task with either candy letters or foam letters a taste test.<sup>68</sup> The pre-exposure priming tempting food cues was effective in healthy weight individuals but not obese individuals.

## DISCUSSION

The studies reviewed here suggest that food choice and consumption is influenced by many factors. Consumers' food choices can be influenced by food availability and pricing, marketing strategies that determine appearance, packaging, slogans and advertising, conditions at the point of purchase or consumption such as positioning, shelf placement, and lighting, and by the food choices of others in their immediate environment. Priming, including sensory cues, motivational messages, popularity cues, and signage may also influence food choice. We grouped interventions into five categories: product presentation and portion size, eating milieu, sensory cues, pricing and access, and marketing. Manipulation of any or all of these areas can potentially affect choices made about the type and amount of food eaten. Without much mental or physical effort, consumers can rely on these cues to make rapid decisions about what to eat.

Many of these cues may act by imparting a normative influence on consumers. Factors such as the behaviours of other individuals, packaging and portion sizes, and imagery can all affect individuals' concept of what is normal.<sup>17,36,39,40,68,69</sup> Additional influencing factors include status and sense of social responsibility.<sup>57,63,69</sup>

It is likely that a person's nutrition knowledge and skills, their health status, their personal motivations, values, beliefs, attitudes and goals, can all modify the impact of food-related interventions on each individual.

The success of priming interventions greatly depends on the consumers' underlying values or goals.<sup>58,63</sup> It is clear that environmental cues may have a selective effect on individuals depending on their health or enjoyment goals.<sup>32,57,59,60,63,66,71</sup> Most of these studies demonstrate how overweight individuals were influenced by cues that activate health or weight control.<sup>63,57,59,60,64</sup> Low inhibitory control, in combination with being overweight, makes participants especially vulnerable for environmental food cues.<sup>58</sup> Conversely, pre-exposure priming to tempting food cues reduced consumption only in healthy-weight individuals and not obese individuals.<sup>55</sup>

Compensatory health beliefs are beliefs that an unhealthy behaviour (unhealthy eating) can be compensated for by engaging in a healthy behaviour (physical activity).<sup>72</sup> The importance of an individual's perception of physical activity in influencing food choices was demonstrated by Werle et al. (2015) who observed that individuals perceiving physical activity as fun were more likely to choose

a healthy snack, while those who perceived it as exercise tended to compensate for their physical activity by choosing more pleasurable food products.<sup>62</sup> In another study, it was observed that eating fitness-branded food served as a substitute for actual physical activity in restrained eaters.<sup>61</sup>

Most studies investigated short-term outcomes with most studies having an intervention duration shorter than 6 months. It is therefore unclear whether the reported effects were sustained. Some researchers have argued that such “nudges” may have only a short-term effect.<sup>73</sup>

### **Implications for practice**

There is limited but significant evidence demonstrating the influence of environmental cues on food choice and consumption. No intervention in and of itself is likely to lead to sustain consumer choices. Equally, addressing obesity requires a multidimensional approach to promoting healthy eating.<sup>3,4,67</sup>

The evidence in the literature reviewed is mainly from laboratory studies. As a result, the translation of these findings and application to public health initiatives may be premature and warrants more empirical research.

We summarise factors that impact on consumer choices (Table 4). While it may not be possible to be impervious to these influences, awareness may be helpful. Consumers would benefit from being educated that product placement (at the checkout counter and on store shelves), as well as what is advertised and prominently displayed, may lead to more of those products being purchased and consumed. Equally, having only healthy options or smaller portions available in the work environment may help those trying to manage their weight. While convenient, vending machines are designed to sell more of what may be unhealthy.

### **Strengths and limitations**

The published papers have a bias toward US and European locations. Similarly, most studies deploy young university students as subjects introducing further bias. There is a focus on simulations and limited real-life observational studies where confounding factors may influence outcomes. Overall, the studies had moderate quality. Very few studies measured duration of effect and in most others follow-up was of short duration. Though not assessed in this study due the heterogeneity of the studies, effect sizes, when present, were often very small despite being reported as “statistically” significant. The interpretation of such small effect sizes with wide confidence intervals merits caution.

