Elsevier Editorial System(tm) for Food Quality and Preference

Manuscript Draft

Manuscript Number: FQAP-D-15-00552R3

Title: The combined effect of front-of-pack nutrition labels and health claims on consumers' evaluation of food products

Article Type: Research Article

Keywords: Front-of-pack label; health claim; Daily Intake Guide; Traffic light; Health Star Rating

Corresponding Author: Dr. Zenobia Talati, PhD

Corresponding Author's Institution: Curtin University

First Author: Zenobia Talati, PhD

Order of Authors: Zenobia Talati, PhD; Simone Pettigrew, PhD; Clare Hughes; Helen Dixon; Bridget Kelly; Kylie Ball; Caroline Miller

Abstract: The majority of studies examining the effect of nutrition information on food packets (such as the Nutrition Information Panel (NIP), front-of-pack labels (FoPLs) and health claims) have examined each in isolation, even though they often occur together. This study investigated the relationship between FoPLs and health claims since (i) they both appear on the front of packs and typically receive more attention from consumers than the NIP, (ii) they can convey contradictory messages (i.e., health claims provide information on nutrients that are beneficial to health while FoPLs provide information on nutrients associated with increased health risks) and (iii) there is currently scant research on how consumers trade off between these two sources of information. Ten focus groups (n= 85) explored adults' and children's reactions when presented with both a FoPL (the Daily Intake Guide, Multiple Traffic Lights, or the Health Star Rating) and a health claim (nutrient content, general-level-, or high-level). A particular focus was participants' processing of discrepant information. Participants reported that health claims were more likely to be considered during product evaluations if they were perceived to be trustworthy, relevant and informative. Trust and ease of interpretation were most important for FoPLs, which were more likely than health claims to meet criteria and be considered in during product evaluation (especially the Health Star Rating and Multiple Traffic Lights). Results indicate that consumers generally find FoPLs easier to interpret than health claims.

The combined effect of front-of-pack nutrition labels and health claims on consumers' evaluation of food products

Research Article

Zenobia Talati, zenobia.talati@curtin.edu.au[a]

Simone Pettigrew, simone.pettigrew@curtin.edu.au[a]

Clare Hughes, clareh@nswcc.org.au[b]

Helen Dixon, helen.dixon@cancervic.org.au[c]

Bridget Kelly, bkelly@uow.edu.au[d]

Kylie Ball, kylie.ball@deakin.edu.au[e]

Caroline Miller, Caroline.Miller@sahmri.com[fg]

[a]School of Psychology and Speech Pathology, Curtin University, Kent St, Bentley, Australia

[b] Cancer Council, New South Wales, Australia

[c] Centre for Behavioural Research in Cancer, Cancer Council Victoria, Victoria, Australia

[d]School of Health and Society, University of Wollongong, New South Wales, Australia

[e]Deakin University Centre for Physical Activity and Nutrition Research, School of Exercise and Nutrition Sciences, Victoria, Australia

[f]South Australian Health and Medical Research Institute, South Australia, Australia

[g]University of Adelaide, Adelaide, South Australia, Australia

Corresponding author details:

Zenobia Talati

Address: School of Psychology and Speech Pathology, Curtin University, Kent st, Bentley, WA 6102, Australia

Phone: 92664396

Email: zenobia.talati@curtin.edu.au

Financial support: This work was supported by an ARC Linkage grant (LP130100428), with additional cash and in-kind support provided by the following partner organizations: the South Australian Health and Medical Research Institute, the National Heart Foundation, Cancer Council NSW, and Cancer Council Victoria.

Conflict of interest: SP and CH have sat on committees providing advice on food labelling to the Australian Government.

