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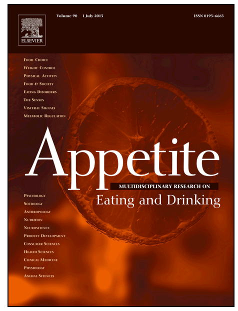

The impact of front-of-pack marketing attributes versus nutrition and health information on parents' food choices

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** Please note that Dr Russell is currently on maternity leave so Dr Burke has assumed the role of corresponding author to ensure a smooth response during the review process.

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The impact of front-of-pack marketing attributes versus nutrition and health information on parents' food choices

Abstract

Front-of-pack attributes have the potential to affect parents' food choices on behalf of their children and form one avenue through which strategies to address the obesogenic environment can be developed. Previous work has focused on the isolated effects of nutrition and health information (e.g. labeling systems, health claims), and how parents trade off this information against co-occurring marketing features (e.g. product imagery, cartoons) is unclear. A Discrete Choice Experiment was utilized to understand how front-of-pack nutrition, health and marketing attributes, as well as pricing, influenced parents' choices of cereal for their child. Packages varied with respect to the two elements of the Australian Health Star Rating system (stars and nutrient facts panel), along with written claims, product visuals, additional visuals, and price. A total of 520 parents (53% male) with a child aged between five and eleven years were recruited via an online panel company and completed the survey. Product visuals, followed by star ratings, were found to be the most significant attributes in driving choice, while written claims and other visuals were the least significant. Use of the Health Star Rating (HSR) system and other features were related to the child's fussiness level and parents' concerns about their child's weight with parents of fussy children, in particular, being less influenced by the HSR star information and price. The findings suggest that front-of-pack health labeling systems can affect choice when parents trade this information off against marketing attributes, yet some marketing attributes can be more influential, and not all parents utilize this information in the same way.

Keywords: food choices; parents; children; food labels; fussiness; health star rating

Introduction

The eating behaviors, dietary intakes and weight status of children in many developed countries are far from optimal. In the United States, 17% of children aged six to eleven years are obese and over one third are overweight or obese (Ogden, Carroll, Kit, & Flegal, 2014), whilst in the UK, 30% of five to ten year olds are overweight or obese (Health and Social Care Information Centre, 2015). In Australia, the setting for the present study, 23% of children aged four to 18 years are overweight or obese (Hardy et al., 2017). In addition, a national survey found that 98% of Australian children aged five to 14 years did not eat the recommended daily serves of fruit and vegetables (Australian Institute of Health and Welfare, 2016), whilst other research discovered two thirds of children exceed recommended sugar intakes, and four fifths exceed recommended saturated fat intakes (CSIRO, 2008). This presents a significant public health challenge as many aspects of eating behaviors, as well as weight status, are formed in childhood and are subsequently difficult to change (Savage, Fisher, & Birch, 2007; Scaglioni, Salvioni, & Galimberti, 2008; Wheaton, Millar, Allender, & Nichols, 2015). This puts individuals at greater risk for developing non-communicable diseases such as diabetes, cardiovascular disease and some forms of cancer in later life (Ebbeling, Pawlak, & Ludwig, 2002), which are presently the biggest causes of disease and disability in many developed countries including Australia (Australian Institute of Health and Welfare, 2016).

The development of poor eating behaviors in childhood is a complex problem that is the result of the interacting effects of multiple personal and societal factors, however the role of parents is well established (e.g., Birch & Davison, 2001; Golan & Crow, 2004; Lindsay, Sussner, Kim, & Gortmaker, 2006; Savage et al., 2007). Parents shape children's food environments, thus affecting not only the foods that are available for consumption, but also the development of eating behaviors, attitudes towards eating and food preferences (Benton, 2004; Birch & Davison, 2001; Johnson, 2016; Peters, Sinn, Campell & Lynch, 2012; Shloim, Edelson, Martin & Hetherington, 2015; Steinsbekk, Belsky, & Wichstrøm, 2016; Syrad, Johnson, Wardle & Llewellyn, 2016) .

Although parents are generally motivated to feed their children well, they often struggle to do so (Alderson & Ogden, 1999; Russell, Worsley, & Campbell, 2015; Maubach, Hoek, & McCreanor, 2009). The reasons for this are multifaceted, but contributions are made by: 1) individual-level parent factors, such as lower education, ethnicity, socio-economic position, gender and eating pathology (Lloyd, Lubans, Plotnikoff, Collins, & Morgan, 2014; McPhie, Skouteris, Daniels, & Jansen, 2014; Shloim et al., 2015); 2) individual-level child factors, such as pestering (Pettigrew, Jongenelis, Chapman, & Miller, 2015), temperament (Bergmeier, Skouteris, Horwood, Hooley, & Richardson, 2014), and food fussiness (Dovey, Staples, Gibson, & Halford, 2008); and 3) societal factors, such as the availability of healthy and unhealthy foods (Swinburn et al. 2011), and the effects of marketing and advertising (Hastings, McDermott, Angus, Stead, & Thomson, 2006; Mehta et al., 2012; Roberto, Baik, Harris, & Brownell, 2010).

Marketing and advertising is particularly influential on both parents' and children's selection and consumption of non-core foods (Cairns, Angus, Hastings, & Caraher, 2013; Vilaro et al., 2017). Although television advertising is still the predominant medium for promoting foods to children (Hastings et al., 2006; Kelly, Smith, King, Flood, & Bauman, 2007; Kelly et al., 2015; Roberts, Pettigrew, Chapman, Quester, & Miller, 2014), food packaging is also significant as it affects consumers, both parents and children, at the point of purchase (Hawkes, 2010; Young, 2004). Subsequently, Front of Pack (FoP) features have the potential to affect a large proportion of consumers' food choices and, therefore, health at the population level.

Many FoP attributes, such as imagery (e.g., of the product ingredients or sports people), colors, typography and unregulated written claims (e.g., taste claims), form important parts of a product's marketing and communications with consumers about its healthiness, tastiness or suitability for children (Dixon et al., 2014; Mehta et al., 2012). In fact, with few exceptions (e.g., nutrient facts panel, health claims or ingredient list, which are at least partly regulated by governments) marketers control the majority of information contained on food packages. As such, marketers use multiple techniques to influence both parents and children (Elliott, 2008; Mehta et al., 2012), such as bright colors, childish script and cartoon characters, with a particular emphasis on making a visual impact for products oriented towards children (Young, 2014).

The wide range of marketing, nutrition and ingredient information on food packages can make it confusing for consumers to make informed decisions. Packages may contain marketing images signaling health (e.g. athletes, fruits), but may also report nutrient profiles inconsistent with a healthy diet (e.g. high levels of sugar or sodium) on their nutrition information panels (Elliott, 2012). Furthermore, some FoP features (e.g. use of claims) are used extensively, regardless of the product's actual nutrient profile, highlighting that similar techniques are used to promote both healthy and unhealthy products (Elliott, 2008; Mehta et al., 2012). In fact, some unhealthy children's products are more likely to contain marketing images and text implying health than healthier products (Elliott, 2008), thus making it difficult for consumers to make accurate assessments of a product's healthfulness (Abrams, Evans, & Duff, 2015; Elliott, 2008; Mehta et al., 2012).

In an effort to help consumers make more informed decisions about the health content of packaged foods, many governments have introduced summary FoP nutrition labels to supplement more detailed nutrition information panels and ingredient information contained on sides or backs of packs. Systems range from those that are simple (e.g., ticks; stars) to those that are more complex (e.g., Guideline Daily Amount scores). Feunekes, Gortemaker, Willems, Lion, & van den Kommer's (2008) study of European consumers comparing several of these systems, found that all are effective in helping consumers make healthier choices, with little differences in perceived friendliness across systems. The authors did, however, find consumers made faster decisions with simpler FoP formats, thereby suggesting their suitability to be effective in shopping environments requiring quick decision-making. Various elements of the health ratings system can receive differing levels of attention. In studying cereal choices by Dutch and Turkish university students, van Herpen and van Trijp (2011) found that traffic light labels and logos receive greater attention and guide healthier choices relative to nutrition tables.

In Australia, the Government introduced the Health Star Rating (HSR) system in 2014, and several companies have adopted this voluntary system (see, www.healthstarrating.gov.au). This system combines both evaluative (i.e. numerical information on key nutrients) and reductive (i.e. a summary assessment of the food's health value) elements (Hamlin, McNeill, & Moore, 2015) in the form of a visual star rating (from ½ to five stars) and summary nutrient facts panel. This panel information contains the amount of four 'risk' nutrients (energy, sugar, saturated fat and sodium) and one positive nutrient (e.g., dietary fiber or protein per 100g) (Department of Health, 2015). A recent study of Australian consumers found the HSR labeling to be most preferred over two other FoP labeling systems (Daily

Intake Guide; Multiple Traffic Lights) largely because of its simplicity and ease of use (Pettigrew et al., 2017). However, whether parents actually rely more on the HSR system than on other FoP elements is unclear.