### **CONCLUSION**

Much published research suggests that what we eat can be influenced by many factors, including how food is presented and served, the environment in which we eat, and how product placement impacts consumer choice. Overall, the studies were of moderate quality and had limited follow-up; therefore, the reliability and reproducibility of these studies is uncertain. Nevertheless, in the broad range of publications we reviewed, most suggest that people can be influenced to make choices that reduce the scope for weight management. Some theoretical primers also exist that could support consumers

looking to set appropriate goals for their health and well-being even in the presence of these nudges that promote consumption.

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Table 2A: Product presentation and portion size

	Author	Year	Title	Population	Country	Design	Objective	Outcome measure	Key Findings
1	Bergeron et al. <sup>34</sup>	2019	Using insights from behavioural economics to nudge individuals towards healthier choices when eating out: A restaurant experiment	General public N=303	FR	Simulated restaurant experience	To test the hypothesis that participants will choose the default menu position more frequently irrespective of nutritional attributes.	Food choice	The study tested both standard and automatic default nudges for dessert selection. The status quo bias could be observed without reference to the health qualities of the desserts. Automatic default nudges had a stronger effect than standard defaults. Status quo bias has potential use in menu design to promote healthier options in eating out without removing participant choice.
2	Dayan and Bar-Hillel <sup>33</sup>	2011	Nudge to obesity II: Menu positions influence food orders	University students 19–35 yo N=240  N =951 (restaurant orders)	IL	2 experimental studies; 1 laboratory, 1 field test	To examine the effect of manipulating the position of foods on a restaurant menu.	Food choice	Placing menu items at the beginning or end of their category increases the frequency of selection.
3	Friis et al. <sup>35</sup>	2017	Comparison of three nudge interventions (priming, default option, and perceived variety) to promote vegetable consumption in a self-service buffet setting	N=88 General public  (77% students)	DK	Food laboratory simulated buffet setting  Randomised cross-over design	To test the ability of three different nudges: priming, default, and perceived variety to promote vegetable consumption.	Food consumption	Priming for higher vegetable intake instead promoted decreased accompanying meat intake. The default nudge was a set serving of vegetables, but this did not decrease total calorie intake. Increasing visual variety did not increase intake. Gender analysis trend suggested women may have increased vegetable intake while men's intake decreased. Impact of social setting was not evaluated.
4	Flores et al. <sup>30</sup>	2019	If I Indulge First, I Will Eat Less Overall: The Unexpected Interaction Effect of Indulgence and	Cafeteria patrons N=134; Employees	US	1 cafeteria setting  4 experimental studies	To determine the effect of food type (indulgent vs healthy) and presentation order	Food consumption; Food purchasing	When selecting food in sequence such as in a buffet setting, individuals are influenced by the first food item they see. When an indulgent dish is seen first, lower-calorie items are selected subsequently resulting in a decreased overall

	Author	Year	Title	Population	Country	Design	Objective	Outcome measure	Key Findings
			Presentation Order on Consumption	N=120; N=160; N=180; N=296		Online ordering	on sequential food choice.		calorie intake. This effect is negated under high cognitive load.
5	Keller et al. <sup>25</sup>	2015	Nudging product choices: The effect of position change on snack bar choice	University students N=120	CH	Experimental design	To evaluate the effect of position change in a displayed array on snack bar choice.	Food choice	The snack bar with the lowest calorie content was selected three times more often when placed in the middle of a 3-choice display. No gender differences were observed.
6	Kroese et al. <sup>28</sup>	2015	Nudging healthy food choices: a field experiment at the train station	N=91	NL	Field experiment Train station snack shop	To evaluate an accessibility nudge to promote purchase of healthier snacks.	Food purchasing	Placement of healthier snacks at the point of purchase (near cash register) and moving unhealthy snacks to the back of the shop increased healthy snack purchase but did not decrease unhealthy snack purchase. Disclosure of the nudge did not alter the effect.
7	Irmak et al. <sup>18</sup>	2011	The impact of product name on dieters' and non-dieters' food evaluations and consumption	General population N=77; University students N=142; N=134; N=168	US	1 field experiment, 3 experimental studies	To determine if changing the name of a food item influences the product evaluations and consumption of dieters and non-dieters.	Food choice; Food consumption	Dieters rely on heuristics to a greater extent than non-dieters when evaluating foods. Dieters perceive food with healthy name as less tasty and consume less of these foods. Non-dieters taste evaluations are not altered by food name.
8	Keegan et al. <sup>32</sup>	2019	The effect of the spatial positioning of a healthy food cue on food choice from a pictorial-style menu	Female university students N=143	AU	Salience nudge	To investigate the effect of changing the spatial positioning of a healthy food cue on a pictorial menu of other unhealthy food cues.	Food choice	Participants chose the healthier option when the food cue was presented separately to other unhealthy food cues. Separate presentation is proposed to trigger different cognitive processing and highlights the goal of weight control. Dietary restraint had no effect on food choice.