***Highlights (for review)**

- Consumers are faced with multiple forms of on-pack nutrition information
- Participants were sceptical of health claims but generally supportive of labels
- Labels were prioritised where health claims and labels were incongruent
- Incongruence was easier to detect with evaluative labels, especially among children

The combined effect of front-of-pack nutrition labels and health claims on consumers' evaluation of food products

Abstract

The majority of studies examining the effect of nutrition information on food packets (such as the Nutrition Information Panel (NIP), front-of-pack labels (FoPLs) and health claims) have examined each in isolation, even though they often occur together. This study investigated the relationship between FoPLs and health claims since (i) they both appear on the front of packs and typically receive more attention from consumers than the NIP, (ii) they can convey contradictory messages (i.e., health claims provide information on nutrients that are beneficial to health while FoPLs provide information on nutrients associated with increased health risks) and (iii) there is currently scant research on how consumers trade off between these two sources of information. Ten focus groups (n= 85) explored adults' and children's reactions when presented with both a FoPL (the Daily Intake Guide, Multiple Traffic Lights, or the Health Star Rating) and a health claim (nutrient content, general-level-, or high-level). A particular focus was participants' processing of discrepant information. Participants reported that health claims were more likely to be considered during product evaluations if they were perceived to be trustworthy, relevant and informative. Trust and ease of interpretation were most important for FoPLs, which were more likely than health claims to meet criteria and be considered in during product evaluation (especially the Health Star Rating and Multiple Traffic Lights). Results indicate that consumers generally find FoPLs easier to interpret than health claims.

Keywords: Front-of-pack label; health claim; Daily Intake Guide; Traffic light; Health Star Rating

1. Introduction

A substantial proportion of consumers report using nutritional information contained on food packets to make decisions about food products (Campos, Doxey, & Hammond, 2011; Grunert, Wills, & Fernández-Celemín, 2010). The three main sources of nutrient information available on food packs are the nutrition information panel (NIP), front-of-pack labels (FoPLs) and health claims. Each of these differs in content, purpose and style of presentation. The NIP appears on the back or side of food packs and reports levels of many key nutrients and, in some cases, their contribution to recommended daily intakes (Gorton, Ni Mhurchu, Chen, & Dixon, 2008). FoPLs and health claims typically appear on the front of packs and provide summary information that may or may not be replicated in the NIP (Hawkes, 2010; Van Der Bend et al., 2014). FoPLs tend to refer to multiple nutrients, whereas health claims generally refer to a single nutrient.

Despite food products in the marketplace commonly featuring multiple forms of nutrition information, most research in this area has examined how each source of nutrition information works independently and the literature on their combined effects is scant. The aim of the present study was to explicitly investigate these combined effects to provide insight into how consumers make food choices when there is competing health information. The context of the study is the Australian marketplace where new regulations for health claims are currently being implemented (Food Standards Australia New Zealeand, 2014) and a new government-developed, voluntary FoPL (the Health Star Rating) has been recently

introduced (Australian Department of Health, 2015). An example of each of these FoPLs is shown in Figure 1.

Figure 1 about here

1.1 Independent effects of front-of-pack nutrition information sources

1.1.1 FoPLs

FoPLs provide simplified nutrition information, generally by reporting and/or interpreting the levels of key negative nutrients. FoPLs can be categorised into two main types: *reductive* FoPLs, which provide only numerical information on nutrients and *evaluative* FoPLs, which provide an assessment of a food's health value (Hamlin, McNeill, & Moore, 2014). Evidence suggests that evaluative FoPLs are more effective than reductive FoPLs in assisting consumers identify healthier food choices (Hawley et al., 2013; Hersey, Wohlgenant, Arsenault, Kosa, & Muth, 2013). The Daily Intake Guide (DIG) is a reductive FoPL that is widely used in Australia and details the levels of nutrients such as sugar, total fat, saturated fat and sodium within one serve of a product. The nutrient levels are expressed as a percent of a reference adult's (70kg male) recommended daily intake. There are multiple forms of evaluative FoPLs. The Multiple Traffic Lights system (MTL), which is currently being used voluntarily in the UK, is the most studied to date (Hawkes, 2010; Hawley et al., 2013; Hersey et al., 2013). This system uses the three colours (red, amber and green) to indicate high, medium and low (respectively) values for specific nutrients (fat, saturated fat, sugar and sodium). As noted above, the Health Star Rating (HSR) is a more recently developed FoPL that combines evaluative and reductive elements. The evaluative component assigns foods a

rating between half a star and five stars based on the nutritional profile of the food, while the reductive component details the amount of sugar, saturated fat and sodium per 100g of product, or per single serving when the pack is less than 100g (Australian Department of Health, 2015).