Although research effort has been directed at understanding how parents use and respond to nutrition and health information on food packages (Harris, Thompson, Schwartz, & Brownell, 2011; van Herpen & van Trijp, 2011; Watson et al., 2014), little is known about how this information affects parents' decisions when considered relative to other marketing FoP features. This is important given that developing an understanding of and strategies for addressing the effects of the obesogenic environment on parents and children (Swinburn, Egger, & Raza, 1999), and specifically the purchase and consumption of packaged foods as part of this is needed. To effectively promote healthier packaged foods to parents and their children it is necessary to understand not only how parents use FoP nutrition information like the HSR system, but also how these systems affect parents when taken in the context of other, possibly conflicting, FoP marketing attributes.

In understanding how parents use FoP attributes it is likely that not all parents will be affected in the same way. This is partly because parental feeding practices and decisions are affected by the characteristics of their child and their beliefs about them (Jansen et al., 2014). Children's food fussiness or pickiness is one characteristic that has wide ranging effects on parent-child feeding interactions (Cardona Cano et al., 2015; Dovey et al., 2008). Food fussiness is characterized by an unwillingness to eat both familiar and unfamiliar foods, and, therefore, a poorer dietary intake (Carruth, Ziegler, Gordon, & Barr, 2004; Dovey et al., 2008; Taylor, Wernimont, Northstone, & Emmett, 2015; Wardle, Guthrie, Sanderson, & Rapoport, 2001). Parents of fussy children have higher motivations to select foods that their child is already familiar with and likes, and, therefore, can be less focused on health or nutrition (Perry et al., 2015; Russell & Worsley, 2013) and so offer their children a limited range of foods (Carruth et al., 2004; Galloway, Fiorito, Lee, & Birch, 2005; Koivisto & Sjödén, 1996; Russell et al., 2015).

A child's weight status also affects parental feeding practices (Jansen et al., 2014), but parental concerns about their child's weight status and perceived vulnerability to obesity appear to mediate relationships between a child's actual weight and how they are fed (Webber, Hill, Cooke, Carnell, & Wardle, 2010). Parents with higher concerns about their child's weight use more restriction of non-core foods and have greater use of highly directive strategies in an attempt to control the child's weight status (Costanzo & Woody, 1985; Faith et al., 2004). Whether these effects extend to parents' use of FoP attributes is unknown.

Given the dearth of information comparing effects of FoP attributes on parents' food choices, the aim of this study was to understand the trade-offs that parents make when faced with products displaying a range of front-of-pack features while evaluating and selecting a suitable breakfast cereal for their child's consumption, and how this related to the child's characteristics. Specifically, the research objectives were to: (1) discover the relative importance of six FoP attributes (HSR stars and panel, written claims, product visuals, additional visuals and price) when parents choose to purchase a cereal for their child to consume; and (2) discover how product choice relates to the child's fussiness and the parents' level of concern about their child's weight. This study contributes to the literature by examining the influence of multiple packaging features on parents' choices from a holistic perspective to consider the relative impact of various packaging elements, including those controlled by the health and food regulators and those added by marketers.

Motivation and Background to Discrete Choice Experiment Methodology

As stated, the current research aims to determine the relative importance of six FoP attributes when parents choose to purchase a cereal for their child to consume. Specifically, this requires an understanding of how parents make trade-offs when making food choices for their children. To do so, we use an indirect measurement approach that replicates marketplace decisions (Maubach et al., 2009), namely a discrete choice experiment (DCE). In the present context, the DCE asks parents to make choices between product offerings by considering various competing FoP dimensions, such as whether they would prefer to select a five-star rated product at a higher price against a two-star rated, but cheaper product. The experiment proceeds by observing how product choices (i.e., a limited dependent variable) alter as a function of variation in several FoP features (i.e., independent variables).

From a theoretical perspective, our approach to understand preferences of parents for variations in FoP information is based on a normative choice framework embedded in random utility theory (see Ben-Akiva & Lerman, 1985). In this framework, people are assumed to make choices that maximize their utility; that is, people choose the option that they perceive as offering the greatest benefit to them relative to any other option available. To do so, it is further assumed that consumers determine an overall value for each offering by giving a different importance weight to the features or factors describing them; a DCE is used to gather data that can then be used to estimate a discrete choice model (DCM), which is then able to recover these weightings. The choice modeling literature is well developed in areas such as transport, marketing, and health economics (e.g., Louviere, Hensher, & Swait, 2000; Train, 2009). It has also been applied in areas outside business and economics, such as heritage management (Choi, Ritchie, Papandrea, & Bennett, 2010) and education (Authors et al., 2015).

The DCE approach offers a number of advantages. Most notably, the approach forces parents to consider and make trade-offs among multiple competing product features simultaneously rather than evaluating and responding to each one-at-a-time. In this way, they are unable to choose the most ideal offering, such as the product which is healthiest, cheapest, and most liked by their children. It would be expected that, given that parents are highly motivated by health, nutrition and naturalness when selecting foods for their children (Roos, Lehto, & Ray 2012; Russell, Worsley, & Liem, 2014), parents would indicate a preference for products with product images conveying health, over those that convey poor health or artificial ingredients, without any other competing information or choices. As such, separately asking consumers about how important it is to select a product that is healthy, offers value-for-money and more likely to be liked by their children using separate scales of importance (e.g., a Likert scale) will provide limited information about parents decision making to address the study's aims. This is because these types of scales do not force parents to consider how much they are willing to trade-off the healthiness of a product against considerations of value-for-money or preference among their children. A consequence of such surveys is that the results often indicate that all factors are very important (Louviere & Islam, 2008). There are also various demand bias concerns in using direct measures of importance as respondents may want to appear as making appropriate decision consistent with social norms, and direct measures can bring greater attention to this (Auger, Burke, Devinney, & Louviere, 2003; Comşa & Postelnicu, 2012).

Another advantage of using a DCE approach is that the task simply requires consumers to make product choices as they would in a retail environment. As such, the method overcomes issues arising from various response-style biases that are often observed when rating scales are used instead. For instance, in studies of rating scales, some respondents avoid the extreme ends of rating scales whilst others consistently remain neutral position leading to issues in analysis and interpretation of results (Baumgartner & Steenkamp, 2001; van Vaerenbergh & Thomas, 2012). The DCE also overcomes inconsistencies that arise with cognitive burdensome tasks such as those involving the allocation of points or percentages, which are often used as an alternative to rating scales to measure relative importance among competing dimensions (Louviere & Islam, 2008).

The additional advantage of utilizing a stated choice experiment is to offer control over the various dimensions that can be correlated or consistently co-occur in the marketplace. For example, it could be the case that products with higher HSR ratings or health claims can command price premiums relative to products with lower or no star rating listed. Using real market data, therefore, it becomes difficult to separate the effects of star rating from the impact of variations in price (Louviere, Hensher, & Swait, 2000). Also, using an experimental design allows the presentation of offerings that otherwise would not occur in the market to understand demand among parents for such goods. In the next section, we provide the further details of how the choice experiment method was operationalized to understand parent choices in relation to the relative value of various FoP attributes, including nutrition facts panel information, in the context of choosing cereals for their child.

Study of Cereal Choices by Parents

<u>Overview</u>

The study examined parent's food choices among cereals using a DCE. Parents were presented boxes of hypothetical cereal boxes in which FoP information varied. The parents then had to select the cereal they were most likely to buy. Parents also provided information about themselves, including socio-demographic information, concerns that they may have about their child's weight, and the fussiness of their child with respect to eating behaviors.

Participants

To be included in the study, parents had to be over 18 years of age, currently living in Australia and have a child aged between five and eleven years (primary school age), who ate breakfast cereals at least once a week. Additionally the parent was required to be the sole or joint decision maker in relation to purchasing breakfast cereal for this child. Respondents were recruited via *TEG Rewards*, a commercial online panel company. Respondents earned points towards vouchers of a small monetary value that cover a range of goods (e.g., movies; iTunes; magazines; charities).

Survey content

Respondents were presented with four unique DCE scenarios, each containing images of four hypothetical breakfast cereal boxes. The choice of breakfast cereal as a context for this study was selected because it is a product category that has widely adopted the HSR system, provides products with a range of nutrient profiles, is extensively consumed by Australian children, and is under considerable scrutiny for the ways in which its products are marketed to parents and children (Choice, 2016; Nash, 2015). Respondents were asked to imagine that they had arrived at the supermarket and that their usual products were not available. They were then asked to select the product they most preferred and the product that they least preferred from the four cereal options available. The available options were selected to represent a range of marketing / nutrition attributes commonly used on children's food in Australian supermarkets. Each cereal option contained several key attributes as shown in Figure 1 and described here.