	Author	Year	Title	Population	Country	Design	Objective	Outcome measure	Key Findings
9	Kongsbak et al. <sup>31</sup>	2016	Increasing fruit and vegetable intake among male university students in an ad libitum buffet setting: A choice architectural nudge intervention	Male university students N=65	DK	Simulated buffet setting	To assess whether a choice architecture nudge could increase fruit and vegetable intake of male students.	Food choice; Food consumption	Placing the vegetables and fruit at the front of the serving sequence and in separate bowls reduced the total energy of self-served of meals.
10	Li et al. <sup>19</sup>	2019	Impact of common food labels on consumer liking in vanilla yogurt	General population N=108	US	Consumer taste test within-subjects design	To analyse the influence of popular labels on the liking of yogurt and willingness to pay.	Food choice, willingness to pay	Labels can effect consumer experience and their response to a product. Product labels of high-protein, low-fat, made with stevia and all-natural for the identical yoghurt elicited differing responses by changing the label only. A product's hedonic response can be influenced by identifying the product in a differing manner, regardless of its sensory properties. This effect is strongly determined by an individual's liking of a particular label or concept.
11	Petit et al. <sup>23</sup>	2018	Are large portions always bad? Using the Delboeuf illusion on food packaging to nudge consumer behavior	UK residents N=102; University students N=76	UK	4 within-subjects experimental studies to test nudge	To test if the Delboeuf illusion can be used to nudge consumers to reduce serving sizes.	Purchase intention; Portion size consumed	Food served in a smaller container (large portion illusion) compared to an image of food served in a larger container (small portion illusion) increased purchase intentions during online evaluation and also the desire to eat during real serving experiments.
12	Romero and Biswas <sup>24</sup>	2016	Healthy-left, unhealthy-right: Can displaying healthy items to the left (versus right) of unhealthy items nudge healthier choices?	General population N=42; N=78; University students N=93; N=109 N=169; N=60	US	5 between subjects experimental design	To test if lateral display positions of healthy/unhealthy options affects choice and healthful consumption.	Food choice; Food consumption	The lateral display pattern of healthy and unhealthy items influences choice and also has consequential effects on consumption volume. Placing healthy items on the left-hand side of printed or digital displays increased food choice for these items.

	Author	Year	Title	Population	Country	Design	Objective	Outcome measure	Key Findings
13	van Kleef et al. <sup>22</sup>	2014	The unit size effect of indulgent food: How eating smaller sized items signals impulsivity and makes consumers eat less	N=118 Female university students; N=124 [79 females, 49 males]; N=165 [104 females; 61 males]	NL	3 between subjects experimental design studies	To investigate the effects of eating food in small vs. large unit sizes.	Portion size; consumption	The perceptual cue of smaller unit size decreases indulgent food consumption. Twenty-three per cent less chocolate is eaten when it is presented in small unit size versus a large unit size. Unit size did not impact caloric estimations, but participants incorrectly thought that they consumed more when food is presented in smaller unit sizes. The unit size effect on the amount of chocolate consumed is particularly pronounced when the chocolate is served unwrapped. With a small unit size, people eat less because they have the impression (that others think) they eat more and are impulsive.
14	Van Gestel et al. <sup>27</sup>	2018	Nudging at the checkout counter - A longitudinal study of the effect of a food repositioning nudge on healthy food choice	N=186	NL	Longitudinal pre-post design	To investigate the effect of a food repositioning nudge on healthy food choice from a kiosk.	Food choice; Food purchasing	There was increased purchasing of selected healthy foods during the nudge phase (compared to baseline). This effect was maintained for the 4-week period of the intervention. There was no reduction in other healthy foods not part of the repositioning suggesting these were not replacing other healthy item purchases.
15	Vermote et al. <sup>21</sup>	2018	The effect of a portion size intervention on French fries consumption, plate waste, satiety and compensatory caloric intake: an on-campus restaurant experiment	University students and university employees N=4,231	BE	Field experiment at university buffet setting using default portion size pre-post design	To examine the effect of a default reduced portion size of French fries on consumption, plate waste, caloric intake, and satiety.	Food consumption	Consumption of French fries decreased by 9.1% during the intervention phase. Total plate waste decreased by 66.4%. This intervention was achieved by serving portions in smaller receptacles (smaller volume paper bags) for the intervention phase. Satiety and caloric intake was unchanged between baseline and intervention.