1.1.2 Health claims

The term 'health claims' refers to the broad category of nutrient-specific and health-related claims that provide a written description of one or more positive nutritional aspects of the food. There are three types of health claims in Australia (FSANZ, 2014): (i) nutrient content claims, which inform consumers about the presence or absence of a nutrient (e.g., 'Good source of calcium'); (ii) general-level health claims, which relate nutrients within the food to a health function (e.g., 'Contains calcium for healthy bones and teeth'); and (iii) high-level health claims, which relate a nutrient to a specific disease (e.g., 'Contains calcium to reduce the risk of osteoporosis').

Health claims can be beneficial as an educational tool to inform consumers of nutrients that are beneficial in preventing or managing chronic diseases (Ippolito & Mathios, 1991). However, they may also be a public health concern when they prevent consumers from accurately assessing the nutritional value of products, especially nutritionally poor products. Health claims have been criticised as being potentially misleading or deceptive because their purpose is to present products in a positive manner rather than provide a balanced summary of the product's nutritional value (Hastak & Mazis, 2011). Some studies have found that health claims can induce a positivity bias whereby products featuring them receive more

favourable evaluations (Gorton, Ni Mhurchu, Bramley, & Dixon, 2010; Saba et al., 2010) or are consumed in larger portions (Faulkner et al., 2014; Wansink & Chandon, 2006) compared to products without a health claim. This effect has been found to occur among adults, children and adults buying food for children (Abrams, Evans, & Duff, 2015; Dixon et al., 2011, 2014; Harris, Thompson, Schwartz, & Brownell, 2011; Soldavini, Crawford, & Ritchie, 2012). In an attempt to ensure consumers have access to unbiased nutritional information, a number of countries have mandated the use of an NIP when health claims appear on the pack (Hawkes, 2010), or have established criteria for the overall nutritional profile of products eligible to make a health claim (FSANZ, 2014).

1.2 Combined effects of nutrition information

In the studies described above where health claims appeared in isolation, food product evaluations were found to be influenced by the claims. However, some studies have provided participants with the option to view an NIP (which has been manipulated to indicate either a good or poor nutritional profile) along with the health claim. The findings of these studies have been mixed, with some reporting that the NIP had little to no effect when presented with a health claim (Kozup, Creyer, & Burton, 2003; Study 1; Wansink, 2003; Wong et al., 2013, 2014) and others finding that the NIP had a greater influence on product evaluations than health claims (Dixon et al., 2011; Ford, Hastak, Mitra, & Ringold, 1996; Garretson & Burton, 2000; Keller et al., 1997; Kemp, Burton, Creyer, & Suter, 2007; Labiner-Wolfe, Lin, & Verrill, 2010; Mazis & Raymond, 1997; Mitra, Hastak, Ford, & Ringold, 1999).

If the NIP is to attenuate the positivity bias induced by health claims, consumers must first be motivated to read the NIP. The chance of this occurring in a real world food choice setting is unlikely for several reasons. First, due to its less prominent location and greater complexity and level of detail, the NIP is infrequently used (Graham & Jeffery, 2011; van Herpen & van Trijp, 2011). Second, the mere presence of a health claim can reduce the likelihood of consumers looking at the NIP (Roe, Levy, & Derby, 1999), even when they report being sceptical of the claim (Chan, Patch, & Williams, 2004; Szykman, Bloom, & Levy, 1997). Third, observational studies carried out in supermarkets reveal that the proportion of consumers who look at the NIP in actual shopping environments is low (e.g. Grunert et al., 2010). This all suggests that consumers are less likely to turn the pack over to view the NIP in a real world shopping context compared to the laboratory or online environments in which most health claims studies have been conducted.