Insert Figure 1 about Here

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a) *Health Star Rating System (stars):* Boxes had either no star rating displayed, a two (low) or five (high) star rating, or an exaggerated five star rating. The rationale for including the exaggerated five star rating was that companies have used various mechanisms (e.g., with arrows) to draw attention to their product's favorable star rating.

b) *Health Star Rating System (nutrient facts panel):* As part of the HSR system, companies can also provide numeric-based information on key nutrients. As such, panel information appeared in one of four ways representing a product as being: i) relatively less healthy than current market offerings; ii) relatively healthier than current market offerings; iii) a third level that was between the two extremes; or, iv) no panel information at all. The range in levels was based on a comprehensive review of the product variations that currently occur in the market place.

c) *Product visual:* Each box included a picture of the cereal product. Each was identical in terms of the use of a white bowl, a flaked product, and milk being poured onto the product, but the color of the cereal flakes varied. The color variations mimicked several variations in the marketplace including options it was anticipated that would be perceived as being healthy and less healthy. These included an artificial looking product in terms of the use of blue, green, pink, and purple colored cereal and chocolate-brown flavored option. A yellowish colored option matched much of the cornflake style products on the market. Finally, a fourth option was presented in terms of a browner option, but milder than the chocolate and being more consistent with a bran style product.

d) *Extra visual image:* An additional visual was offered that again mimicked current FoP practices in the cereal market. First, two cartoon characters were used: one a dog to appeal to young children and another of a child playing sport to be suggestive of an active lifestyle as some cereals often make a connection to with their products a solution to the high energy needs of children. The sport selected was basketball, which is played by both boys and girls in Australia. Fruit was included as a healthier option, and comprised of fruits readily available in Australia (strawberries, blueberries, blackberries, raspberries, kiwi fruit, and banana). A fourth visual communicated healthiness via a picture of wheat in its natural form.

e) *Written claims:* The marketing claim was introduced in four different ways, also reflecting typical claims available on breakfast cereals in Australia: two were ingredient claims, the first representing the inclusion of healthy ingredients (folate, iron, vitamin B) and the second communicating the exclusion of unhealthy ingredients (fat; sugar). The third claim was a taste claim (the taste and crunch that children love) which are unregulated in Australia. Finally, the last was a credence claim (contains organic and biodynamic ingredients). Companies using such claims must be able to substantiate them and are subject to a set of voluntary industry standards (Standards Australia, 2017).

<u>Experimental Design of Product Offerings Used in DCE</u>

To determine what products would be constructed for respondents to evaluate in the choice task, an experimental design was used. The experimental design ensured that the estimates in the choice model capturing how variation in any one product feature affects choice would not be correlated with the estimates relating to another product feature. For example, this allows us to see how the variation in a product in terms of its star rating affects choice without this effect being contaminated by variation in another product feature (e.g., changing the product visual from a cartoon character to an image of wheat). We used an orthogonal main effects plan to do so, which requires the assumption that higher order effects (e.g., the two way interaction between product image and star-rating) are negligible (Cochran & Cox, 1957;

Montgomery, 2008). The experimental design ensures that not all product combinations are used, but instead a fraction of the possible product combinations are systematically selected in a way that maximizes the statistical information being gathered when observing respondents' choices amongst this subset of products (Louviere, Hensher, & Swait, 2000).

In the current setting, there were five product features, each with four levels, which means that a total of 4^5 or 1024 possible product combinations exist. Instead, we used an orthogonal main effects plan to select a smaller fraction of these products to determine which options to show respondents (Street & Burgess, 2007). Following this fractional factorial design approach, 16 product offerings were constructed. Each respondent saw all 16 offerings viewing these across four sets of four using a completely randomized design unique to each individual. As a result, at the aggregate level, each of the 16 offerings appeared an equal number of times and co-occurred an equal number of times with each other product (Cochran & Cox, 1957; Montgomery, 2008).

At the same time, the price of each offering was varied using draws of a market price from a uniform random distribution. The market price and product volume was made specific to each individual based on information about his or her most recent purchase in terms of pack size. In turn, each respondent evaluated cereals that were relevant to him or her by controlling for budget and volume considerations. To do so, based on their most recent purchase, the volume was fixed for each respondent at one of four volumes (300g, 500g, 750g, or 1kg). The price per unit of each offering was varied randomly as a percentage above or below an identical market price per unit ($.80/100g). The percentage variation ranged between -15% and +15%. As a result, the overall variation in the resulting market price followed a normal distribution independent of variation in any of the product features. Consistent with regulated supermarket practices (Australian Competition and Consumer Commission, 2016; Berning, Chouinard, Manning, McCluskey, & Sprott, 2010), the overall price, volume information and with the equivalent price per unit were provided to respondents. An example of a choice scenario following this design approach is presented in Figure 2.

Insert Figure 2 about here

Survey Procedure and Other Measures

Participants initially completed a number of questions to ensure they met the inclusion criteria and that their computers/devices were able to use all of the technical features of the survey software. Respondents provided information about the size of the typical breakfast cereal they purchased to enable manipulation of package size before introducing the DCE task. Following the DCE task, participants completed questions about their child including a widely used scale of food fussiness (Wardle et al., 2001) and their concern about their child's weight. Finally, respondents provided further socio-demographic information questions (e.g., income; marital status).

Children's food fussiness was measured with the Children's Eating Behavior Questionnaire Fussiness subscale (Wardle et al., 2001). This scale consists of six items measured on a five-point frequency scale (anchored never-always). Example items are "*My child refuses new foods at first*" and "*My child is difficult to please with meals*". Parents' concerns about their child's weight were measured via a single item question with a five-point response scale: i) very concerned about my child not weighing enough; ii) a little concerned about my child not weighing enough; iii) not concerned about my child's weight; iv) a little concerned about my child weighing too much; and v) very concerned about my child weighing too much).

Results

Sample

A total of 810 respondents commenced the survey with 172 respondents not meeting the screening criteria. Of the qualified 638 respondents, 520 parents completed the survey in full (completion rate 81.5%). The median response time was 15 minutes. Approximately half of the sample was male (53%) with a median age of 37 years. The majority of respondents had two children (52%). The majority of parents were married or living with a long-term partner (84%). The sample was made up of 68% of respondents who were entirely or mostly responsible for purchasing cereal on behalf of their child, while 25% equally shared the responsibility with someone else. The reference children were predominantly male (59%) with a median age of seven years of age, most ate breakfast cereal once a day (32%) and the majority (62%) ate cereal on at least five or more occasions per week. More details are presented in Table 1.

Insert Table 1 about here

Discrete Choice Model Results

In the current context, the characteristics of the FoP information (e.g., star rating; visual elements; price) were linked via a DCM to parent decisions by observing which cereals were selected as the most and least preferred options. A second model discussed in the next section introduces terms to capture how preferences for all six FoP elements were moderated by incorporating individual-level fussiness scores and concern of child weight indicators (i.e., concern on under-weight and concern of over-weight). The model estimates in Table 2 capture how each product feature increases or decreases the perceived value of the selected option and whether this impact is significant or not relative to changes in the other features. For example, the model predicts that the perceived value of a cereal significantly decreases when it is offered with no HSR (β=-.2476; $p<.0001$), but significantly increases if it has a five-star rating (β=.2536; $p<.0001$). Among the six attributes, variation in product visuals and health star rating had the most significant impact on product choices. While also significant in affecting choices, variation in the written claim and additional visuals appearing on the FoP had much less of an impact on parents' choices. Although t-statistics in aggregated MNL model are indications of importance of predictor or group of predictors contributing to a model, a more formal approach is through a likelihood ratio test (Hilbe, 2009).

Insert Table 2 about here

<u>LR Tests Results</u>

The likelihood-ratio test (or LR-test) compares a proposed reduced model (i.e., without a variable) to the model that it is nested within (i.e., full model). A test statistic is calculated as twice the difference in log-likelihood between the reduced and full models, and this asymptotically follows a chi-squared distribution. The magnitudes of the LR-test statistic can be used to compare different predictors or groups of predictors in terms of importance to models (Small & Hsiao, 1985; Train, 2009). Six reduced models were tested against the full aggregated model in which all attributes are predictors. In each reduce model, an attribute was excluded from the MNL estimation, one at a time. Test results are shown in the Table 3.

