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Encouraging Healthy Choices in the Retail Store Environment: Combining Product Information and shelf allocation

Structured abstract

Purpose – Nutritional information and the visibility of healthier food products inside the store are believed to be important variables in helping shoppers to make healthy choices. However, there remain gaps in our understanding of how consumers select healthy products and how they include complex nutritional information in the decision-making process, in a stimuli rich environment. This research tests the impact of different combinations of stimuli (information and space management) on the selection of healthier products.

Methodology – Through a within-between subjects on-line experiment, a set of hypotheses relating different combinations of information provision (communication) and space management (shelf display) were tested for two different product categories: cereal bars and breakfast cereals. The sample comprised 249 participants within the UK.

Findings – Results show that there is no single unique solution to encourage healthy food choices. The characteristics of the category, the frequency of purchase, the way products are displayed on the shelf and the complexity of the nutritional information provided matter.

Originality – This paper enriches the literature about healthy food choice behaviours by exploring combined interventions in store.

Keywords: shelf-display, healthy choices, nutritional information, coloured labels

Article classification: research paper

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1. Introduction

The link between a poor diet and ill health, with the consequent personal and societal implications, is well established. Despite numerous macro-level information campaigns in the UK to encourage healthier eating, changes in behaviour have been limited. The retail store environment, as the place where most food and drink choices and purchases are made, is regarded as a crucial battleground in trying to change behaviours. Some steps have been taken to alter this environment and to 'nudge' consumers into making different choices. Nudging reshapes the environment in which shoppers make their decisions by changing the presentation of options to consumers and making them more appealing, without removing options, changing economic incentives or constraining shoppers' liberty of choice (Thaler and Sustein 2008; Downs et al., 2009; Keller, Markert, and Bucher 2015).

At the product level, informed choice has been supported through clearer presentation of product contents. Legal requirements determine the product information, but communication and consumer understanding of this information remain key issues. A voluntary front-of-pack nutritional labelling scheme has been in place in the UK since 2013, but there remain large gaps in our understanding of how this information is processed, interpreted and used by consumers. The impact of nutritional labels has been tested through menus in restaurants, cafeterias and hospital canteens (Cadario and Chandon 2017; van Kleef, Otten, and van Trijp 2012). These studies demonstrate growing evidence of the ability of point of purchase (POP) information, particularly front of pack (FOP) nutrition labels, to assist consumers in determining the healthiness of food products (Volkova and Ni Mhurchu 2015). Most research has, however, focused on the level of understanding of these labels; on the time required to process the information; and the time needed to assess whether a product is healthy or unhealthy (Jones and Richardson 2007).

Purchasing behaviour is typically measured through the likelihood of selecting healthier alternatives rather than the actual choices made by individuals. The effect of front of pack labelling in general is not clear (Achabal et al. 2000; Kristal et al. 1997; Muller 1984; Cawley et al. 2015). Some authors found no significant change in purchasing behaviours, whilst others found that shoppers bought fewer items in the category rather than switching to more nutritious items. Others found that nutritional information only increased the purchases of 'healthier' foods in certain categories, such as prepared foods, yoghurt, butter, cookies and crackers, dried fruit and nuts (Levy et al. 1988; Rodgers et al. 1994; Schucker et al. 1992;

Curhan 1974; Cawley et al. 2015). Due to the vast range of stimuli in a retail store environment, many authors argue that the effectiveness of this kind of intervention is weaker in grocery stores (Cadario and Chandon 2017).

Product location and display inside the store matters. Most of the marketing literature demonstrates that the quality and the quantity of space given to a product, category or brand can influence shoppers' decisions (Chandon et al. 2009; Inman, Winer, and Ferraro 2009; Dulsrud and Jacobsen 2009; Stilley, Inman, and Wakefield 2010). The more space allocated to a specific product, brand, or segment, the more likely is it to be seen and then purchased (Bhakat and Muruganantham 2013; Inman, Winer, and Ferraro 2009; Bayley and Nancarrow 1998). Despite this, previous studies provide limited evidence that product positioning can be effective in influencing healthier food choices (Wilson et al. 2016). Currently, the UK store environment appears more prone to exploit shelf space to promote unhealthy, rather than healthy, food products as some manufacturers, especially in smaller stores, supply branded shelving and other fixtures to promote their products (Sparks and Burt 2017). There are few studies on choice architecture and different context adjustments (e.g. product placement and presentation) in the retail setting in the UK market.

Adam and Jensen (2016) argue that health related interventions need to be combined: *"interventions which combine price, information and easy access to and availability of healthy foods with interactive and engaging nutrition information; if carefully designed can help customers of food stores to buy and consume more healthy foods*". Most research, however, is focused on a single way of promoting health. This study aims to test strategies for promoting healthier food choices by combining different stimuli (Wansink 2017). Different combinations of information provision (product information) and space management (product display) will be tested in two different product categories with different purchasing characteristics. Specifically, we aim to test the effectiveness of simple single colour shelf labels (red, amber, green) that synthetize the *overall* nutritional profile of each product when presented through different shelf display options. This 'augmented' labelling presented clearly on the shelf rather than the pack draws attention to the healthiest options and helps consumers categorize food options according to healthiness (Cadario and Chandon 2017).

Given the ambiguous results found in the literature regarding the effectiveness of in-store marketing strategies on the promotion of healthy products, the general aim of this work is to enrich the extant literature by testing the hypothesis according to which the point of sales is able to stimulate the purchase of healthier alternatives and not only vice products. If this hypothesis is confirmed, a new scenario is opening for retailers that can make the selection

of healthier products easier, increase the sales of virtue products and at the same time position themselves as healthy-oriented companies.

This paper is organized into four sections. First, we provide an overview of the impact of different kinds of nutritional information provision from the literature and conclude that a simpler way to communicate healthier products is needed in combination with different display options and develop appropriate hypotheses. Second, we present our methodology, which distinguishes the pre-test and the main experiment, and then we present and discuss our findings. Finally, we provide an overview of the main conclusions and we discuss the implications for retail managers, before addressing the limitations and suggesting areas for future research.

2. Theoretical Background and Hypotheses

Within the literature on healthy eating, several authors have identified a lack of knowledge as one of the main factors contributing to unhealthy diets (Thorndike et al. 2014). But it has been demonstrated that relying only on education, knowledge and cognition fails to change eating behaviours, as there is an unreliable link between knowledge and behaviour (Wansink 2015). Individuals do not predominantly rely on the information available to make choices, rather habit, impulse and nonconscious goals dominate (Papies 2016). Habits have been defined as '*associations between specific situational cues and actions, which individuals form by repeatedly performing a goal-directed behaviour in the same context*' (Hofmann, Friese, and Wiers 2008) and impulses are typically conceived as immediate approach responses towards rewarding stimuli (Hofmann, Friese, and Wiers 2008; Bayley and Nancarrow 1998; Beatty and Ferrell 1998). These variables make food choice a mindless choice (Wansink 2012; Wansink and Sobal 2007), which can be triggered automatically by the situation (Papies, Barsalou, and Custers 2012).

