



Research report

Behavioural strategies to control the amount of food selected and consumed ^{☆,☆☆}



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ARTICLE INFO

Article history:

Received 21 March 2013

Received in revised form 13 August 2013

Accepted 13 September 2013

Available online 25 September 2013

Keywords:

Behavioural strategies

Energy intake

Overweight

Food intake

ABSTRACT

Several factors within the food environment may stimulate overconsumption. The present study aimed to (1) identify behavioural strategies to cope with this environment to control the amount of food consumed, (2) examine the feasibility and usefulness of the strategies, and (3) evaluate the association between the strategies and body mass index (BMI). After the literature was screened for evidence of factors that contribute to the consumption of large amounts of food, 32 behavioural strategies were identified to overcome these influences (study 1). Subjectively reported feasibility and usefulness of the 32 behavioural strategies in weight management were explored using a pretest post-test study (study 2: $n = 52$). Additionally, two cross-sectional questionnaire studies (study 3a: $n = 120$ and study 3b: $n = 278$) were conducted to evaluate the association between the 32 behavioural strategies and BMI. The strategies were subjectively reported as feasible and useful in weight management. Frequent use of strategies discriminated non-overweight from overweight individuals, but did not discriminate overweight from obese individuals. In conclusion, the findings provided preliminary evidence for the acceptability and validity of the strategies. The effectiveness of the strategies for controlling the amount consumed should be further investigated, especially in overweight and obese participants.

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Introduction

There are numerous factors of the food environment that may stimulate overconsumption whereby food intake exceeds daily requirements, resulting in a positive energy balance (French, Story, & Jeffery, 2001; Swinburn, Egger, & Raza, 1999). Also, several environmental cues (i.e. music, in-store media such as talking shelves, food-commercials and advertisements) influence eating and food purchasing behaviours in ways that people cannot even recognize or resist (Cohen & Babey, 2012). Key factors in the food environment associated with a surplus amount of foods consumed are (1) the availability of high caloric tempting foods, (2) easy accessibility of high-caloric, low nutrient-dense foods, (3) the presence of large food portion sizes, and (4) price and marketing strategies that persuade consumers to increase their food purchases of high-caloric or low-nutrient dense products (Brownell, 2004). To empower individuals to cope with the influences of the food

environment on the amount of high caloric they consume, a solution might be found in increasing their ability to self-regulate the amount of food they select and consume (de Ridder & de Wit, 2006; Steenhuis & Vermeer, 2009).

Self-regulation refers to all efforts to steer attention, emotions and behaviours to reach beneficial long-term goals (i.e. weight loss), even when there are short-term temptations (i.e. a nice cookie) or conflicting long-term goals (De Ridder & de Wit, 2006). In the context of controlling the amount of food consumed, self-regulation refers to efforts to control and maintain adequate selection and intake of the amount of food, thereby resisting or adapting temptations and situations by which one is triggered to overeat. As a first step towards improving self-regulation of the amount of food consumed, it is important to identify and evaluate evidence-based behavioural strategies that help individuals to regulate the amount of food selected and consumed.

Therefore, the aim of this manuscript was to identify behavioural strategies to control the amount of food selected or consumed and to determine the preliminary evidence for their acceptability and validity. In study 1, existing literature on factors influencing the amount of food selected and consumed were reviewed, and behavioural strategies to eliminate or to cope with these factors were identified. In study 2, the current use of these strategies by individuals was evaluated, and furthermore, the strategies were evaluated for their feasibility, usefulness and outcome

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** Funding: This study was funded by ZonMW, the Dutch Institute for Research in Health Care (project number: 121020019).

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expectancies. In study 3, the use of the strategies was evaluated for their association with body mass index (BMI). Finally, overall conclusions and implications for further research and practice were explored.

Study 1: Identification and evidence of behavioural strategies to control food consumption amounts

Methods

Based on literature in the field of eating and consumer behaviour and marketing research found in the PubMed database, factors associated with the selection and intake of large amounts of food were identified. Literature was searched using keywords such as 'portion size', 'energy intake', 'food intake', 'food selection' and 'food consumption'. Further studies were identified based on references in the retrieved manuscripts. Studies with adults, adolescents or mixed study samples as research population were selected, and outcome measures had to be related to the amount of food selected or consumed.

Results

In total, 51 articles were included to identify factors associated with surplus food selection and intake. In short, these factors were related to purchase behaviour, meal and package size, stockpiling, food exposure (e.g. visibility of foods), mindless eating (e.g. as a consequence of being distracted by watching television) and portions in eating establishments (e.g. food portions in restaurants).

Based on these factors, 32 behavioural strategies to eliminate or to cope with the associated influences were identified. These behavioural strategies increase people's ability to self-regulate the amount of food they select and consume and might decrease individuals risk for overconsumption due to daily life influences of the current (Western) food environment. Below, each factor is discussed. Additionally, for each factor the behavioural strategies are presented. A complete overview of all strategies is presented in [Table 1](#).