Insert Table 3 about here

LR test results show that each attribute, including its underlying levels, do significantly contribute to the full model at $p<0.01$ level; however, the sizes of resulting statistics are largely different. As represented by a larger χ^2 statistic of 647.11, the most important contribution to model came from variation in product visuals. In terms of impact in the overall model, health star rating is the next most important feature, followed by numeric panel information and written claims. Product variation in the form of additional visuals significantly affected choice, but was found to be the least important attribute (χ^2=21.69). Figure 3 presents these changes in log-likelihood as a percentage thereby demonstrating the largest contribution to the model coming from variation of products with respect to product visuals (58%). How variations in each of the product features affected choice are now discussed in more detail.

Insert Figure 3 about here

Product Visuals

This attribute was the most significant in contributing to the model, as exemplified in the largest t-statistics and as shown by the likelihood ratio test. As illustrated in Figure 4, parents strongly disliked cereals with artificial looking colors, compared to other product visuals ($p<.001$). The second least favored product visual was chocolate looking cereals. Instead, the bran-like cereal and the more neutral looking cereals (i.e., yellow consistent with ‘corn flakes’) were significantly preferred by parents in their choice of cereal ($p<.001$). However, there was no significant difference in preference between these two cereal options ($p=.176$).

Insert Figure 4 about here

Health Star Rating System (stars)

Parents' choices clearly showed a strong preference for cereals presented as having a five-star rating (p<.001), regardless of whether this star-rating was further magnified (see Figure 2). In comparison, parents showed a significant preference away from two-star rated products (p<.001). Similarly, parents placed significantly less value on products that were presented without any star rating (p<.001). That is, parents significantly favored five-star rated products over poorer rated products or those with no star rating at all. The effects on variation in star-rating on choice, however, are not as strong relative to the impact of variation in product visuals as confirmed by the LR-test, and also comparing Figures 4 and 5.

Insert Figure 5 about here

Health Star Rating System (Nutrient Facts Panel)

Parents had a significantly lower preference for cereals with poor nutritional value as communicated in the FoP nutrient facts panel information relative to those with consistently healthier levels on the same indicators (p<.001). These cereals contained the highest levels of energy (1660KJ), saturated fat (1.5g), sugars (39.5g) and sodium (650mg), and the lowest level of nutrient (1.9g). Parents had the highest preference for a cereal when the nutrient facts panel described it as being lower in energy (1410KJ), saturated fat (<0.1g), sugars (0.4g) and sodium (5mg), and nutrients were higher (15.1g) than other cereals. Parents showed that their choices for cereals were significantly affected by unfavorable nutritional appraisals as per the nutrient facts panel. Also, but to a lesser extent, parents significantly discounted offerings that showed no panel information (p<.001). We also examined differences across parents, comparing males to females; we found no significant differences with respect to the manner in which either group used the health-star rating and nutrition facts panel information in their cereal choices.

Written Claim

The effect of the written claims was varied in a number of ways to consider claims that focused on including healthier ingredients (folate; vitamin B), excluding unhealthy ingredients (fat; sugar), making appeals to children in terms of taste, and a final variation focused on a more abstract form of nutrients (organic and biodynamic ingredients). When comparing the written claims, cereals that promoted their nutritional value (good source of folate, iron and vitamins) were significantly more likely to be chosen ($p<.001$). In comparison, cereals were significantly less likely to be chosen when written claims focused on appeals about taste and texture that children would prefer ($p<.001$).

Additional Visuals

Additional visuals were the least significant attribute in affecting parents' choices. However, parents did significantly alter their choices to favor those products presented with various fresh fruits relative to other product visuals ($p<.001$). On the other hand, parents did also show a significant preference away from products presented with a visualization of the wheat ingredient ($p<.001$). Interestingly, parents were insignificant with respect to varying their choices as a response to products presented with a cartoon character, regardless of whether the character may have appealed to children ($p=.19$) or represented a sporting activity ($p=.98$).

Price

Price was introduced to the model in a number of ways including using the actual dollar value, logarithmic form or with respect to the relative market price. In the best fitting model reported here, price was introduced into the choice model in terms of the relative percentage premium or discount of the product relative to the average price of all products in the same choice set. That is, the price estimates describe the impact of changes in relative prices rather than in absolute dollar terms. The estimates revealed that when price varied in this fashion, the impact on choice appeared as being non-linear, but well approximated as a demand curve using log form (see Figure 6). Parents were highly elastic in their response to options that were priced more than ten percent below the average price; and became less elastic at a diminishing rate in responding to higher priced options. In other words, parents placed significant value on those products that were discounted relative to other cereals in the market, on average, but even more so when discounts exceeded a discount of 10% or more. Parents also placed less value on products that were above the market price consistent with expectations. Since this main effects model shows the price function can be approximated as a logarithmic function, price was then simplified in later models that included moderating terms (i.e., with fussiness and weight concern).

Insert Figure 6 about here

Fussiness and Weight Concern on Choice Preference

A second model considered whether parents' decisions regarding their valuation of various product features (e.g., health star rating; product visuals) were further affected by the fussiness of their child with respect to eating behaviors and concerns parents had regarding the weight of their child. In other words, the objective of this model was to consider how decisions reported above were moderated by parents' individual situations. To do so, an individual-level fussiness score (standardized with 0 mean and 1 as standard deviation), along with parents' concern on child's under-weight and over-weight indicator variables, were used to generate three sets of interaction terms to be included in the models besides the main effects. Logarithmic price was used to reduce the number of interaction terms to capture changes in price elasticity and whether this is further affected by fussiness and weight concern. In the in the interest of brevity, only statistically significant interaction terms (i.e., significant moderating terms) are reported in Table 4 (full results available upon request).

Insert Table 4 about here

The results showed the impact of the interaction between the standardized latent variable capturing fussiness with each of the variables capturing the preference for various product attributes. In this manner, we saw that parents of fussier children were significantly less likely to be influenced by the health star rating of a product. Specifically they placed significant less value on five-star rated products than other parents on average ($p<.01$). They were also more likely to choose products that provided no health star rating relative to other parents ($p<.10$). The results are presented in Figure 7. Parents of fussier children were also found to be less sensitive to price ($p<.01$). For all other cases, including product visuals and product claims, no differences in preferences could be attributed to differences pertaining to the fussiness of the child.

Insert Figure 7 about here

The model also introduced two sets of variables that examined whether preferences for product variants in terms of health star rating, product claims, visuals, and other variables, were moderated by a parent's concern about their child's weight. The first of these sets of variables considered parents who were concerned about their children being under-weight. These parents were found to discount the value of the HSR in making their decisions (see Table 4). This included being more inclusive of products with no health star rating or two health-stars ($p<.05$), whilst not favoring those with five health-stars with magnified claims when compared to parents that had no concerns about their child's weight ($p<.01$). The same discounting by these parents also occurred in relation to the role of panel information in making product choices, showing greater forms of indifference between products that varied in terms of panel information suggestive of being poorer or healthier. Parents concerned by their children being underweight were also found to be significantly more likely to choose options made with organic and biodynamic ingredients ($p<.05$). At the same time, product visuals appeared to play less of a role among such parents. Specifically these parents were less likely to reject artificially looking cereals, or choose products based on looking healthier ($p<.05$) or taking on a more neutral yellow appearance ($p<.10$). These parents were also found to be less price sensitive relative to parents without concern for their child's weight ($p<.10$).

Insert Figure 8 about here

In contrast, parents with children for which they were concerned were overweight were less likely to reject to purchase cereals that appeared as being more artificially looking ($p<.01$) as compared to parents without such concerns. They were also less likely to purchase cereals that were associated with a wholemeal or bran-like based color ($p<.001$). Parents concerned about their child being overweight also were less likely to dismiss products that were two-star rated ($p<.05$) or had panel information suggesting poorer nutritional content ($p<.05$). On the other hand, these parents were also more likely to reject products that had no nutrient facts panel information on the front of pack ($p<.01$).

Insert Figure 9 about here

Discussion

This study manipulated nutrition and marketing information commonly featured on children's breakfast cereal packs to understand how parents trade off this information when making food product choices on behalf of their children. Results indicated that the most influential FoP feature was the product visual followed by the nutrition and health information; written claims and other visuals contributed the least. Furthermore, the impact of these elements varied according to whether the child was perceived by the parent to be a fussy eater and the parents' concerns about their child's weight status with parents of fussy children, in particular, being less influenced by the star rating, an element of the HSR system.

The present findings indicate that in order to shift parents' packaged food choices towards healthier alternatives, which is the aim of government initiated FoP health and nutrition labeling systems, consideration needs to be given to not only the impact of such systems in isolation, but their effects when they co-occur with marketing attributes, such as visual images of the product. Presently, in many countries, marketing to children on food packages does not fall under any form of government regulation (Abrams et al., 2015). Instead, voluntary self-regulated initiatives have focused on advertising and marketing communications to children, such as the Responsible Children's Marketing Initiative (RCMI) in Australia, where current definitions of marketing communications within these are not inclusive of labels, packaging and in-store point of sale material (Australian Food and Grocery Council 2014). Imagery presented on packages may inaccurately reflect the product's characteristics and, therefore, has potential to misrepresent a product's actual nutrient profile (Watson, Johnston, Hughes, Wellard, & Chapman, 2014).