	Author	Year	Title	Population	Country	Design	Objective	Outcome measure	Key Findings
16	Theben et al. <sup>20</sup>	2020	The effect of packaging colour and health claims on product attitude and buying intention	300 students	NL	2x2 between-subjects experimental design.	To investigate the effect that health claims on food packaging have on the attitude towards the product and on the buying intention of this product.	Purchase intention	Attitude towards the product did not significantly differ between the colour conditions and health claim conditions. Attitude towards the product significantly predicted intention to buy. The results do not support the assumption that visual cues (colour) and textual cues (health-related advertising claims) are effective in conveying symbolic meaning about the product's healthfulness and influence consumer attitude to the product.

Table 2B: Eating milieu

	Author	Year	Title	Population	Country	Design	Objective	Outcome measure	Findings
1	Bellisle et al. <sup>40</sup>	2009	Influence of dietary restraint and environmental factors on meal size in normal-weight women. A laboratory study	General population Female (normal weight)	FR	A series of 5 ad libitum lunches over 5 weeks	To determine the effect of external and psychological factors that influencing meal size in healthy, normal-weight women.	Food consumption	Subjects experienced different social environments for each lunch. They ate alone; in groups; listening to radio; watching TV (no cues); watching food ads on TV. Energy and main dish intakes were lower in the group meal condition than in the other four settings. No other differences were observed. Group meals were followed by less intense satiety than the other settings. Restrained eaters were not different to unrestrained eaters.
2	Goedegeburte et al. <sup>36</sup>	2020	Using product popularity to stimulate choice for light products in supermarkets: An examination in virtual reality	300 Dutch shoppers	NL	A virtual simulated supermarket; Study used a 3 group between subjects design	To determine whether product popularity can stimulate the choice for healthier products.	Food choice	Consumers are more likely to choose light products when these are combined with a popularity cue. The popularity cue did not affect choice for the regular alternative products.
3	Hock et al. <sup>39</sup>	2018	The impact of crowding on calorie consumption	Field study of N=4,730 food orders;	US	1 field study and 4	To investigate how human crowding	Food consumption	Crowded environments increase calorie consumption. Crowding increases distraction and hampers cognitive thinking leading

	Author	Year	Title	Population	Country	Design	Objective	Outcome measure	Findings
				Restaurant attendees N=100 University students N=115 N=107 N=108		experimental studies	impacts consumption.		consumers to process information affectively. When given a choice between several different options, people select and eat higher-calorie items, but when presented with only one option, people eat more of the same food item in crowded environments. This effect is seen both with larger numbers of people or with smaller numbers of people in close proximity.
4	Liu et al. <sup>38</sup>	2019	Investigating the effect of use and social cues in food advertisements on attention, feelings of social support, and purchase intention	164 University students	US	The current study used a use cue(2)x social cue(2) x repetition (3) within-subjects factorial design. This design was fully crossed. Thus, participants viewed 12 food ads of four types.	Study examined how the presence of actual food consumption behaviours (use cues) and presence of multiple individuals endorsing food products (social cues) in fast food ads would influence individual attentional and behavioural responses.	Purchase intention	Findings demonstrated that participants paid greater attention to the fast food ads that contained multiple people (group cue) eating the advertised food products (use cue) when compared to other types of fast food ads. Participants also self-reported greater social support and purchase intention when seeing use and group cues in ads. People are more likely to pay more attention to the food ads when they see a group of people (group cue) enjoying eating the advertised food products in the food ads.
5	Otto et al. <sup>37</sup>	2020	Consumer strategies to improve the efficacy of posted calorie information: how provincial norms nudge consumers to healthier consumption	Cinnabon customers N=166	USA	1 field study and 2 laboratory experiments	To test the possibility that exposure to provincial norms can reduce the total calories desired by the consumer.	Reduced calorie intake; follow-up and demographic questions	Setting norms for specific contexts (provincial norms) can nudge consumers to lower calorie purchasing. Provincial norm reduced calories purchased relative to the control ( $p=.037$ ) and descriptive norm ( $p=.008$ ) conditions, with no difference between the descriptive norm and control conditions ( $p>.88$ ).