There is a range of information to assist healthy food choices on products at the point of purchase. The nutrition information panels (NIPs) on product packaging provide nutritional content per serving and per 100 grams and the percentage of reference intakes for the average adult, in addition to ingredients and allergens. As they describe in detail the nutritional content for each product, NIPs are classified as 'descriptive nutritional labels' (Cadario and Chandon 2017). Despite the detail provided, this type of information does not seem to encourage consumers to select healthy products. Some authors state that the NIPs are complex, cryptic and placed in non-visible areas, making comparisons between different products difficult. In isolation a NIP is unlikely to help shoppers during a grocery shopping expedition, when fast visual evaluation characterizes the large majority of decisions (Hamlin

and McNeill, 2016; Inman, Dzhogleva, and Maurer, 2013). The combination of a large volume of information and a lack of time discourages shoppers from reading NIPs (Kelly et al. 2009; Walker et al. 2008) and high literacy and numeracy skills are also required to interpret the information (Sonnenberg et al. 2013). Even when consumers have these skills, they may not have the resources to use the nutritional information to engage in healthy behaviours (Easton, Entwistle, and Williams 2010).

This suggests that, in order for nutritional information to be incorporated into consumers' decision making, it should not only be available at the point of purchase but also easily "processable" (Inman, Dzhogleva, and Maurer 2013; Russo et al. 1986; Bettman 1975). Shoppers face three different types of costs when incorporating nutritional information into their food choices: collection costs (time and effort required to acquire the information); computation costs (effort in combining the information into an overall evaluation), and comprehension costs (effort to understand the information). Reducing all three increases the probability that individuals will use and rely on nutritional content information when making food choice decisions (Russo et al. 1986). Providing simpler and easy-to-process nutritional information should reduce all three types of cost and help customers to make healthier food choices.

Based on these assumptions, the majority of interventions tested in the extant literature have attempted to reduce the complexity of nutritional information by providing synthesised information for each product in a more visible manner, for example on the front of the package (Borgmeier and Westenhoefer 2009). There are two common types of FOP label systems: nutrient-specific systems, and summary systems. The former usually provides a ranking of total fat, saturated fat, sugar, sodium or salt, and sometimes energy. The latter system uses an algorithm to provide an overall nutritional score. The system can be both binary, when a logo is portrayed if the food meets specified nutrient criteria, or graded, when a ranking is provided (Hersey et al. 2013). Graded systems take into account several items of nutritional information (vitamins, minerals, fibres, whole grains, as well as saturated fat, trans-fat, added sodium and added sugars) and assign scores to each product. A number of algorithms have been developed and different symbols have been used to communicate such information (Hersey et al. 2013; Russo et al. 1986; Hamlin and McNeill 2016; Borgmeier and Westenhoefer 2009). These labelling systems are categorised as 'evaluative nutritional labels' because, in contrast to descriptive ones, they aim to draw attention to the healthiest options and help consumers categorize options according to healthiness (Cadario and Chandon 2017).

Research shows that consumers find it more difficult to understand FOP labels that only display numeric information such as % GDA (Guideline Daily Amount) and/or grams (Jones and Richardson 2007). To simplify the information, often 'traffic light' colour coding is associated with the proportion of each the nutrients in the food to show consumers whether a product is high (red), medium (amber) or low (green) in fat, saturated fat, salt, sugar and, energy (in calories). As well as this 'traffic light' colour coding the scheme also uses text to denote 'high', 'medium, and 'low' and a percentage GDA.

Both FOP systems appear to have had limited effect in the UK market. The scheme is voluntary so not all grocery chains and manufacturers use it, and as there are a number of different FOP labelling systems used by individual manufacturers and retailers, this further increases communication "noise" and may increase confusion among customers. Further, food products still remain displayed in ways that fail to help consumers easily find healthier alternatives (Lugli 2017; Hamlin and McNeill 2016). The variety of the food offer in grocery retailing makes direct product comparison difficult and shoppers inside a store cannot effortlessly compare all the products in a given category. Labels are not very visible, shoppers need to evaluate the information on every pack and the information is only partial: for example, in existing schemes the protein, fibre and vitamin content are not taken into account. Finally, as FOP labels and traffic light labels speak only to people who are already interested in healthy food (Wansink 2017), these types of intervention are more closely related to the traditional behavioural interventions of information provision (Bucher et al. 2016).

It has been demonstrated that a strong interest in labels is not always matched with an understanding of the quantitative information provided and that shoppers may be more readily influenced by qualitative information (Berning et al. 2010). Some authors suggest that simple labels and visual cues may be more useful in quick decision environments (such as the grocery store) as consumers need less time to evaluate them (Feunekes et al. 2008). Research has demonstrated a good consumer understanding and recognition of labels which use colours, compared with other information systems such as percentage based information or healthy choice labels (Wilson et al. 2016). The effectiveness of colours in communicating the healthiness of products relates to strong associations from prior experience. Individuals automatically attribute meanings to colour-coded items, as consumers generally having a good understanding of traffic light labels (Grunert, Wills, and Fernández-Celemín 2010; Hieke and Wilczynski 2012). Furthermore, a study in the UK found that consumers could process coloured FOP labels more quickly than non-coloured labels (Jones and Richardson 2007), and eye-tracking studies showed that health stimuli increased the time participants

spent looking at healthy foods, and this in turn predicted their healthy choices (van der Laan et al. 2016; Papies 2016; Chandon et al. 2006, 2009). Given the shortcomings of existing schemes, a simplified visual cue, that clearly communicates which product is healthier based on an overall nutritional profile (calories, saturated fats, sugar, salt, proteins, fibres, content of fruit and nuts), should make the choice of healthy products easier. Thus, we posit that

H1: Providing a simplified single colour shelf label synthesizing the overall nutritional information will be more effective in encouraging people to choose healthier products compared to situation in which only FOP information are provided

It has been argued that the way products are displayed on the shelf can influence shoppers' behaviour (Inman, Winer, and Ferraro 2009). In most product categories, products are grouped (aggregated) into segments and are displayed according to tangible product attributes, which create sub-categories. In contrast, in a benefits-based display (in this case 'healthy eating') products are grouped in terms of '*their ability to solve different consumers problems or help them meeting certain needs'* (Lamberton and Diehl 2013). It is argued that a benefits-based display guarantees the visibility of these outcomes (Lamberton and Diehl 2013; Lugli 2015), so displaying products together on the basis of their overall nutritional profile, indicated by a single coloured shelf label, might more easily attract shopper attention, since all the (healthier) 'green' products will be displayed together as will the less healthy 'amber' and 'red' ones. This approach to product display should enable consumers to positively react to cues and this could lead to a change in purchasing behaviour (Parniangtong 2017).