Our findings that the picture of the cereal product bowl was most influential in affecting parents' choices, is therefore noteworthy. The reasons for the high capacity of the product visual to influence parents' decisions require further exploration to identify the role of awareness and interpretation (e.g. inferences of health or taste) in affecting use, but may indeed relate to taste implications (Simmons, Martin, & Barsalou, 2005). For example, the rejection of the blue, pink cereal is consistent with the tendency for parents to avoid products with artificial flavors and artificial coloring (Neilsen, 2016), but future research would be useful to confirm such inference making. Nonetheless, the present study has shown that images of the product can be more influential than health/nutrition information in affecting parents' food decisions.

The use of product images by food manufacturers is to attract the attention of target consumers in order to maximizes the chances that there products are selected. At the same time, the FoP nutrition information like the HSR system offers food manufacturers another mechanism to attract consumer attention to their products. This contrasts previous FoP strategies in which historically, nutritional information was only available on the back or side of packages. However, as noted earlier, the range of marketing techniques used on children's products can bear little resemblance to the product's actual nutrient profile (Elliott, 2008; Mehta et al., 2012). By simultaneously observing both variations in regulated and unregulated FoP elements and their impact on product choices using a DCE methodology, the results demonstrate that consumers are prone to categorization of products simply based on some aspects of appearance. Subsequently, the results demonstrate the considerable challenge that regulated elements of FoP elements must compete against other unregulated FoP elements to gain consumers' attention and to affect their decision-making.

The two elements of the HSR system, namely the visual stars and the panel information affected parent's choices of cereals for their children, although to a lesser extent than the product visuals. In particular, products with healthier (numeric) HSR nutrient facts panel information and five star rated products – including those further highlighted on the front of pack were significantly more likely to be chosen by parents. At the same time, products with no star, two star, or poor panel information were significantly less likely to be chosen by parents. This supports earlier findings indicating that visual and numeric FoP nutrition/health information can guide consumer choices towards healthier options (e.g. Maubach et al., 2009; van Herpen & van Trijp, 2011); although it may be less influential than other aspects of the pack.

Health and nutrient claims are also known to have significant and wide-ranging effects on consumer perceptions and choices (Feunekes et al., 2008; Maubach, Hoek, & Mather, 2014). In the present study, though the written claims were the least influential attributes, parents tended to avoid products with the taste claim and preferred products with the 'high in' nutrient claim, but otherwise the claims had a relatively small impact. This is significant given extensive prior work documenting the influence of health claims on consumer behaviors (Harris et al., 2011; Watson et al., 2014). While it is possible that parents did not pay attention to or value the claims as much as other FoP elements in the present study, it is acknowledged that only four claims were tested from a wide range of possible claims. However, given that these claims did significantly affect parents' choice of cereals, this suggests that further research is required to explore the impact of other regulated and unregulated claims.

While the visual elements of the pack in the form of the product image and HSR stars were influential, decisions were relatively less influenced by the other visual elements, namely the two cartoon images and fruit and wheat images. The cartoon images represent FoP visual elements directed at children. Parents are influenced by their children's preferences when selecting products and children are known to prefer products with cartoons (Roberto et al., 2010). Consequently, given that this was a study undertaken by parents and children were not present during the testing, with the potential to influence parents, consideration for the child's preferences may have been lower than in real life supermarket contexts. Such visual elements are known to signal unhealthy food to parents (Abrams et al., 2015), and in the absence of children, parents may have placed less emphasis on them. Also, whilst able to make sense of more information relative to infants and toddlers, young children aged five to twelve years are generally less fluent readers than their parents, and so are more likely to be influenced by visual FoP elements more so than text-based elements (Valkenburg & Cantor, 2001). Parents on the other hand have a greater capacity to process more complex elements and able to be influenced by both text and visual based elements simultaneously (Phillips & McQuarrie 2004). Furthermore, the cartoons were not familiar to the respondents, making them less likely to have an effect than had they been popular, licensed characters (Levin & Levin, 2010). The lack of demand for products associated with wheat may be based on growing demand for 'gluten-free' products led by an increasing number of consumers identified to be affected by coeliac disease (Heller, 2009), but also driven by a wider set of consumers who wish to avoid wheat for other reasons. This includes those changing diets to avoid a range of allergens, to manage autism and attention disorders, or a general perception that such products are healthier (Bogue & Sorenson 2008; Heller, 2009). On the other hand, the presence of fresh fruits on FoP, despite not being an ingredient of many cereals, was enough to affect parents' choice of cereal significantly such that products using this visual were chosen more often than those using other visuals. As such, the use of visuals as a heuristic for healthier decisions, whether driven by convenience, a lack of understanding, or skepticism of other more objective indicators (Maubach et al., 2009), may result in less healthier choices for children. Further investigation is required to tease out the reasons for the greater effects of some visual elements over others.

An important contribution of the research was demonstrating that children's fussiness moderated the valuation of FoP attributes by parents. Of particular interest was that parents of fussier children appeared more likely to ignore or avoid products with information indicating a product with higher health value. Specifically, parents of fussier children were less likely to use the HSR stars than other parents, and they were significantly less likely to dismiss products that did not display any health star rating at all. Consumers often dichotomize products into healthy or tasty (Raghunathan, Naylor, & Hoyer, 2006; Wardle & Huon, 2000). Hence, parents may have inferred that products carrying a five-star rating may be healthy and therefore less tasty, and subsequently be more likely to be rejected by the fussier child. Given that fussier children have a narrower range of food preferences (Dovey et al., 2008) and that parents tend to choose foods for their fussier children that the child already likes, this could reflect an orientation to good taste over health, a finding that has been observed in other settings (e.g., Raghunathan et al., 2006). As such, an avenue for further research is to consider inferences about taste and other elements made among parents of fussier children in response to the presence and variation in health star ratings.

Concern about a child's weight status also affected how parents used the range of FoP attributes. In particular, parents who were concerned about their child being underweight were found to be less reliant on HSR system, particularly the nutrient facts panel information, to guide their choices. Parents with concerns for their child being or becoming overweight, however, were much more dismissive of those products offering no such information. Further, they were more likely to choose products with a poorer HSR nutrient facts panel and two-star rated product when compared to those with no concerns about their child's weight. Similarly, the influence of product imagery was even stronger among parents with concern for their child being overweight, being less likely to select bran-like option, but more likely to select an artificial looking cereal. These findings highlight the important role that parents' cognitions have in influencing how FoP is used when selecting products for children. It is unclear from the present research, however, whether parents select products with particular FoP features because they have an overweight/underweight child (or concerns about their child becoming over/underweight) or whether their selection of products is affecting their child's weight status (and subsequently concerns about this). In the present study, we focused on whether such differences in preference arose, but future research could examine possible explanations further. For example, it would be worthwhile to further consider reasons for observing such differences, including whether a child's weight is in part symptomatic of such choice tendencies by parents who may not be able to interpret or apply the information given to them in the form of the nutritional facts panel.

In view of these findings, when developing strategies for promoting healthier food choices in supermarkets, consideration needs to be given to the particular needs of some groups of parents, including those with fussier children or those concerned about their child's weight status. It appears particularly important to consider the influence of currently non-regulated features (e.g. images of products) in affecting these parents' decisions. Nonetheless, the findings offer additional evidence that numeric and visual based nutrition/health information offers a suitable heuristic such that parents including those with fussier eaters or for which they are concerned about their children being overweight are able to locate and be more likely to choose a healthier option (Pettigrew et al., 2017). In other words, the implication for those scrutinizing policy is that our findings provide evidence that some of the regulatory information will be utilized by parents in the way it was intended, but just not to the same extent across all parents.

In this study the choice modelling methodology proved to be an effective approach for understanding the relative importance of a range of FoP elements in influencing parents' food choices. However, there were some limitations to the study. Parents' decisions in supermarkets are influenced by a range of factors, such as the presence of their children, time pressures and health or nutrition knowledge, and these were not considered in this experimental context. The cartoon and sporting images used were created for the study and not known to the respondents, and so the effect may have been lower than if known cartoon characters or sports people were used as familiar characters have more influence on children and possibly parents (Kotler, Schiffman, & Hanson, 2012; Roberto et al., 2010). Likewise, branded cereal products were not used, which are also preferred by both parents and children (Levin & Levin, 2010). As such, it would be interesting to explore whether some features remain salient when the impact of brands are also introduced. Other limitations of the study were that two of the claims (regarding the nutrient content) could be verified with nutrient facts panel information, but the other two claims could not, and this may also have affected some parents' decisions. Future studies could consider expanding the choice modelling methodological approach to consider other FoP elements that currently exist on supermarket products (e.g.. fonts, other claims), as well as looking at consistency in decision making across food categories (e.g. snacks, dairy), to further understand how changing various FoP assist parents to make healthier choices for their children.