	Author	Year	Title	Population	Country	Design	Objective	Outcome measure	Findings
6	Stöckli et al. <sup>42</sup>	2016	An (un)healthy poster: When environmental cues affect consumers' food choices at vending machines	N=634 snack purchases	CH	2 field studies	To examine whether food choice can be influenced by environmental cues in a naturalistic setting.	Snack food purchasing	Exposure to an environmental cue affected the choice between healthy and unhealthy snacks. Consumers with a health-evoking nature poster or images of thin Giacometti sculptures compared to a pleasure-evoking fun fair poster or no poster in their visual sight purchased proportionally more healthy snacks than unhealthy snacks from a vending machine. Overall more unhealthy snacks were purchased from vending machines.
7	Thomas et al. <sup>44</sup>	2011	Ecological momentary assessment of obesogenic eating behaviour: combining person-specific and environmental predictors	Female university students N=39	US	Prospective observational study	To investigate the interaction between person-specific factors and environmental factors in the prediction of obesogenic eating behaviour (ie, episodes of overeating).	Food consumption (Eating events)	None of the hypotheses were supported by the data. Nearly one-third of all eating events in the observational period were characterised as overeating. None of the person-specific variables, nor the number of good tasting high-calorie foods available during eating events, predicted the likelihood that an eating event would be characterised by overeating.
8	Velema et al. <sup>41</sup>	2018	Nudging and social marketing techniques encourage employees to make healthier food choices: a randomized controlled trial in 30 worksite cafeterias in The Netherlands	Employees N	NL	A randomised controlled trial involving 30 worksite cafeterias.	The objective of this study is to examine the effects of a healthy worksite cafeteria ["worksite cafeteria 2.0" (WC 2.0)] intervention on Dutch employees' purchase behaviour over a 12-week period.	Food purchasing	During the intervention, a significantly higher number of healthier ("better choice") sandwiches were sold in the intervention cafeterias than in the control cafeterias. The purchases of regular sandwiches decreased in the intervention cafeterias. The difference in sales of regular sandwiches between the groups was also significant. No significant differences between cafeteria types were noted for snacks, prepackaged snacks, healthier "better choice" salads, and healthier "better choice" meat products for bread toppings.

	Author	Year	Title	Population	Country	Design	Objective	Outcome measure	Findings
9	Vermote et al. <sup>43</sup>	2020	The effect of nudges aligned with the renewed Flemish Food Triangle on the purchase of fresh fruits: An on-campus restaurant experiment	University staff and students of University restaurant. Estimation of 1000 diners per day.	BE	Mixed method field experiment of 4 nudges over 4 weeks. (1) Food Triangle posters in the restaurant, (2) 'green heart' icons above the fruit stands, and (3) substitution and (4) social norm messages at the fruit stands. Interventions were combined sequentially over 4 weeks.	To investigate the effect of a combination of food labelling and POP messaging, aligned with the renewed Flemish Food Triangle, on fresh fruit purchase as a choice of dessert in a Belgian on-campus restaurant.	Purchasing of fruit as the dessert option. [fruit sales]	Effects were small across all groups. The strongest effect was seen in Week 2 with combination of the Food Triangle posters and the green heart logo. Female staff increased their fruit purchase up to 10.4% during the "Food Triangle + green heart" intervention in Week 2, which is twice as much as did male staff. About 32.8% of the respondents indicated that the substitution messages influenced their dessert choice, whereas for the norm message, the green hearts and the Food Triangle, this was only the case for respectively 20.8%, 18.0%, and 12.4% of the respondents. The combination of all intervention components was effective in the long term, as increased fruit purchase remained present for nearly all subgroups after 35 weeks from baseline.