Finally, of the studies showing that the NIP can counteract the positivity bias, most presented participants with an NIP physically next to the health claim (Ford et al., 1996; Keller et al., 1997; Kemp et al., 2007; Labiner-Wolfe et al., 2010; Mazis & Raymond, 1997; Mitra et al., 1999). This makes the NIP highly salient and more prominent than it would be in the real world. A more ecologically valid design is one in which participants need to exert extra effort to view the NIP as they would in a normal product purchase situation. Studies using this technique find that the NIP only has an effect on the minority of participants who chose to view it and thus has a much weaker, almost negligible, effect overall (Dixon et al., 2011; Maubach, Hoek, & Mather, 2014; McLean, Hoek, & Hedderley, 2012). As a result, even

though the NIP is, in theory, capable of attenuating the effects of health claims, this is unlikely to happen in practice.

Since FoPLs appear in close proximity to health claims, they may have a stronger attenuating effect on these claims than the NIP (Maubach, Hoek, & Mather, 2014; McLean, Hoek, & Hedderley, 2012). In general, information on nutrient levels can be expressed in a written (e.g., words such as 'low' or 'high') or numerical format (e.g., percentages). Written nutrition information has been found to have a stronger effect on liking, perceptions of healthiness and willingness to purchase the product than numerical information (Viswanathan, 1996), suggesting that health claims (which mainly use words) could override the influence of reductive FoPLs (which often use numbers). However, colours (Antúnez, Giménez, Maiche, & Ares, 2015) and symbols (Oh, 2010) are highly effective in drawing people's attention. They also aid in comprehension. The mere addition of colour to an otherwise monochrome DIG leads to increased understanding (Antúnez et al., 2015). This is likely to be because colours, unlike numbers, are processed innately (Ozturk, Shayan, Liszkowski, & Majid, 2013) and unconsciously (Ro, Singhal, Breitmeyer, & Garcia, 2009). Similarly, symbols have been found to help people differentiate healthy and unhealthy foods (Feunekes, Gortemaker, Willems, Lion, & van den Kommer, 2008; Maubach et al., 2014). This suggests that evaluative FoPLs may be more influential in product decisions than health claims.

There have been very few studies to date examining how consumers make sense of FoPLs and health claims when they are presented together on food packets. McLean, Hoek and Hedderley (2012) used a discrete choice task to look at consumers' willingness to buy

products that varied in their level of sodium (high or low), FoPLs (none, DIG or MTL) and nutrient content claims (none, 'low salt' or 'reduced salt', although they did not include the 'low salt' health claim on high sodium products). They found that participants were less likely to be influenced by health claims and more likely to be influenced by FoPLs on low sodium products. Crucially, for high sodium products, the MTL FoPL (but not the DIG) influenced product selection to a greater extent than the 'reduced salt' health claim. Similarly, Maubach et al. (2014) used a discrete choice experiment to investigate consumers' perceptions of product healthiness for healthy and unhealthy products. The primary finding was that when a general-level health claim (as opposed to no claim) appeared alongside a DIG or star-rating based FoPL (compared to the MTL FoPL), products with a poor nutritional profile were more likely to receive a positive evaluation. This suggests that general-level health claims in combination with the DIG or star-rating created inflated positive evaluations of the unhealthy product. The majority of participants did not choose to view the NIP. It is important to note that unlike the HSR, the stars FoPL created by Maubach et al. (2014) for their study rated product healthiness on a scale from one to seven stars and did not provide information on levels of energy, saturated fat, sugar, or sodium. Together, these two studies suggest that the MTL are more effective than the DIG, the star-rating or the NIP at attenuating any unrealistic positive effects of health claims on product perceptions. However, the quantitative nature of these studies precludes an explanation of why this was the case.