Conclusion

This study analyzed the trade-offs that parents make when faced with products displaying a range of front-of-pack features while evaluating and selecting a suitable cereal for their child's consumption. Findings indicated that when considering the relative importance of a range of packaging features on parents' food choices for their children, attributes that do not draw attention of food regulators and policy makers, but are instead the realm of marketers and advertisers were highly influential, especially in the use of visual images of the product. In particular, health and nutrient information, whether in numeric, visual or written claim form, had less influence on parental decision making than product imagery when presented simultaneously. Health information in the form of a visual health star rating was relatively more important in affecting decisions as compared to written health claims and summary nutrient facts panel when parents were asked to consider such elements simultaneously. Furthermore, parents' use of FoP attributes was also dependent upon their perceptions of their child's fussiness and their concern about their child's weight.

Policies directed at improving children's food intakes should take account of the range of influences acting upon parents at the point of purchase, and consider their relative importance rather than in isolation, and how these influences differentially affects parents. This research contributes to the discourse on policy-related influences on food choice with respect to government regulated labelling (e.g., Feunekes et al. 2008; Hamlin et al., 2015; Pettigrew et al. 2017; van Herpen & van Trijp, 2011), plus it addresses an important research gap by intersecting this line of research with previous works on product-related predictors and parents' individual decision-making (Symmank et al., 2017). Taken together, the research suggests that the HSR system is capable of encouraging better food choices among parents on behalf of their children even when other marketing variables are in play.

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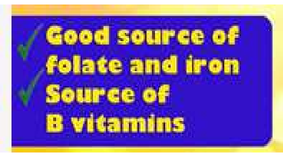
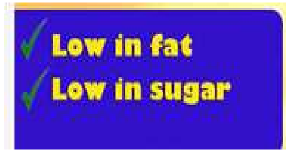
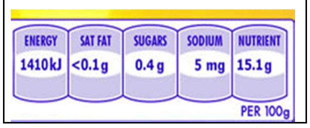
Figure 1: Attribute Levels Varied in Choice Experiment

Attribute	Level 1	Level 2	Level 3	Level 4
Health Star Rating	Poor rating Two-star rating 	High rating Five-star rating 	High (magnified claim) Five-star with arrow 	Missing No rating displayed 
Written Claims	Ingredient (high in) Inclusive (folate, iron,B) 	Ingredient (low in) Reduced fat and sugar 	Taste (unregulated) Appeal to children 	Ingredient (health/adult) Ambiguous 
Product Visual	Artificial looking blue, purple, pink, green 	Chocolate colored Dark brown 	'Neutral' looking Yellowish 	Healthy looking cereal Brown like bran 
Additional visual	Animal related Cartoon dog 	Activity / Sport Cartoon basketball 	Healthy ingredients Various fruits 	Healthy ingredients Wheat 
Panel information	Unhealthy 1660kJ/1.5g/ 39.5g/650mg/1.9g^ 	Medium 1535kJ/0.8g/ 19.9g/327.5mg/8.5g 	Healthy 1410kJ/<0.1g/ 0.4g/5mg/15.1g 	None No panel displayed 

^ Panel information presented in terms of energy (kJ), saturated fat (g), sugars (g), sodium (mg) and fibre (g).

Figure 2: Example of Discrete Choice Experiment Task

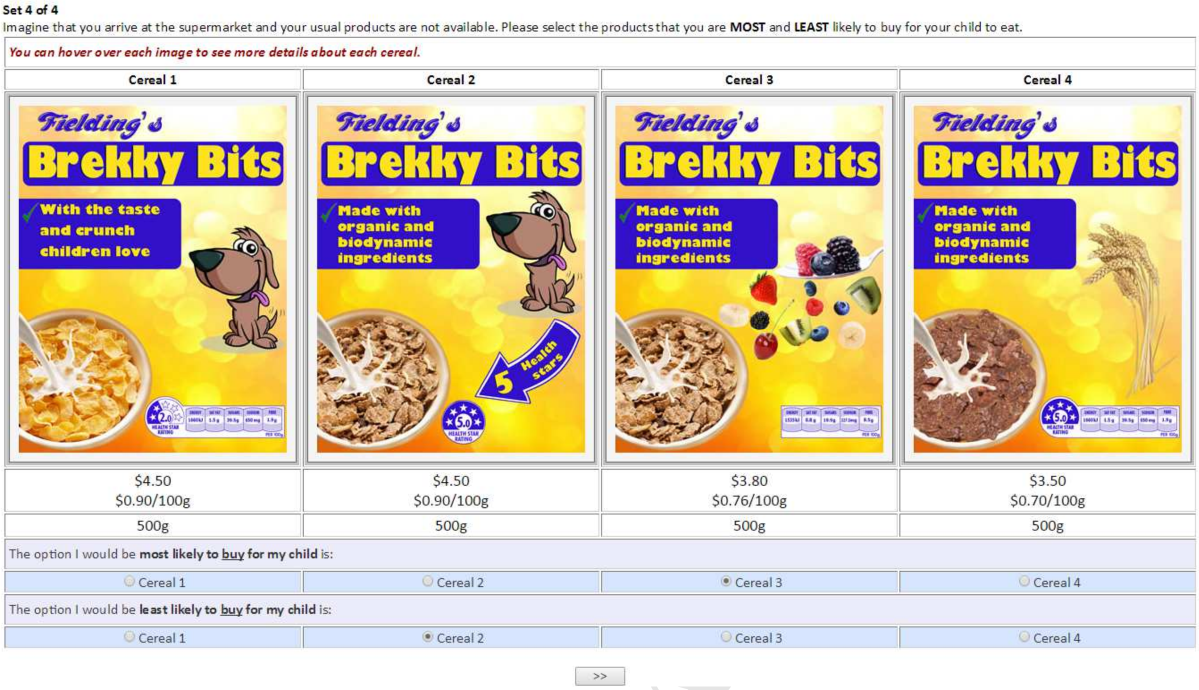


Figure 3: Contribution of Attributes to Model (LR-Test)

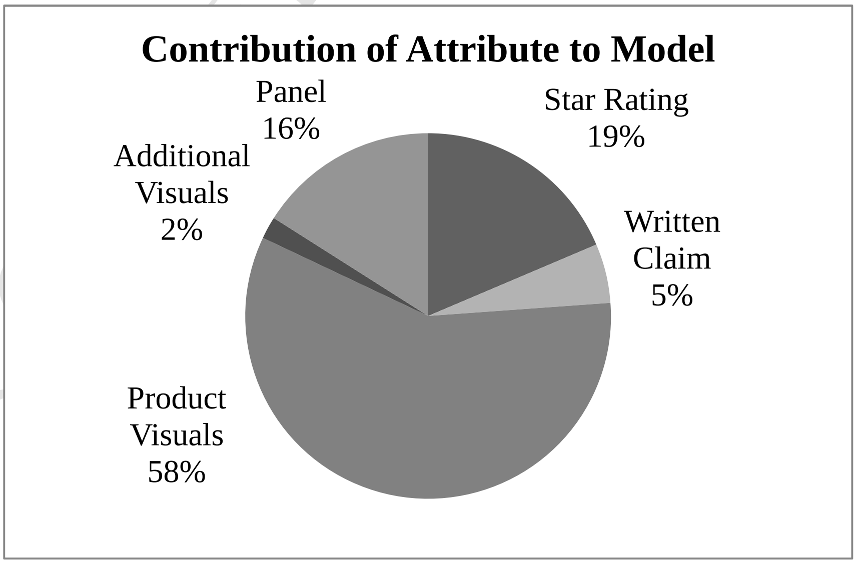


Figure 4: Preferences of Parents by Product Visuals

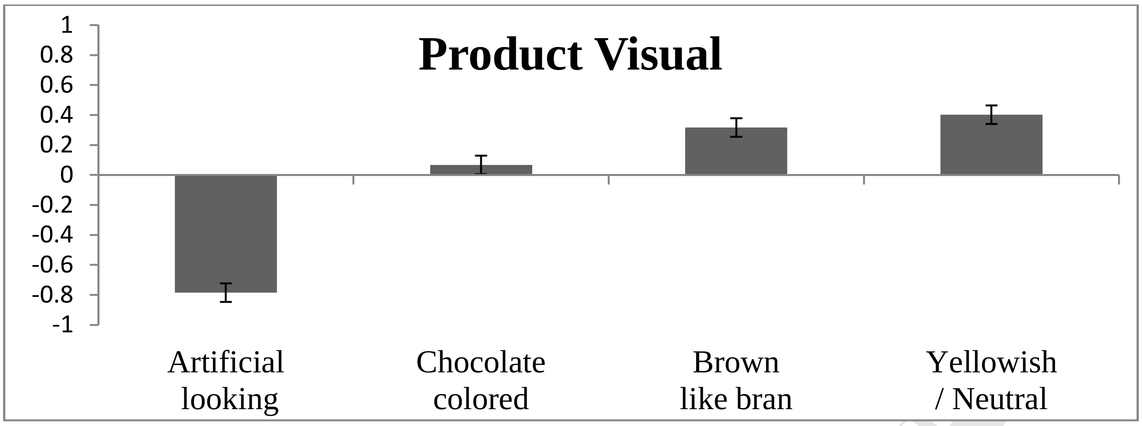


Figure 5: Preferences for Variations in HSR System (Stars)