Table 2C: Sensory cues

	Author	Year	Title	Population	Country	Design	Objective	Outcome measure	Findings
1	Biswas et al. <sup>45</sup>	2017	Shining light on atmospherics: How ambient light influences food choices	University students	US	1 field study 4 experimental studies	To examine how increasing versus decreasing the luminance of ambient light might influence choices between food items that are considered healthy versus unhealthy.	Food choice; alertness	A higher proportion of participants preferred the healthy option with bright (vs. dim) ambient light. There was a main effect of gender on food choice, with women (vs. men) choosing healthier options to a greater extent (66.18% vs. 49.15%; $c_2 = 3.77, p < .06$ ). There was no interaction effect between ambient light and gender on food choice ( $p > .40$ ).
2	Gaillet et al. <sup>48</sup>	2013	Priming effects of an olfactory food cue on subsequent food-related behaviour	N=58 N=70	FR	Melon-scented odour prime Pear odour cue	To examine if an olfactory food cue could have an impact on food choice.	Lexicon task	Participants in the melon-scent condition were more likely than control participants to choose starters with vegetables, but not main courses or desserts with fruit and vegetables.
3	Gaillet-Torrent et al. <sup>47</sup>	2014	Impact of a non-attentively perceived odour on subsequent food choices	N=115	FR	Field test	To explore whether an olfactory food cue could have an impact on food choices.	Food choice; Lexicon test	A non-attentively perceived fruity odour was shown to influence actual food choices. Participants subjected to the scented condition chose to consume the “fruity” dessert (compote) more frequently than those who had waited under the control condition, who chose more frequently the dessert without fruit (brownie).
4	Lefebvre et al. <sup>50</sup>	2019	The influence of ambient scent temperature on food consumption behavior	University students	USA	1 field experiment and 5 experimental studies	To test if ambient odours that induce perceptions of warmer (vs. cooler) temperatures will lead to decreased calorie consumption and reduced choice	Effects of ambient odour on calorie consumption	A warm (vs. cool) ambient odour led participants to consume less food. The results of six studies show that a warm (vs. cool) ambient odour leads to a reduced amount of food and calorie consumption both in field as well as in laboratory settings.

	Author	Year	Title	Population	Country	Design	Objective	Outcome measure	Findings
							likelihood of calorific foods.		
5	Mors et al. <sup>51</sup>	2018	Can food choice be influenced by priming with food odours?	N=37 recruited through food research database	DK	Observational study; Within-participant design	This study's aim was to examine the effects of different types of non-attentively perceived food odours—namely, bread odour and cucumber odour, on subsequent lunch choices in a real-life setting.	Food choice; odour awareness; mood	Odour priming and control conditions did not affect lunch selections. Self-reported positive mood was significantly affected by odour condition. Odour condition did affect mood but not lunch choice. No effects of odour primes on food choice in a real-life setting were observed.
6	Wansink et al. <sup>46</sup>	2012	Fast food restaurant lighting and music can reduce calorie intake and increase satisfaction	Restaurant customers	US	Field experiment	To investigate whether people in a relaxed environment with soft lighting and music would eat longer and order more than those in a typical environment.	Length of eating time; Food purchasing	Diners in both the fine dining and fast food groups ordered similar foods and a similar number of calories. Those eating in the fine dining room ate for longer. This led them to eat less and to waste more of the food they had originally ordered. Those in the fine dining condition were no more likely to order extra food than those in the fast food condition. In the fine dining condition, ratings of the food were higher than in the fast food condition. These results challenge the generally hypothesised U-shaped effect of restaurant lighting and music on food consumption. Loud music and bright lights accelerated one's food consumption, and soft music and soft lights decelerated consumption. Even when people stayed longer, they ate less.

Table 2D: Pricing

	Author	Year	Title	Population	Country	Design	Objective	Outcome Measure	Findings
1	Aydinoğlu et al. <sup>55</sup>	2010	Guiltless Gluttony: The Asymmetric Effect of Size Labels on Size Perceptions and Consumption	University students (N=58; N=82; N=224; N=200)  1 field test Executives (N=76)	US	Series of 4 crossover in between subject tests	How do people integrate different cues to arrive at a size judgment?	Portion size estimation; perceived consumption; actual consumption	Size labels affect size judgements and also actual and perceived consumption. Consumers can continue to eat large sizes that are labelled as small and feel that they have not consumed too much.
2	Hagen et al. <sup>54</sup>	2017	Rejecting Responsibility: Low Physical Involvement in Obtaining Food Promotes Unhealthy Eating	Students: N=189; N=75; N=179; N=184  General population: N=160	US	Series of 5 experiments	To investigate if consumers being less (vs. more) physically involved in helping themselves to food increases both the incidence and the quantity of unhealthy eating by enabling the consumers to avoid responsibility.	Food consumption; portion size choice	Consumers' portion size and eating decisions depend jointly on whether the food is healthy or unhealthy and on the level of physical involvement required to obtain it. When food was unhealthy, both portion sizes and consumption amounts were larger when participants were served by someone else rather than themselves. Being less involved in portion choice and the physical act of being served is associated with consumers abdicating their personal responsibility for what they eat.
3	Carroll et al. <sup>53</sup>	2018	Food bundling as a health nudge: Investigating consumer fruit and vegetable selection using behavioral economics	General population N=367	US	Field experiment in simulated small grocery store	To determine: 1) whether cognitive load influences healthy versus unhealthy grocery selection; 2) if displaying healthy food bundles influences fruit and vegetable selection, and 3) whether such bundles need to offer a price discount.	Food purchasing	The highest percentage of fruit and vegetables are selected when participants are under no cognitive load and view discounted bundles. Unhealthy options are more likely to be selected when cognitive resources are constrained. When bundles are displayed, an increase in fruit and vegetable purchasing is observed. Discounted bundles are more effective in the absence of cognitive load, but non-discounted bundles are more effective when shoppers are under cognitive load.