Understanding more about the interaction between health claims and FoPLs is critical given the high prevalence of both forms of nutrition information on food packages (Hughes, Wellard, Lin, Suen, & Chapman, 2013; Lalor, Kennedy, Flynn, & Wall, 2010; Van Der Bend

et al., 2014). From the perspectives of public health and consumer protection, it is important for consumers to have an accurate understanding of the nutritional value of a product and this is unlikely to occur if consumers are more influenced by health claims than FoPLs or if health claims exist without FoPLs. This may be particularly important for children, as they have more difficulty distinguishing between objective information and persuasive marketing content (John, 1999).

The aim of this study was to explore adults' and children's reactions when presented with foods containing multiple forms of front-of-pack nutrition information (i.e., FoPLs and health claims) and any trade-offs made between these information sources. Previous studies examining this issue have been quantitative in design. While their findings are useful in showing that people's decisions can be influenced by different types of FoPLs, health claims and combinations of the two, the present study used focus groups to better understand how the various characteristics of different on-pack nutrition information sources are processed during product evaluation. The findings contribute to the limited literature on this topic and provide information that can inform future FoPL policies and regulations.

2. Method

This study was part of a larger project examining consumer attitudes to nutrition information. In the present study, ten focus groups comprising 50 adults (27 males and 23 females) and 35 children (18 males and 17 females) were conducted in Perth, Western Australia. Focus groups were considered a suitable data collection method for this study because of their

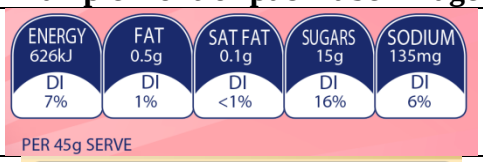
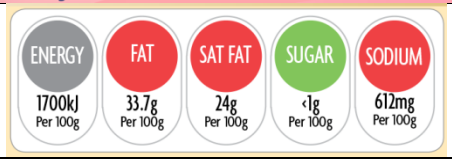
utility in assessing how people come to individual and collective interpretations of phenomena (Wilkinson, 1998). Participants were recruited by a social research agency that was commissioned to source individuals from across the city of Perth. Groups ranged in size from seven to 10 participants and were segmented according to gender (male, female) and age (10-13, 14-17, 18-25, 26-45, 46+ years). Ethics clearance was obtained from the Curtin University Human Research Ethics Committee. Participants were provided with information letters informing them that the group discussions would focus on food and nutrition. Signed consent (including additional parental consent for the 10-13 year olds) was provided by all participants prior to the focus groups.

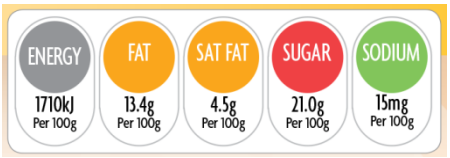
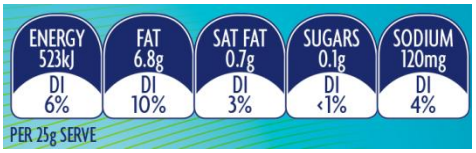
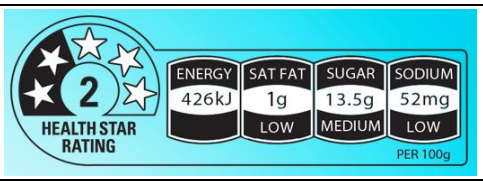
Discussions began with broad questions about food preferences, shopping habits and sources of nutrition information used, including any information contained on product packaging. Participants were then shown examples of different types of FoPLs (DIG, MTL and HSR) and different types of claims (nutrient content, general-level and high-level). The health claims developed for use on the mock packages were based on the type and content of claims permitted by Food Standards Australia New Zealand (2014).Participants were also shown mock food packages featuring different combinations of FoPLs and health claims (see Table 1 for details). The relationship between the FoPLs and health claims was designed to be somewhat contradictory in that the health claims promoted one positive aspect of the food while the FoPLs provided a negative overall picture of the food. The foods used in this study were selected because they are common every-day foods that adults and children consume, there are healthier and less healthy options available within these product categories and manufacturers will often modify the nutrition content of these foods to increase healthier