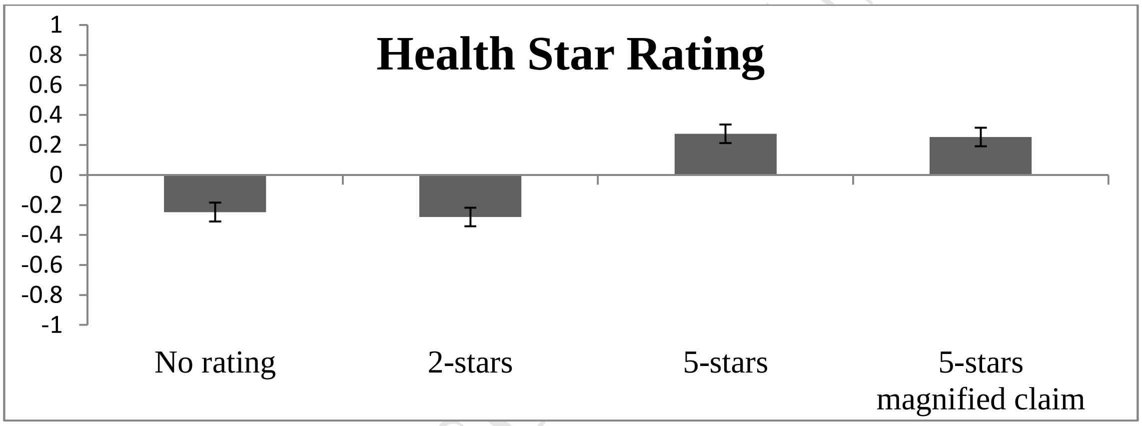
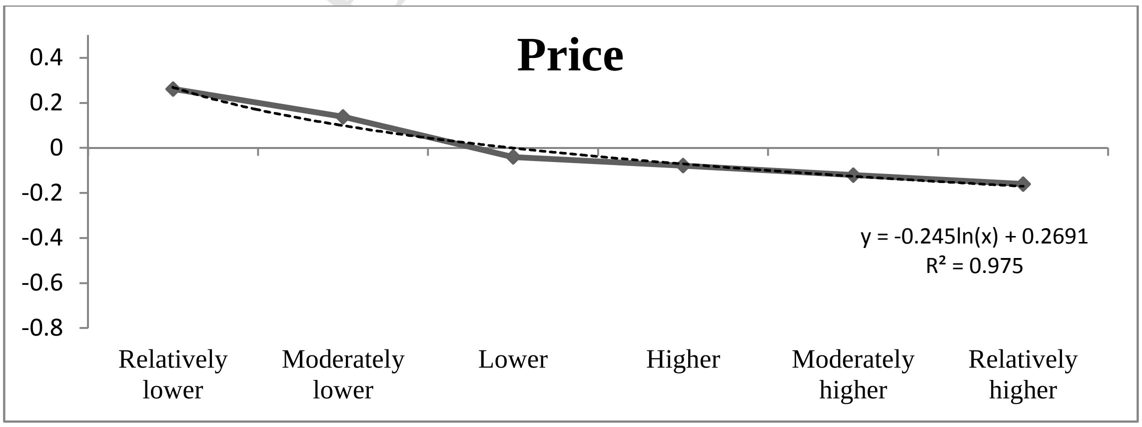


Figure 6: Preferences of Parents for Cereals by Relative Price



Note: The solid line represents effects captured by the separate coefficient estimates.
The dotted line represents the predicted (logarithmic) line-of-best fit.

Figure 7: Role of Health Star Rating in Choice by Fussiness of Child

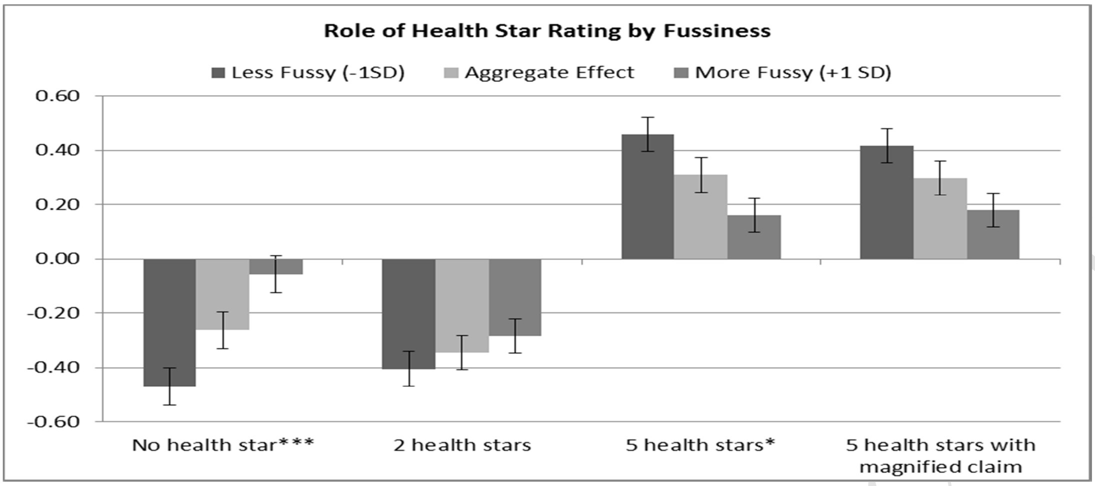


Figure 8: Role of HSR Nutrient Facts Panel Information by Concern for Child's Weight