Table 2E: Marketing

	Author	Year	Title	Population	Country	Design	Objective	Outcome Measure	Findings
1	Boland et al. <sup>66</sup>	2013	Time of day effects on the regulation of food consumption after activation of health goals	University students N=121 N=149	US	2 experimental studies: TV advertising priming; and supraliminal priming	To determine whether activating health goals—either via laboratory priming techniques or via advertisements—can help people regulate food intake later in the day, when self-regulation resources are typically depleted.	Snack food consumption	Activation of health goals resulted in decreased snack food consumption in the afternoons but not the mornings. This effect is present for non-conscious primes.
2	Buckland et al. <sup>67</sup>	2013	Pre-exposure to diet-congruent food reduces energy intake in restrained dieting women	N=55 female	UK	2 (condition: diet or tempting) × 2 (dieting status: restrained dieter or unrestrained non-dieter) mixed factorial design with condition as a within-subjects factor and dieting status as a between-subjects factor	To examine the effect of exposure to a diet-congruent food on subsequent energy intake in active dieters.	Snack food consumption	Unrestrained non-dieters consumed similar amounts of snack food across conditions, while restrained dieters consumed 60% less chocolate (kcal) after exposure to the diet-congruent cue compared to the tempting cue. Exposure to a diet-congruent food cues may help dieters control energy intake when tempted by palatable food.

	Author	Year	Title	Population	Country	Design	Objective	Outcome Measure	Findings
3	Papies et al. <sup>56</sup>	2014	Using health primes to reduce unhealthy snack purchases among overweight consumers in a grocery store	Supermarket customers N=99	NL	2x2 between-participants design	To test the effectiveness of a simple health prime [flyer] to reduce the purchases of energy-dense snack foods in a grocery store among overweight individuals.	Time spent in store;  Purchasing intention	The health prime reduced snack purchases compared with the control condition among overweight and obese participants. When primed, overweight and obese participants bought almost 75% fewer snacks. No conscious awareness of the prime was necessary for these effects.
4	Papies et al. <sup>58</sup>	2010	Goal priming and eating behavior: enhancing self-regulation by environmental cues	Customers N=156	NL	Observational study	To observe the eating behaviour of participants in a setting where they were exposed to attractive food cues, and had the opportunity to eat free meat snacks.	Number of snacks consumed	Restrained eaters ate more than unrestrained eaters in the control condition. However, they reduced their eating behaviour when primed with dieting, whereas this manipulation did not affect unrestrained eaters.
5	Koenigstorfer et al. <sup>61</sup>	2016	The effect of fitness branding on restrained eaters' food consumption and postconsumption physical activity	University students N=163; N=231; N=145	DE	3 experimental studies	To determine if restrained eaters will consume more calories when the food is fitness branded and if fitness cues will have a similar effect as diet cues.	Food consumption	Fitness cues, which associate a product with the concept of fitness, increase restrained eaters' consumption of dietary-permitted food, and decrease physical activity post consumption. Eating fitness-branded food serves as a substitute for actual physical activity in restrained eaters.