nutrients (e.g., fibre) or decrease less healthy nutrients (e.g., fat). The combinations of FoPLs and health claims were designed such that no pair appeared more than once. The mock foods were based on real products in the Australian market place that had poor nutrition profiles (a 2 health star rating or equivalent) to enable participants' reactions to the discrepancy between an unhealthy FoPL and a health claim to be observed.

The moderator led into the focus group discussions by asking participants to imagine they were viewing the products in a supermarket. Discussion prompts relating to the mock products were mainly kept general and open-ended (e.g., "What do you think about this?") to elicit spontaneous reactions to the different FoPLs and health claims. Towards the end of the sessions, participants were specifically asked which label they found easiest to interpret. After the focus group discussion had finished, participants were thanked and paid $80AUD (participants under 18 received $60AUD and their caregiver received $20AUD) to compensate them for their participation.

Table 1: Front-of-pack labels and health claims appearing on mock food packages

Food	Health claim	Label type	Example front-of-pack label image
Breakfast cereal	High in fibre (nutrient content claim)	Daily Intake Guide (DIG) – reductive label	
Cheese	Contains calcium which reduces your risk of osteoporosis (high-level health claim)	Multiple Traffic Lights (MTL) – evaluative label	
Chicken nuggets	Contains protein necessary for tissue building and repair (general-level health	Health Star Rating (HSR) – evaluative label	

	claim)		
Muesli bar	Contains zinc which is necessary for normal immune system function (general-level health claim)	Multiple Traffic Lights – evaluative label	
Potato chips	Contains vegetables which reduce the risk of coronary heart disease (high-level health claim)	Daily Intake Guide – reductive label	
Yoghurt	99% fat free (nutrient content claim)	Health Star Rating – evaluative label	

246

247 Discussions lasted 70-110 minutes, with an average of 88 minutes (adult groups averaged 96
248 minutes, child groups averaged 76 minutes). The discussions were recorded and transcribed
249 and the transcriptions were imported into NVivo10 qualitative data analysis software. Text
250 was coded according to a node hierarchy that was progressively updated as new codes
251 emerged from the data. The coding of the data was undertaken by the first author and
252 reviewed by the second author until a consensus was obtained. An inductive approach was
253 used to develop a thematic interpretation of the data (Strauss & Corbin, 1990). This
254 interpretation was then refined through discussions among the author team.

255

256 **3. Results**

257

A series of focus group discussions with Western Australians of varying age, gender and SES provided insight into how consumers evaluate the nutritional value of a product when both a FoPL and a health claim are present. A summary of the key findings of this study are shown in Figure 2. As can be seen, there appeared to be a number of criteria that FoPLs and health claims needed to meet individually before being considered together in the evaluation process. These findings were largely consistent among men and women and all the age groups sampled.

Participants reported that health claims needed to demonstrate their value by providing new, relevant and reliable information, whereas FoPLs needed to be trusted and easy to use. If the featured claim and FoPL met all the criteria for inclusion in the evaluation process and no discrepancy was detected, participants felt that both would be considered during product assessment. However, if a discrepancy was detected, only the FoPL would be used as this was considered a more reliable source of information. These stages of the evaluation process depicted in Figure 2 are explained below.