By providing a clear visual cue and combining stimuli (information and shelf display), it is possible to create a stronger effect on choice. Several authors have argued that combining communication with space management strengthens the effectiveness of the intervention (van Kleef, Otten, and van Trijp 2012; Adam and Jensen 2016). The basic assumption is that the more visible an aggregated product group is, the higher the probability that it will be seen and then selected (Lamberton and Diehl 2013; Buttle 1984). Thus,

H2: Displaying products in an aggregated manner based on nutritional benefits (healthy eating) communicated through a single coloured shelf label can be more effective in helping customers choose healthy products compared to

displaying products according to product attributes with the same coloured shelf label communication

As Johnson et al. (2012) note, '*what is chosen often depends upon how the choice is presented'*. It is argued that the visibility of options influences the perceived effort required to make decisions (Colombo, De Ponti, and Rizzi, 2010), and shoppers are more likely to select products that reduce the perceived effort required. Studies demonstrate that consumers are more likely to choose healthy items when they are displayed to the left (vs. right) of an unhealthy item (Romero and Biswas 2016). The consumption volume of healthy products is also higher when they are displayed on the left, further supporting the strong effect of the in-store environment and shelf space allocation on consumers' choices. Placing products at eye-level, or closer to the end of an aisle can guarantee high visibility, as they will experience more passing traffic and are more likely to be seen compared to products displayed in the middle of the shelf (Hansen, Raut, and Swami 2010).

Product segments (aggregated groups) can be displayed both vertically and horizontally on shelves. Choosing one display over another may strengthen the impact of aggregating products according to their nutritional benefits. Several authors argue that retailers should use a vertical display to give more visibility (Lugli 2002; Cardinali 2001; Pellegrini and Zanderighi 1991). Thus, within a product category, retailers prefer to manage segments by displaying products vertically, whilst brands are displayed horizontally. The vertical display provides a higher level of visibility compared to the horizontal display and it helps shoppers to save time during the shopping expedition, as they do not need to go up and down the aisle seeking out the products\brands they are looking for. These considerations lead us to posit that:

H3: Displaying nutritional benefit segments vertically is more effective in helping customers choose healthy products compared to displaying nutritional benefit segments horizontally

Finally, consideration should be given to the characteristics of the categories under investigation. In this study the categories chosen (breakfast cereals and cereal bars) were selected for several reasons. First, they can both satisfy the same core need, specifically 'breakfast', and as such could be considered as alternatives. In addition, there is great variability in the healthiness of the products available within both categories. According to some authors, the greater the variability in the healthiness of the products on offer, the

stronger the impact of a proposed intervention (Wansink 2017). Both categories can be considered as generally more nutritious than others displayed in-store and previous studies have demonstrated that consumers are more likely to use nutritional information in categories that are generally perceived to be more nutritious (Brucks, Mitchell, and Staelin 1984). Finally, although they may satisfy the same core need, they are characterized by different conditions. Breakfast cereals are a long established product category in the UK, and due to high levels of familiarity and the frequency of consumption they can be considered to be a 'staple' (Dhar, Hoch, and Kumar 2001). The breakfast cereal category is characterised by habitual purchases typically planned before the shopping trip. In contrast, cereal bars are a more recent category, mostly bought on impulse since they can also be consumed 'on the go' and the frequency of consumption is lower than that of breakfast cereals.

The literature relating to the role of the environment, and specifically to the role of the point of sale, considers the inter-purchase cycle. More frequently purchased products must be replenished most often. Several authors state that for these purchases, shoppers have a greater recognized need. Every time they go shopping they are likely to purchase items that are used up quickly (Inman, Winer, and Ferraro 2009), because they are more salient and therefore more accessible in the memory (Posavac, Sanbonmatsu, and Fazio 1997). Shoppers are also more likely to plan the purchase of items they buy frequently (Inman, Winer, and Ferraro 2009). The literature posits that the ability to influence shopping behaviour is greater when consumers have not yet decided what to buy in front of a shelf. In contrast, if individuals have a clear idea of what to purchase, the ability of merchandising interventions to modify preferences is weaker. Several authors identified different levels of planning in the shopping process. A shopper can plan to purchase: a specific product and brand, before the shopping trip; a specific type of product (segment), but not the brand; a specific product class (category), but not the segment nor the brand; or may identify a need, without specifying the class, segment or brand (Kollat and Willett 1967). Shoppers who have not decided the specific product and brand are frequently highly susceptible to in-store influences (Buttle 1984). Thus, we posit that:

H4: Consumers are more influenced by the environment when they have to choose products in the cereal bars category, compared to the breakfast cereals category, due to the nature the categories considered

3. Methodology

Promoting products based on their overall nutritional profile and communicating this through simple single colour shelf labels combined with favourable display conditions should guarantee more on-shelf visibility and increase the probability that consumers would use these cues when making a choice. To assess the effectiveness of different combinations of communication and shelf display stimuli, we created and tested our hypotheses with four different display stimuli for two different categories: breakfast cereals and cereal bars. A within-between subjects experiment was conducted, through an on-line questionnaire, to test the hypotheses.

Before the full experiment, a pre-test was completed to select the individual products for display in each the categories and to test and adapt the questionnaire for the main experiment.

3.1 The Pre-Test

A pre-test was conducted to select suitable products and brands that most consumers would be familiar with and which they would expect to see in a store (Iyengar and Lepper 2006). To ensure that the displays were as realistic as possible we visited a typical store of one of the leading UK grocery chains, took note of all the products displayed in the two chosen categories and ranked them using the Healthy Star Rating System to obtain a unique aggregate nutritional score for every product. The Healthy Star Rating System (Lawrence et al., 2018) is an Australian system that uses an algorithm to provide a composite score for each product, based on the content of energy (KJ), risk nutrients (saturated fat, sodium and sugars) and positive nutrients (dietary fibres, protein and the proportion of fruit, vegetable, nut and legume content). The values generated by the algorithm are based on a consistent measure of 100g or 100ml of a product, thus the star ratings of similar products can be compared at-a-glance. After classifying each product, they were divided into three colour groups (red, amber, and green) depending on the overall nutritional score. As we said before, the system returns a ranking based on 5 points. In order to simplify the readability of the shelf, we have decided to group the products into three clusters, corresponding to three nutritional segments. Specifically, a high score is better and it means that the nutritional quality of the product analysed is high, while a lower score means the product has worst nutritional quality. So, considering the three groups identified, the first group is "red," the second group is "amber," and the third group is "green". There is a need of reducing the complexity given the huge amount of products on the shelf and the need of simplify the buying process instore. It is well known that the retailer is the 'architect of the choice' (Lugli,

2009) and its role is to sell assortments and not only products (Lugli,2009). Based on these considerations, we have decided arbitrarily to place the breakpoints at 1.5 stars (dividing the first and second groups) and 3.5, dividing the second and the third groups.