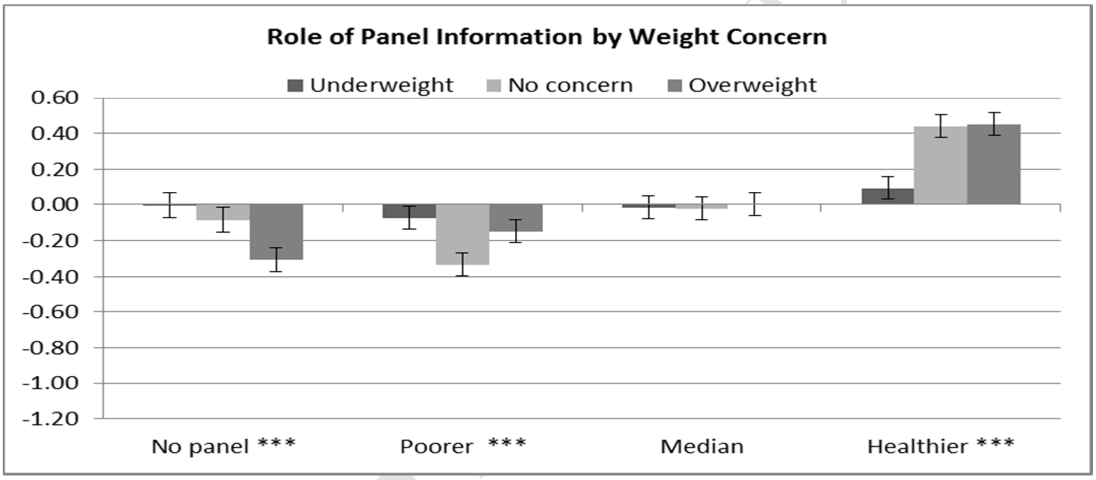


Figure 9: Role of Health Star Rating (Stars) by Concern About Child's Weight

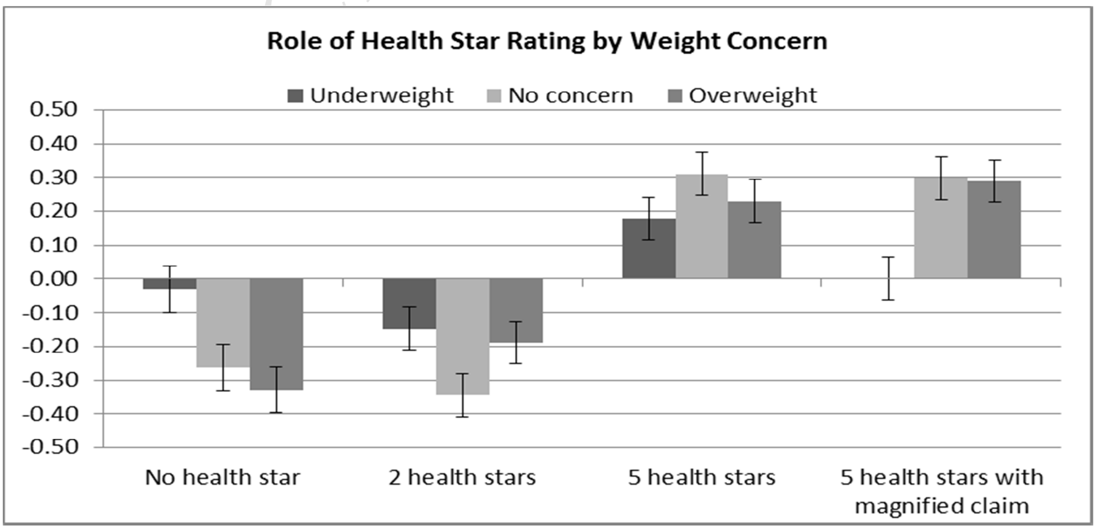


Table 1: Demographic characteristics and breakfast purchasing behaviors

Variable	Respondents	n	%
Sex	Male	276	53.1
Household location	Living in capital city	412	79.2
Number of children	One	84	16.2
	Two	270	51.9
	Three	116	22.3
	Four or more	50	9.6
Respondent's age	18 - 34 years	117	22.5
	35 - 49 years	379	72.9
	50 or more	24	4.6
Reference child's age	5 years	109	21.0
	6 years	120	23.1
	7 years	91	17.5
	8 years	73	14.0
	9 years	65	12.5
	10 years	51	9.8
	11 years	11	2.1
Reference child's sex	Male	304	58.5
	Female	216	41.5
Marital status	Married	375	72.1
	Living with long-term partner	62	11.9
	Separated, not divorced	31	6.0
	Divorced	18	3.5
	Never married	30	5.8
	Widowed	4	0.8
Educational attainment	University degree of higher	204	39.2
	Post-school certificate, trade or diploma	204	39.2
	Year 12 or equivalent	81	15.6
	No formal qualification	29	5.6
	Other	2	0.4
Country of birth	Australia	401	77.1
	United Kingdom	33	6.3
	New Zealand	12	2.3
	Other	74	14.2
Responsibility for purchasing child's breakfast cereal	Entirely responsible	201	38.7
	Mostly me	153	29.4
	Share equally	129	24.8
	Mostly another	37	7.1
Frequency at which child eats breakfast cereal	Once a week	44	8.5
	2-4 times/week	153	29.4
	5-6 times/week	145	27.9
	Once a day	166	31.9
	2 or more times a day	12	2.3

Table 2: Aggregate Model Estimates

	Est. β	Std. Err.	Est./SE	p-value	sig.
Attribute 1: Health Star Rating					
No health star	-0.2476	0.032	-7.73	0.00	***
2 health stars	-0.2802	0.032	-8.88	0.00	***
5 health stars	0.2742	0.032	8.67	0.00	***
5 health stars with magnified claim	0.2536	0.032	8.05	0.00	***
Attribute 2: Written Claim					
Made with organic and biodynamic ingredients	0.0208	0.031	0.67	0.51	
With the taste and crunch children love	-0.2208	0.032	-6.92	0.00	***
Low in fat; Low in Sugar	0.0284	0.031	0.90	0.37	
Good source of folate and iron; source of B vitamins	0.1716	0.031	5.46	0.00	***
Attribute 3: Visual of Bowl with Cereal					
Artificial looking cereal (in various colors)	-0.7849	0.033	-23.66	0.00	***
Chocolate looking cereal (chocolate coated)	0.0664	0.032	2.11	0.04	**
Healthy looking cereal (wholemeal color)	0.3168	0.031	10.07	0.00	***
"Neutral" looking cereal (yellow creamy color)	0.4018	0.032	12.68	0.00	***
Attribute 4: Extra visuals on box					
Ingredients (wheat/wholegrain)	-0.1356	0.032	-4.27	0.00	***
Cartoon (a puppy)	0.0408	0.031	1.30	0.19	
Sports kid (cartoon sport kid)	-0.0008	0.031	-0.03	0.98	
Fruits (various fresh fruits)	0.0957	0.031	3.06	0.00	***
Attribute 5: Health panel on box					
No panel displayed	-0.1221	0.032	-3.84	0.00	***
Panel at poorer levels	-0.2564	0.032	-8.10	0.00	***
Panel at median levels	-0.0157	0.031	-0.50	0.62	
Panel at healthier levels	0.3942	0.032	12.31	0.00	***
Attribute 6: Comparison to Average Price					
Relatively lower (<10%)	0.2616	0.045	5.82	0.00	***
Moderately lower (≤10% to <5%)	0.1383	0.039	3.52	0.00	***
Lower (≤5% to 0%)	-0.0406	0.040	-1.01	0.31	
Higher (0% to ≥5%)	-0.0785	0.040	-1.96	0.05	**
Moderately higher (>5 to ≥10%)	-0.1204	0.041	-2.91	0.00	***
Relatively higher (>10%)	-0.1605	0.050	-3.19	0.00	***

*** p<.001; ** p<.01; * p<.05;

Table 3: LR Tests of six attribute contributing to the full model

Model-summary	Full Model	Without Star Rating	Without Written Claim	Without Product Visuals	Without Additional Visuals	Without Panel
Log-likelihood (LR)	-5188.13	-5291.53	-5217.3	-5511.69	-5198.97	-5277.08
Degree of freedom	23	20	20	20	20	20
AIC	10422.26	10623.06	10474.61	11063.37	10437.95	10594.16
BIC	10599.81	10777.45	10629	11217.76	10592.34	10748.55
Comparison to full-model						
Differences in χ^2	-	206.8	58.35	647.11	21.69	177.9
Degree of freedom	-	3	3	3	3	3
Average χ^2/df	-	68.93	19.45	215.7	7.23	59.3
Prob > χ^2	-	0.000***	0.000***	0.000***	0.000***	0.000***

*** p<.001; ** p<.01; * p<.05.

Table 4: Fussiness and Concern with Child's Weight

		Est. β	Std. Err.	Est./SE	p-value	sig.
Attributes						
	Interactions (Fussiness)					
HSR	No health star^	0.2288	0.0778	2.94	0.00	***
HSR	5 health-stars	-0.1521	0.0773	-1.97	0.04	**
HSR	5 health stars (magnified claim)	-0.1464	0.0758	-1.93	0.05	*
PR	Log Price	1.3683	0.5068	2.70	0.01	***
	Interactions (under-weight concern)					
HSR	No health star	0.2325	0.0983	2.36	0.02	**
HSR	2 health stars	0.1970	0.0948	2.08	0.04	**
HSR	5 health stars with magnified claim	-0.2981	0.0951	-3.13	0.00	***
WC	Organic and biodynamic ingredients	0.2137	0.0974	2.19	0.03	**
PRV	Artificial looking cereal (in various colors)	0.3634	0.0997	3.65	0.00	***
PRV	Healthy looking cereal (wholemeal color)	-0.2088	0.0963	-2.17	0.03	**
PRV	"Neutral" looking cereal (yellow creamy)	-0.1674	0.0966	-1.73	0.08	*
ADV	Cartoon (a puppy)	-0.1869	0.0963	-1.94	0.05	*
HPL	Panel at poorer levels	0.2604	0.0957	2.72	0.01	***
HPL	Panel at healthier levels	-0.3462	0.0975	-3.55	0.00	***
PR	Log Price	1.2229	0.6268	1.95	0.05	*
	Interactions (over-weight concern)					
HSR	2 health stars	0.1553	0.0827	1.88	0.06	*
PRV	Artificial looking cereal (in various colors)	0.2365	0.0858	2.76	0.01	***
PRV	Healthy looking cereal (wholemeal color)	-0.2634	0.0810	-3.25	0.00	***
HPL	No panel displayed	-0.2198	0.0824	-2.67	0.01	***
HPL	Panel at poorer levels	0.1857	0.0826	2.25	0.02	**

^ Only significant effects are shown; *** p<.001; ** p<.01; * p<.05;
HSR - Health Star Rating; PR - Price; WC - Written Claim;
PRV - Product Visuals; ADV - Additional Visuals; HPL - Health Panel