	Author	Year	Title	Population	Country	Design	Objective	Outcome Measure	Findings
6	Nederkoom et al. <sup>60</sup>	2014	Effects of sales promotions, weight status, and impulsivity on purchases in a supermarket	general population 18-50 years	NL	online simulated purchasing tasks with or without advertisement primes	To determine whether overweight and/or high-impulsive people buy more calories in an internet supermarket with sales promotions for snacks then without sales promotions, compared to lean and/or low-impulsive people.	Total calories purchased; snack calories purchased; impulsivity	High-impulsive people purchased more calories from the supermarket than low-impulsive people. High-impulsive individuals bought more calories from snack products when they were advertised, but only when they were overweight. Lean high-impulsive individuals were not influenced by advertisements. Low inhibitory control leads to increased caloric purchases in an internet supermarket. In addition, low inhibitory control, in combination with overweight, makes participants especially vulnerable for environmental food cues.
7	Forwood et al. <sup>57</sup>	2015	Priming healthy eating. You can't prime all the people all of the time	General population over 18. N=143 N=764	UK	2 between subjects design experiments	To investigate: 1) the prime activates the goal of eating fruits and vegetables in participants with high hunger; and 2) the prime activates the goal of eating fruits and vegetables under cognitive load.	Food choice; hunger; dietary restraint;	The effect of the prime is only in more educated participants with some hunger. Age and education appear to have an impact on food preferences not explained by the psychological variables that predicted fruit selection including explicit food goals and the belief that unhealthy foods generally taste better. The effect is not generalisable to a representative population.
8	Harris et al. <sup>59</sup>	2009	Priming effects of television food advertising on eating behavior	Children 7-11 years. N=118. Adults 18-24 year old	US	Randomised observational intervention study. Participants	To investigate if: 1) food advertising that conveys snacking and fun (ie, those typically shown during children's	Amount of snack food consumed; awareness of prime; hunger	Food advertising that promoted snacking, fun, happiness, and excitement directly contributed to increased food intake. This effect was observed in both children and adults. In adults, nutrition

	Author	Year	Title	Population	Country	Design	Objective	Outcome Measure	Findings
				University students. N=98		were blind to study objectives.	programming) automatically cues eating behaviour among adults as well as children; and 2) advertising will affect consumption of any available foods, not only those that were advertised.		advertising did not result in healthier snack consumption. The amount consumed after viewing snack advertising was completely dissociated with adult participants' reported hunger. Men and restrained eaters were affected more strongly.
9	Sihvonen et al. <sup>63</sup>	2017	Hear what I appreciate: activation of consumption motives for healthier food choices across different value segments	Pilot N=99 N=654	FI	4 group between participant design	1) To evaluate the usefulness of direct goal priming when aiming at healthier food choices; and 2) to identify the boundary conditions that either favour or inhibit the emergence of motivational priming effects.	Food choice	Direct priming of a health goal proved to be effective in steering consumers towards healthier food options. Surprisingly, however, responsibility and status primes also led to an increase in choices of healthy food products. Moreover, a moderation analysis showed that the consumer's values (achievement, conservation, and universalism) play an important role in how goal priming works. Thus, the success of priming greatly depends on the underlying values of the consumers.
10	Stamos et al. <sup>68</sup>	2018	Pre-exposure to Tempting Food Reduces Subsequent Snack Consumption in Healthy-Weight but Not in Obese-Weight Individuals	N=131	BE GR	Observational study of snack consumption post unhealthy food prime	To test the pre-exposure effect, which implies that consumption of tempting food is decreased after exposure to tempting food cues in a context of a task that discourages food consumption.	Lexicon task; Food consumption	Pre-exposure effect is a promising procedure to reduce consumption of unhealthy food. The effect is observed in this study only in healthy weight individuals and not obese individuals. The pre-exposure effect mechanisms bear similarity to the counteractive self-control procedure.
11	Werle et al. <sup>62</sup>	2015	Is it fun or exercise? The framing of physical activity biases subsequent snacking	N= 56 female university admin staff; N=46 university	US	Prospective observational study	To examine how changing perceptions of physical activity through framing can impact subsequent food consumption.	Food consumption; calorie consumption; snack food choice	Across three studies, in both lab and field settings, framing a physical activity as fun (vs. exercise) influenced participants' subsequent behaviour. It was also found that labelling a physical activity as fun reduced the amount of calories

	Author	Year	Title	Population	Country	Design	Objective	Outcome Measure	Findings
				admin staff; N= 231 runners					consumed in side dishes during a meal. The amount of hedonic food served and perception of fun during a race positively influenced the choice of a healthy snack. Compensation for physical activity was found to be primarily directed towards hedonic rather than utilitarian food products.