For both product categories 36 items were taken from the 'top seller' section of the retailer's website and the pre-test participants (n=31; 45% female, M_{age}=34.20, SD=13.93) were asked to select five packages in a hypothetical scenario of buying breakfast cereals\cereal bars for the next few months. The pre-test was conducted using real products, arranged on a shelf in a lab setting. From this exercise 18 products were selected for each category.

Since our main goal was to test to the impact upon shopper choice of displaying products by nutritional benefit segments (degree of healthiness) rather than product attribute segments (flakes, clusters, museli etc) we needed to keep constant all other factors. The amount of space allocated to each benefit segment (red, amber, green), product attribute segment, product and brand was therefore kept constant. For the breakfast cereals category three brands (two manufacturer brands and one private brand) were chosen for six product attribute segments (flakes, flakes and fruit, shreddies, rice, clusters, chocolate cereals). For the cereal bar category, nine brands (including one private brand) and three product attribute segments (fruit and cereals, chocolate and cereals and fitness bars) were selected. In both categories, we selected six products belonging to respectively the green, amber and red nutritional segments, in order to avoid giving more visibility in terms of quantity of space to a specific segment or brand. Every product was assigned two facings. Once the quantity of space assigned to each product, brand and segment was kept constant, we sought to break down the effect of quality of space by randomizing the order of products within each brand, of the brand within each segment and of the segments (attributes and benefits). For the purpose of the study, no information was provided about the price of the products.

3.2 The Experiment

3.2.1. Stimuli and Procedure.

After conducting the pre-test, a four factor within-between subjects online experiment was conducted. A sample of 249 participants were recruited from the Qualtrics panel, a platform specifically designed for on-line surveys. After removing 15 participants due to incomplete questionnaires, a sample of 234 participants (52% female, 12% belonging to the 18 – 24 age group, 17% 25 – 34, 16% 35 – 44, 19% 45 – 54 and 37% over 55) were obtained to represent the UK population.

Each participant was randomly assigned to one of the four display stimuli (Appendix A):

1. products displayed by product attributes horizontally and brands vertically (the traditional store layout - control condition);
2. products displayed by product attributes horizontally and brands vertically (control condition) plus coloured shelf labels based on the overall nutritional benefit for each product;
3. products displayed vertically by overall nutritional benefit segments (indicated by coloured shelf labels) and brands;
4. products displayed horizontally by overall nutritional benefit segments (indicated by coloured shelf labels) and brands

Every participant in the experiment saw both categories (cereals and bars) and the same stimulus in both categories. The order of categories seen by participants was randomised to minimize the carryover effect in the within-subjects experiment (Calder, Phillips, and Tybout 1981). Each display option was presented as a picture. Participants were given information about the Front of Pack and shelf based coloured labelling (Appendix B) and were asked to ideally select five packages from each display, recreating a monthly shopping trip. Participants shown the control condition (option 1) could browse and read the information available on the Front of Pack (traditional FOP or traffic light scheme used by each brand). Participants in the other three experimental display conditions could only access the aggregated colour label. After completing the exercise for both product categories participants were asked to fill in a brief questionnaire about their choices, the display, their shopping and eating habits, and their personal profile.

3.2.2 Measures

Our dependent variable was the percentage of healthy choices (products belonging to the 'green' nutritional segment) made by each participant from each display. To test our hypotheses, we considered our independent variables to be the four different displays. After choices had been made from each display, participants were asked to indicate on a 7-point scale, how healthy they perceived their choices to be; how satisfied they were with their choice; how timesaving they considered the display to be, and how much they considered the display to be promoting healthy products (van Kleef, Otten, and van Trijp 2012). Every variable was measured through a single item, except for the extent to which the display promotes healthy choices (*'The shelf helps me easily find healthy products'* and '*The shelf promotes healthy products*'). The Cronbach's alpha for the breakfast cereals category was .819, and .830 for the cereal bars.

Participants then indicated their gender, age, and whether they were following a diet, if they use nutritional labels when choosing food, and whether they were frequent consumers of the two categories. Diet restrictions were measured through a 7-point scale on eight items developed by Moorman and Matulich (1993) measuring the extent to which a person was trying to control his\her diet (‘*I try to reduce my sodium intake’, ‘I watch the amount of fat I consume’, ‘I eat a well-balanced diet’, ‘I moderate my sugar intake’, ‘I eat fresh fruits and vegetables’, ‘I moderate my red meat consumption’, ‘I cut back on snacks and treats’, ‘I avoid foods with additives and preservatives’*), and the Cronbach’s alpha was .889. Nutritional label usage was measured using two items developed by Moorman (2015) on a 7-point scale (‘*I usually pay attention to nutrition information*’, ‘*I use nutrition information on the label when making most of my food selections’*), and the Cronbach’s alpha was .917. These measures serve as covariates in the analyses, since it has been demonstrated that presenting health-related cues might positively influence healthy choice behaviours amongst those who value the primed concepts (Papies 2016), and health status will facilitate healthy behaviours when consumers are motivated with regard to health (Moorman and Matulich 1993). The intention was to measure and isolate the effect of the proposed stimuli, whilst keeping constant all the other variables that could affect choice. Analysing the effects of the covariates is not the focus of the present work. However, Appendix C reports the output, underlying for which variables we found an effect for each of the two categories selected. Data were processed using SPSS 24 statistical software and the planned comparisons conducted.

4. Analysis and Results

4.1 Manipulation Check.

Following previous studies, the perceived realism of each display was measured to ensure that the stimuli were as close as possible to one that shoppers might find in the store (van Kleef, Otten, and van Trijp 2012). For each display participants were asked to indicate on a 7-point scale, how realistic they perceived it to be. In addition, since the main assumption of nudging techniques is that they maintain liberty of choice for individuals, participants were asked to indicate on a 7-point scale, how free they felt in making their choices. The results of the ANOVA showed that, for cereal bars, no differences were found in the perceived realism of the display amongst the different stimuli (M_{FOP}= 5.23, $M_{Coloured\_labels}$= 5.50, $M_{Horizontal}$= 5.04, $M_{Vertical}$= 5.24, F=.803, p=.493) and in the perceived freedom of choice (M_{FOP}= 5.45, $M_{Coloured\_labels}$= 5.62, $M_{Horizontal}$= 5.50, $M_{Vertical}$= 5.55, F=.147, p=.931). For breakfast cereals, whilst no statistical differences were found among the perceived

realism of the displays (M_{FOP}= 5.28, $M_{Coloured\_labels}$= 5.34, $M_{Horizontal}$= 5.54, $M_{Vertical}$= 5.33, F=.323, p=.809), a difference at the significance level of p<.01 was found in the perceived freedom of choice. Specifically, participants exposed to the traditional display (option 1), felt that they were given less freedom of choice (M_{FOP}= 5.00, $M_{Coloured\_labels}$= 5.70, $M_{Horizontal}$= 5.65, $M_{Vertical}$= 5.72, F= 3.994). The other three displays were not perceived as restricting their freedom to choose. Since a new aggregated nutritional information shelf label was provided, which individuals were not used to seeing, participants were asked to indicate on a 7-point scale, how much they trusted the information provided through the new shelf edge labels and traditional FOP\traffic light systems. Results of the ANOVA showed that, in general, considering both product categories together (since participants were exposed to the same stimulus in both categories), no statistical differences were found between the two labelling systems (M_{FOP}= 5.42, $M_{Coloured\_labels}$= 5.31, $M_{Horizontal}$= 5.39, $M_{Vertical}$= 5.13, F= .660, p=.578).