Purchase behaviour

Relevant price marketing strategies used to persuade consumers to buy larger amounts and more products are value size pricing ([Wansink, 1996](#)), bundle promoting ([Foubert & Gijsbrechts, 2007](#)) and free sampling ([Heilman, Lakishyk, & Radas, 2011](#)), as consumers will select a package size that maximizes utility ([Wansink, 1996](#)). Large packages are made attractive for customers because a lower price per unit is paid. Also, because of regular sale promotions, consumers might increase their purchase volume. These marketing strategies generally lead to lower costs per unit for large food portions, which consequently leads to higher usage volume ([Wansink, 1996](#)). Moreover, high-calorie, low nutrient-dense foods are rather cheap compared to low-calorie high nutrient-dense foods ([Waterlander et al., 2010](#)).

In bundling promotions, customers get a discount when a specific (but larger) quantity is purchased (e.g. buy two, get 50 cents off). Bundle promotions with low purchase requirements stimulate purchases among customers who are used to buying products within the food category ([Foubert & Gijsbrechts, 2007](#)), even if they did not intend on buying the promoted food.

In-store free samples further persuade customers to taste and buy the sampled food. Research demonstrated that when offered, 70% of the shoppers consumed a free sample, of which 40% bought the sampled food ([Heilman et al., 2011](#)). Obese consumers were

found to be more vulnerable to increasing their in-store purchases when tasting a free sample ([Steinberg & Yalch, 1978](#)). The behavioural strategies to control the amount of food selected corresponding to purchase behaviour are:

- (1) *When grocery shopping, make a list in advance and do not deviate from it when you are in the supermarket. Do not be tempted by special deals and offers (bundle promotions such as buy-two-get-\$1-off or buy-one-get-one-free).* ([Foubert & Gijsbrechts, 2007](#); [Wansink, 1996](#))
- (2) *Don't buy jumbo-sized packages (30% extra or the largest package) and do not buy large quantities at once.* (e.g. [Wansink, 1996](#); [Raynor & Wing, 2007](#))
- (3) *Don't taste free samples at shops.* ([Heilman et al., 2011](#); [Steinberg & Yalch, 1978](#))

Meal and package sizes

People perceive serving sizes that are larger than reference serving sizes as appropriate to serve themselves ([Schwartz & Byrd-Bredbenner, 2006](#)). Larger than necessary meals promote passive overconsumption, and research demonstrated a positive association between the portion size served and the amount consumed ([Diliberti, Bardi, Conklin, Roe, & Rolls, 2004](#); [Jeffery et al., 2007](#); [Kral & Rolls, 2004](#); [Rolls, Roe, & Meengs, 2007](#); [Wansink, van Ittersum, & Painter, 2006](#)), though no association between ratings of hunger and satiety and the portion size served was found ([Rolls, Morris, & Roe, 2002](#); [Rolls, Roe, & Meengs, 2006](#)).

Also, the amount of pre-packaged food consumed is driven by the size of the single food items and by the size of the package. Individuals increase their energy intake when consuming larger food items by weight compared to small food items (e.g. candies weighing 4 g versus candies weighing 2 g), even when the total caloric content of both portions provided is similar ([Marchiori, Waroquier, & Klein, 2011](#)). Moreover, people consume more out of large packages than out of small packages ([Flood, Roe, & Rolls, 2006](#); [Rolls, Roe, Kral, Meengs, & Wall, 2004](#)) independent of the perceived taste ([Wansink & Park, 2001](#)) or food quality ([Wansink & Kim, 2005](#)). This phenomenon arises for packages of high-convenience foods (e.g. the amount of chips consumed increases as the package size increases) ([Rolls et al., 2004](#)), as well as for packages of low-convenience food that requires preparation before consumption (e.g. a portion of spaghetti that needs to be removed from the package to be cooked) ([Wansink, 1996](#)). Even the container size independently of the portion size influences the amount consumed ([Marchiori, Corneille, & Klein, 2012](#)). Another cause of selecting and consuming large portions might be the result of the 'unit bias' ([Geier, Rozin, & Doros, 2006](#)). In this case, people think that a single package is the appropriate and optimal amount to consume, yet the package actually contains more servings than appropriate for a single eating occasion. Due to unit bias, people are unaware of consuming more than appropriate. The behavioural strategies to control the amount of food selected and consumed corresponding to this factor are:

- (4) *Don't consume the total amount of a package or container of food but determine the amount of a 'normal' serving size to eat.* (e.g. [Diliberti et al., 2004](#); [Flood et al., 2006](#); [Geier et al., 2006](#); [Jeffery et al., 2007](#); [Kral & Rolls, 2004](#); [Rolls et al., 2004](#); [Schwartz & Byrd-Bredbenner, 2006](#); [Marchiori et al., 2012](#);
- (5) *When preparing a meal, decide what a normal serving size of the ingredients per person is beforehand. Don't use the whole package automatically, but take the number of people who will be eating into account.* (e.g. [Geier et al., 2006](#); [Schwartz & Byrd-Bredbenner, 2006](#)).

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