Insert Figure 2 about here

3.1 Decision to use health claims

Participants reported three main reasons for not incorporating health claims in their evaluations. The first was a general distrust because health claims were viewed primarily as marketing messages that were constructed by the food manufacturer rather than balanced, informative statements about the health value of the product. As such, it was assumed they

may not be grounded in objective facts and instead worded in a deceptive manner to achieve their marketing objectives. Some participants expressed uncertainty about whether regulations exist to govern health claims usage, while others believed there is little to no regulation.

> *I don't trust words…They're just trying to get you to buy the product. They can say whatever they want.* Male, 18-25.

> *The bigger the claims on the front, the more suspicious.* Female, 18-25.

> *Who's making the claims? Are these regulated claims, so they have to pass a standard? If so, I think it's good. The more information the better. But if it's companies can more or less say what they like then I think it's probably not a good thing.* Male 26-45.

Participants had specific reasons for distrusting both nutrient content claims and general/higher-level claims. Nutrient content claims were thought to be deceptive if they promoted a particular nutrient in a food product also containing substantial quantities of unhealthy nutrients. The other main criticism of nutrient content claims was that there is a lack of clarity regarding the meaning of the terms "high" or "low". This was mentioned by adults and children alike.

Ones that say like 97% fat free…you turn them over and they're just full of other shit. Male, 18 – 25.

When it says that now 65% less fat, you don't know how much fat's in it. Even though there's less fat, you don't know how much is still there. Female, 14 – 17.

Female 1: I'm thinking they can't really say it's got zinc or whatever if it hasn't
Female 2: But it might be an insignificant amount of zinc though. Females, 46+.

High? What's high? It's subjective. Male, 18 – 25.

It was also argued (mostly by adults) that the nutrient-disease link made by general- and higher-level health claims could be deceptive because people may develop the nominated disease even while consuming the profiled nutrient. For example, as described below, various unhealthy behaviours could offset the benefits of a particular healthy choice.

Female 1: You don't need to tell people it's good for heart health because there are other things that are good for your heart health apart from eating two serves of vegetables.
Female 2: They'll end up just going, "Oh well, if I ate those that's all I need to do to stop me from having a problem". They'll think that you can still smoke and drink and eat fat and what not. Females, 46+

It depends how they're [vegetables] *cooked. They could be swimming in a cheese sauce, but just because there's two serves of vegetables it doesn't mean it's any good for you.* Female, 26-45.

The second main reason health claims were discounted was if they were deemed irrelevant. General- and higher-level health claims in particular were often assumed to be directed at older people who are more at risk of chronic disease. Thus younger consumers more often reported feeling that these health claims were not relevant to them.

It's [osteoporosis] *not at the forefront of my mind. If I was 80, maybe then I'd think a different thing.* Male, 26-45.

That one [cheese packet] *says you can have calcium for strong bones. Like, that's what adults will want to have.* Male, 10-13.

Finally, the third reason for ignoring health claims was if they were considered uninformative. For nutrient content claims, the information was deemed redundant if the food product was well known for containing that nutrient. For general- and higher-level health claims, the information was considered redundant if participants were already aware of the diet-disease relationship being reported.

Any dairy product will reduce your risk [of osteoporosis]. Female, 18-25.

If you're buying something, you know it's got vegetables in there. I don't have to be told again that it's got two serves of vegetables. Male, 46+

3.2 Decision to use front-of-pack nutrition labels

Trust and ease of use were the main factors reported by adults and children as affecting their willingness to incorporate FoPLs into the evaluation process. Participants considered FoPLs to be more objective (and therefore less likely to be deceptive) compared to health claims. They expressed the belief that they are created and monitored by a third party (i.e., the government) rather than food manufacturers.

That would still be better though, as long as you know that you are looking at the government one [FoPL] *and not a similar one that a company's put on their own products.* Female, 26-45.