4.2 Product Choice

Breakfast Cereal Category.

The synthesis of the results is presented in the Appendix D.

In general, in the breakfast cereal category there is a significant impact of the different displays on the mean percentage of healthy products selected by each participant at the significance level of p=.005 (F= 4.428). Consistent with hypothesis 1, the percentage of healthy products selected when coloured shelf labels were provided (Option 2) was significantly higher than the traditional control condition display in which only FOP labels (Option 1) were available (M_{FOP}= .30, $M_{Coloured\_labels}$= .50, F=10.933, p<.001). In addition, when products are aggregated according to the colour, the display is perceived as more time saving (M_{FOP}= 4.65, $M_{Coloured\_labels}$= 5.28, F=4.691, p<.05). However, in general, no significant differences were found between the two display conditions in the perceived healthiness of choice (M_{FOP}= 4.63, $M_{Coloured\_labels}$= 5.28, F=.083, p=.774), in the perceived ease of choice (M_{FOP}= 5.60, $M_{Coloured\_labels}$= 5.70, F=.014, p=.905), in the level of satisfaction with the choice (M_{FOP}= 5.64, $M_{Coloured\_labels}$= 5.42, F=.511, p=.475) and in the display perceived as healthier (M_{FOP}= 4.75, $M_{Coloured\_labels}$= 5.05, F=.906, p=.342).

For the displays where products were both vertically and horizontally organized by nutritional benefits (options 3 and 4), participants were more satisfied with their choices ($M_{Coloured\_labels}$= 5.42, $M_{Horizontal}$= 5.75, $M_{Vertical}$= 5.61, F= 2.685, p<.10). A non-statistically significant difference was found between the percentage of healthy products selected in options 3 and 4, where both space and information were managed, compared to option 2

where only coloured shelf labels were provided ($M_{Coloured\_labels}$= .50, $M_{Horizontal}$= .38, $M_{Vertical}$= .43, F= 1.281, p= .259). No significant differences were found in the perceived healthiness of choice ($M_{Coloured\_labels}$= 5.28, $M_{Horizontal}$= 4.80, $M_{Vertical}$= 4.75, F= .088, p= .768), in the perceived ease of choice ($M_{Coloured\_labels}$= 5.70, $M_{Horizontal}$= 5.73, $M_{Vertical}$= 5.82, F= .270, p= .604), and in time-saving perceptions ($M_{Coloured\_labels}$= 5.28, $M_{Horizontal}$= 5.15, $M_{Vertical}$= 5.06, F= .044, p= .834) between the three conditions. However, when products were organized by vertical nutritional segments (option 3), participants perceived the display as healthier, compared to option 2, where only coloured shelf labels were provided ($M_{Coloured\_labels}$= 5.09, $M_{Vertical}$= 5,15, F= 4.233, p= .041) and to option 4, where nutritional segments were displayed horizontally ($M_{Horizontal}$= 4.86, $M_{Vertical}$= 5,15, F= 5.227, p= .023).

Cereal Bar Category.

In the cereal bar category, there was also a significant general impact of the displays on the mean percentage of healthy products selected at a significance level of p=.003 (F= 4.907). The percentage of healthy products selected when aggregated coloured shelf labels were provided (option 2) was significantly higher than the control condition (1) which only provided FOP labels (M_{FOP}= .33, $M_{Coloured\_labels}$= .47, F=4.646, p=.032). In addition, option 2 was perceived as more time saving (M_{FOP}= 4.68, $M_{Coloured\_labels}$= 5.29, F=4.295, p<.05) and healthier (M_{FOP}= 4.50, $M_{Coloured\_labels}$= 5.20, F=6.785, p<.01). However, no significant differences were found between options 1 and 2 in the perceived healthiness of choice (M_{FOP}= 4.81, $M_{Coloured\_labels}$= 4.93, F=.016, p=.900), in the perceived ease of choice (M_{FOP}= 5.42, $M_{Coloured\_labels}$= 5.62, F=.418, p=.518), and in satisfaction with the choice (M_{FOP}= 5.42, $M_{Coloured\_labels}$= 5.53, F=.081, p=.776).

Testing the second hypothesis, the results showed that, in general, participants chose more 'green' products in options 3 and 4 where products were displayed vertically and horizontally according to the overall nutritional profile, compared to option 2 at the significance level of p=.013 (F=6.207). The extent to which the display promotes healthy choices was higher in options 3 and 4 (F=2.677, p=.10) as was the perceived healthiness of the choice (F=2.513, p=.10). In particular, the display in which nutritional segments were displayed vertically (option 3) was the most effective in leading individuals to choose 'green' products ($M_{Horizontal}$= .41, $M_{Vertical}$= .51, F= 3.013, p= .084). Option 3 was also perceived as 'healthier' compared with option 4, in which nutritional segments were displayed horizontally ($M_{Horizontal}$= 4.82, $M_{Vertical}$= 5.10, F= 4.683, p= .032). Otherwise, no significant differences were found between options 3 and 4 in perceived healthiness of choice (F=1.178,

p=.279), satisfaction with choice (F=.993, p=320), ease of choice (F=.015, p=.903) and timesaving (F=.354, p=.552).

5. Discussion.

Hypothesis 1 posits that, compared to the traditional attribute-based display condition, providing consumers with easy-to-process coloured shelf labels based on aggregated nutritional information could encourage the selection of healthier products. The results showed that the proportions of 'green' products selected from the display where simplified aggregated nutritional coloured labels were provided (option 2) was significantly higher compared to the traditional control condition (option 1) for both the breakfast cereals and cereal bars categories. In addition, for both categories, the simplified coloured shelf labels were perceived as more time saving than the traditional FOP and traffic light information. In the cereal bar category, the simplified shelf labels were also perceived as promoting healthy products.

Hypothesis 2 posits that a combination of easy-to-process information and space management based upon nutritional benefits could be more effective in helping customers choose healthy products than displays with easy-to-process coloured labels organized by product attributes. In the breakfast cereals category, the results did not support this hypothesis, since no statistically significant difference was found between the proportion of healthy products selected from the 'benefit' displays (options 3 and 4) where both space and information were managed compared with the 'attribute' display (option 2) where coloured labels were provided but space was allocated by product attributes. However, participants were more satisfied with their choices from the displays where products were organized both vertically and horizontally by nutritional benefits.

In contrast, the results in the cereals bar category supported hypothesis 2. In general, participants chose more 'green' products in the displays (3 and 4) where products were presented both vertically and horizontally according to the overall nutritional profile, compared to displays based upon product attributes with nutritional information provided by either FOP/traffic light (option 1) or overall nutritional information provided by simplified coloured shelf labels (option 2). Furthermore, the displays where products were organized vertically and horizontally by nutritional segments were perceived as healthier.

For hypothesis 3, which expected the vertical display to be more effective than the horizontal display, the results were again different for the two categories. For breakfast cereals, no significant differences were found between the proportion of green products selected from the two displays. However, in general, when products were organized by vertical nutritional

segments (option 3), participants perceived the display as healthier, compared to the condition where only coloured shelf labels were provided (option 2). In the case of cereal bars, the results supported hypothesis 3. The display where nutritional segments were displayed vertically (option 3) was found to be the most effective in encouraging participants to choose 'green' products and it was perceived as healthier compared to the display where nutritional segments were organized horizontally (option 4).

The final hypothesis, posits that the manipulation would be more effective for the cereals bars category compared to the breakfast cereals category, as the latter is characterized by routinised consumption and habit. Participants were asked to indicate on a 7-point scale how much they rely on habit when choosing products and how frequently they consumed each category. Results showed a significant difference between the frequency of consumption of cereals bars and breakfast cereals, in the direction expected (M_{bars}=3.86, $M_{cereals}$=4.95, F=41.232, p<.001). In addition, participants stated that they relied more on habit when choosing breakfast cereals compared to cereal bars (M_{bars}=4.91, $M_{cereals}$=5.32, F=8.407, p=.004). Given the high frequency of consumption of breakfast cereals and the evidence of habitual purchasing behaviour in front of displays, a high level of familiarity might lead to confusion in front of a display where products are organized by nutritional segments instead of the usual (familiar) product attribute display. This may explain why the display organized by product attributes and brands with coloured shelf labels (option 2) was found to be more effective in helping participants to select 'healthy' products. It was a 'familiar' display but with clearer nutritional information. In contrast, when selecting cereal bars, which were a less familiar, non-habitual or routinized purchase, participants might rely more on external cues, so the displays where products were organized by vertical nutritional segments (option 3) was the most effective.

6. General Conclusion and Managerial Implications

This research aimed to explore if it is possible to help consumers recognize 'healthy' products and thus make it easier to select these products by manipulating both information provision and shelf space in-store. As grocery retailers are one of the main locations for food purchases, these results could provide useful directions for the promotion of healthier products inside the store.

Although individual food products display nutritional information, this currently takes several different forms which hinders comparison in a complex and cluttered store environment where choice is often made under time constraints. A simplified aggregated single colour label would appear to help consumers make choices. When combined with

shelf displays creating benefit (healthier options) segments the impact of this information may be amplified. If retailers wish to emphasise the 'healthy' part of their category offer then these factors should be taken into consideration. However, on the basis of this research this would require relatively radical changes to the way in which products are currently displayed – including highlighting unhealthy options – and not all categories appear to behave in the same way.

Different outcomes were found for the choice behaviour in the two categories selected. This may be explained by the nature of the category and the presence of well established, routinized buying behaviour in a category. In these categories (in this case breakfast cereals) consumers rely on familiar brands and packaging when shopping and habitual behaviours dominate, so they are less prone to external stimuli.

Several authors argue that aggregating products gives a higher level of visibility to the display. Displaying products based on nutritional segments may not always be the perfect way to promote healthy products since in many categories shoppers will face unfamiliar displays which might confuse them. It can be argued that as breakfast cereals is a familiar category characterized by a high frequency of consumption, consumers are used to regularly browsing the shelf and they already know what to buy (Inman, Winer, and Ferraro 2009; Posavac, Sanbonmatsu, and Fazio 1997). For these reasons, a display that remains organized by product attributes and brands seems to be the preferred one. However, for the same reasons, also providing easy-to-process overall nutritional information through a simple colour coding scheme was positively received and appreciated by participants, who selected a higher proportion of 'green' products when confronted with this type of display. Previous analysis found that the higher the frequency of consumption of a certain product, the higher the shoppers' concern about the healthiness of that product (Bellini et al., 2017). Participants also considered this type of display to be more timesaving compared to the traditional display which just provided existing FOP and traffic light labels.

Different conclusions can be drawn from the cereal bar category. The results showed that vertically displaying products according to overall nutritional segments can lead to an increase in the selection of 'green' products compared to when the same nutritional segments are displayed horizontally and when traditional attribute based displays with simplified coloured labels are provided. Thus, the combination of information and space management seems to be more effective in the less familiar and less routinised cereal bar category. Furthermore, the vertical nutritional segment display was perceived as healthier and also the healthiness of the choices made by participants was perceived to be slightly higher compared to all the other stimuli. Therefore, retailers should consider the specific characteristics of the

product category in which they wish to promote healthy eating, since it seems that there is no single unique solution to promoting health. Healthy choices can be made on impulse, but there are some category characteristics that should be also taken into account when implementing this kind of intervention.

Future research might look to address some of the limitations which relate to the research design. As an experiment rather than a real world setting there are a number of considerations to be taken into account. First, the first limitation is about the way stimuli were tested and the setting chosen for the experiment. It has been argued that using a laboratory rather than real setting can bias participants' choices (van Herpen et al. 2016) and results obtained in an artificial environment can be stronger that in a real environment (Cadario and Chandon 2017). Although all participants saw both categories to ensure high internal validity, not all the external variables that could have influenced choice in different conditions could be controlled. This is the nature of experiment-based methodologies.

Although the on-line experiment allowed us to engage with a high number of participants, representative of the population, and to stratify the sample, it meant that every participant was in a different place, condition and situation when he/she took part in the experiment. This provides some limitations in terms of external validity. Another limitation is connected to the fact that the price was not displayed. Price is one of the main barriers that previous studies have found to the adoption and maintenance of healthy eating behaviours. Considering the price would have changed the results and probably mitigated and reduced the effect of the communication. Next research, could test the combined impact of the communication and price on the choices.

Finally, further analysis could isolate the effect of the simplified coloured shelf labels on choice. The choice of products from each display could also be influenced by the brand and the package, since neither could be controlled for. The aim was to test the simplified coloured shelf labels in a 'realistic' environment with familiar products and several variables influence choice. For these reasons, the next step will be an attempt to isolate different variables (for example brand, size, nutritional information provided and segment) through conjoint analysis. This will attempt to identify the weight of the different types of nutritional information (FOP vs aggregated coloured labels) in product choice and assess the effectiveness of coloured shelf labels compared to FOP or traffic light systems.

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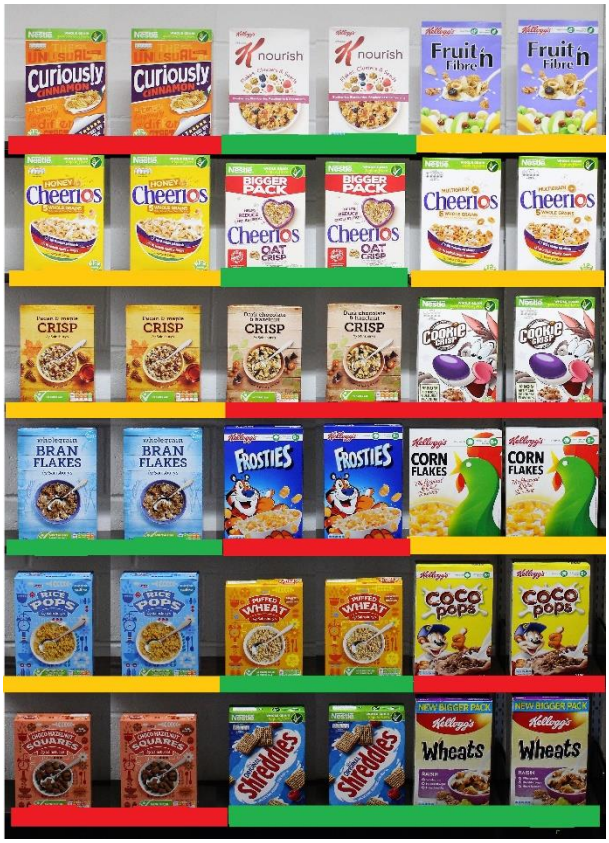
Appendix A – Display Stimuli Options: Breakfast Cereals

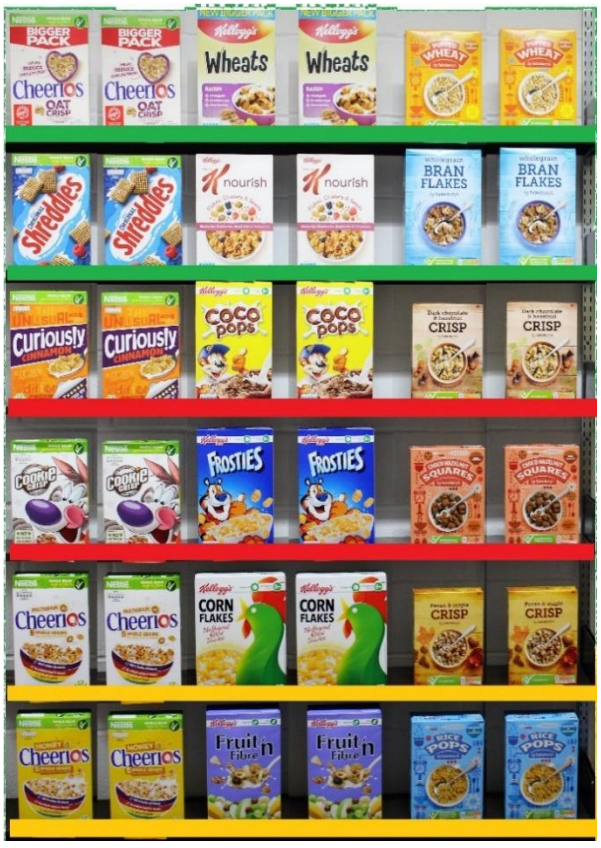
Option 1: by product attributes - horizontal display [control condition]

Option 2: by product attributes – horizontal display with nutritional benefits (coloured shelf labels)



Option 3: by nutritional benefits (coloured shelf labels) – vertical display

Option 4: by nutritional benefits (coloured shelf labels) – horizontal display

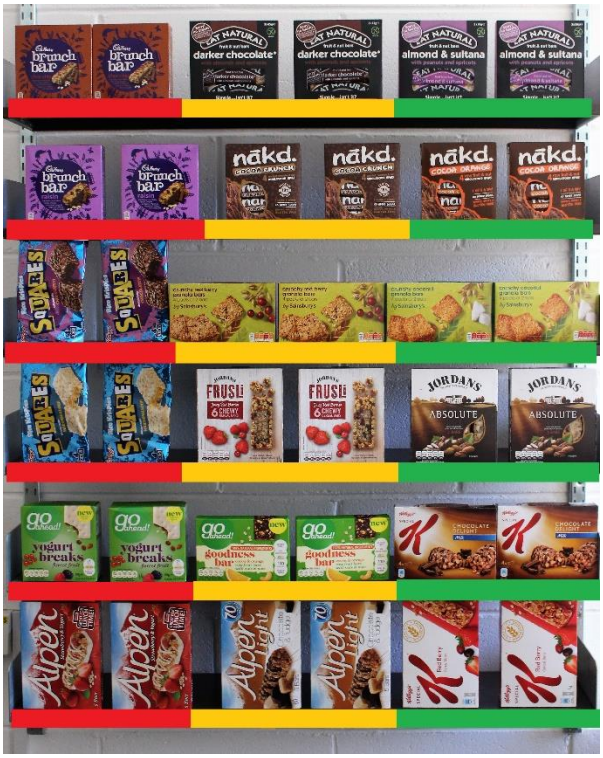


Appendix A – Display Stimuli Options: Cereal Bars

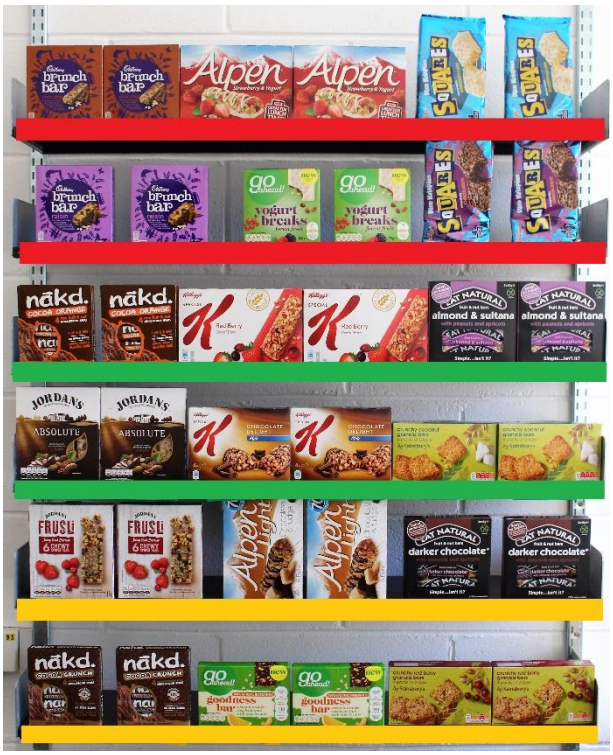
Option 1: by product attributes - horizontal display [control condition]

Option 2: by product attributes – horizontal display with nutritional data (coloured shelf labels)

Option 3: by nutritional benefits (coloured shelf labels) – vertical display



Option 4: by nutritional benefits (coloured shelf labels) – horizontal display



Appendix B – Participant Information Sheet

Participants, before the experiment and before the choice, were asked to behave as if they were in a real situation, in a real supermarket and they faced the following information inside the store:

Front of Pack labels and Traffic Light labels

Front of pack labels provide different information about the content of each product.

In particular they provide information about:

- the energy value per 100g/ml and for a specified portion of the product;
- the amounts of fat, saturated fats, sugars and salt in grams, in a specified portion of the product;
- portion size;
- intake information based on the amount (%) of each nutrient and energy value in a portion of the food.

Sometimes colour coding is associated with each of the nutrients in the food (traffic light labels). These labels use red, amber and green to show when a product is respectively high, medium or low in each nutrient (calories, fats, salt and sugar).

Coloured Shelf Labels

The coloured shelf labels provide a synthesis of information about the overall nutritional content of each product. In particular, the labels provide information on the energy value, the content of saturated fats, sugar, salt, protein, fibres, and content of fruit and nuts per 100g/ml. This allows an at-a-glance comparison between products of different sizes.

The system distinguishes nutrients in two categories, based on the benefits depending on the intake. There are 'negative' nutrients (calories, fats, sugar, and salt), of which excessive consumption has negative consequences and 'positive' nutrients (fibres, proteins, and content of fruit and nuts).

Each product is assigned a colour, based on the overall nutritional content. Specifically,

- red, when there is an excessive content of 'negative' nutrients and a low content of 'positive' ones,
- amber, when there is medium content of 'negative' nutrients and a medium content of 'positive' ones,
- green, when there is a low content of 'negative' nutrients and a high content of 'positive' ones

Appendix C – Effects of the covariates

a_ Breakfast cereals

Origin	Variables	F	Sign.
AGE	C_HEALTHINESS	3.904	.049
	C_SATISF	.006	.938
	C_EASE_CHOICE	.042	.837
	C_TIMESAVING	.210	.647
	C_healthiness_display	.587	.444
	C_PERCENTAGE_GREEN	2.888	.091
LABELUSAGE_MEAN	C_HEALTHINESS	.455	.500
	C_SATISF	.135	.713
	C_EASE_CHOICE	2.423	.121
	C_TIMESAVING	20.153	.000
	C_healthiness_display	18.312	.000
	C_PERCENTAGE_GREEN	.001	.974
DIET_MEAN	C_HEALTHINESS	41.973	.000
	C_SATISF	5.323	.022
	C_EASE_CHOICE	.659	.418
	C_TIMESAVING	1.140	.287
	C_healthiness_display	14.415	.000
	C_PERCENTAGE_GREEN	16.893	.000
C_FREQ	C_HEALTHINESS	2.661	.104
	C_SATISF	5.464	.020
	C_EASE_CHOICE	8.105	.005
	C_TIMESAVING	6.356	.012
	C_healthiness_display	6.318	.013
	C_PERCENTAGE_GREEN	.473	.492

b_ Cereal bars

Origin	Variables	F	Sign.
AGE	B_HEALTHINESS	2.333	.128
	B_SATISF	.558	.456
	B_EASE_CHOICE	.059	.808
	B_TIMESAVING	.302	.583
	B_HEALTHY_DISPLAY	.369	.544
	B_PERCENTAGE_GREEN	3.160	.077
LABELUSAGE_MEAN	B_HEALTHINESS	7.526	.007
	B_SATISF	3.237	.073
	B_EASE_CHOICE	6.047	.015
	B_TIMESAVING	7.560	.006
	B_HEALTHY_DISPLAY	5.540	.019
	B_PERCENTAGE_GREEN	.216	.642
DIET_MEAN	B_HEALTHINESS	5.051	.026
	B_SATISF	2.156	.143
	B_EASE_CHOICE	.382	.537
	B_TIMESAVING	3.029	.083
	B_HEALTHY_DISPLAY	9.898	.002
	B_PERCENTAGE_GREEN	20.086	.000
B_FREQ	B_HEALTHINESS	6.462	.012
	B_SATISF	6.903	.009
	B_EASE_CHOICE	6.493	.012
	B_TIMESAVING	9.516	.002
	B_HEALTHY_DISPLAY	6.980	.009
	B_PERCENTAGE_GREEN	10.862	.001

Appendix D – Summary of the results

FOP = OPTION 1
COLOURED LABELS = OPTION 2
HORIZONTAL AGGREGATION = OPTION 3
VERTICAL AGGREGATION = OPTION 4

Category	**Variable**	**Results**
Breakfast cereals	Percentage of healthy products selected	M1= .30, M2= .50, M3= .38, M4= .43 The difference is statistically significant between M1 and all the other options
	Choice perceived as time saving	M1= 4.65, M2= 5.28, M3= 5.15, M4= 5.06 The difference is statistically significant between M1 and all the other options
	Level of satisfaction with the choice	M1= 5.64, M2= 5.42, M3= 5.75, M4= 5.61 The difference is statistically significant between M2 and M3, M2 and M4
	Perceived ease of choice	M1= 5.60, M2= 5.70, M3= 5.73, M4= 5.82 No statistically significant differences were found
	Perceived healthiness of the choice	M1= 4.63, M2= 5.28, M3= 4.80, M4= 4.75 No statistically significant differences were found
	Display perceived as healthier	M1= 4.75, M2= 5.05, M3=4.86, M4= 5,15 The difference is statistically significant between M2 and M3, M2 and M4
Cereal bars	Percentage of healthy products selected	M1= .33, $M2_s$= .47, M3= .41, M4= .51 The difference is statistically significant between M1 and all the other options, M2 and M3, M2 and M4, M3 and M4
	Choice perceived as time saving	M1= 4.68, M2= 5.29, M3=5.31, M4=5.16

		The difference is statistically significant between M1 and all the other options
	Level of satisfaction with the choice	M1=5.42, M2= 5.53, M3=5.56, M4=5.51 No statistically significant differences were found
	Perceived ease of choice	M1=5.42, M2=5.62, M3=5.63, M4=5.46 No statistically significant differences were found
	Perceived healthiness of the choice	M1= 4.81, M2= 4.93, M3=4.99, M4=4.80 No statistically significant differences were found
	Display perceived as healthier	M1= 4.50, M2= 5.20, M3=4.82, M4=5.10 The difference is statistically significant between M1 a and all the other options, M2 and M3, M2 and M4, M3 and M4