There were, however, some specific aspects of the evaluative FoPLs (i.e., MTL and HSR) and reductive FoPL (i.e., DIG) that were distrusted. Among the adults, a lack of trust in the DIG was mostly due to the perception that serving sizes were often manipulated by the manufacturer to be unrealistically small to produce more favourable figures. Most participants lacked experience with the evaluative FoPLs shown in the focus groups since the MTL have not been adopted in Australian supermarkets and the HSR had only recently begun appearing on packs. This created some doubt about whether these FoPLs could be applied and enforced uniformly. However, participants were still more trusting of them than DIGs.

Sometimes that [serving size on the DIG] *can be deceiving, can't it? You look at that and say it's only 100 grams, then you get home and eat 600 grams.* Male, 46+.

So will some [companies] *just not put it* [HSR] *on there if it's bad?* Female, 46+

By the sounds of it, there's not going to be anything on the shelves that's got one star on it anyway because it's not compulsory. Male, 26-45.

Although the DIG was distrusted by a number of participants, this was not the main stated reason for their reluctance to use it. The DIG (unlike the HSR and MTL) was considered harder to understand since it contains a larger amount of information, which participants felt they were less likely to use, especially under time pressure. Most participants were more trusting of the evaluative FoPLs and adults indicated they would be likely to use them when shopping. The main reason reported for this was the ability to quickly and easily understand the nutrition information and the ability to make comparisons across numerous products. Overall, the evaluative labels (particularly the HSR) were considered easier to interpret than the DIG.

I don't go up to the top looking to start analysing that [DIG]. *I can never understand what it means.* Male, 46+.

It's just a lot easier to just look at the stars and compare everything. Female 14-17.

If you had two products you could compare the star rating on it quite easily. For this type of product, which you know isn't very healthy, it probably would help. And that traffic light thing, I think would do the same. Male 26-45.

3.4 Trade-off between FoPLs and health claims

From the group discussions in response to the mock packages, it was clear that in most cases product evaluation began with consideration of the food type (e.g., yoghurt), the images on the pack and then the FoPL and/or health claim. This was particularly evident among younger participants. Once they paid attention to the front-of-pack nutrition information, many participants reported that their default mode of evaluation when presented with a health claim and a FoPL together on a pack was to use the FoPL. The health claim was apparently viewed as an afterthought and even once it was read it was often not considered in the product assessment process.

Male 1: My eyes did go straight to the nutritional information [MTL]*…*
Male 2: There's that "Contains calcium which reduces…" thing. I got to admit I only just read that a second ago and it had been up for however long now. Males, 18-25.

Facilitator: Anyone else some thoughts on the protein [claim]*?*
Female 1: Well, I actually wouldn't even read it until after. So it didn't take my eye.
Facilitator: What did take your eye from that one?
Female 2: The two stars took my eye.

Female 1: Well I just looked at the picture of the food and I looked at the [HSR] *label.* Females, 46+.

Most adult participants noticed the discrepancy between the unhealthy nutrition profile of the foods (as conveyed by the FoPL) and the health claims, although this occurred most frequently when the HSR was present on the pack. This is likely to be a function the HSR being considered the easiest FoPL to interpret.

When I first read that I saw "99 per cent fat free"…But then I saw that it was two stars, so I got conflicting things. Female, 46+.

I just like that the words say "Got calcium to reduce osteoporosis" and then there's just red lights. You just see these red lights, so you don't eat this. Male 26-45.

Although children sometimes noticed the discrepancy between the health claim and FoPL, this *only* occurred when the HSR was used. Children on the whole paid more attention to other front-of-pack elements, such as graphics and colours, before discussing the FoPLs or health claims.

The first two things that pop out at me would be the fruit in the title and also the picture of the actual cereal…Then it says high in fibre and at the top it's got some sort of nutritional thing [DIG] *which sort of indicates that it might be healthy for you.* Female, 10-13.

Well, it says it contains protein, but it's only got two stars. But I guess the protein is just a small portion of it. That [star rating] *might be the whole thing.* Female, 10-13.

It says 99% fat free. The health rating is two again, which doesn't really make sense. Male, 10-13.

4. Discussion

The present study examined how consumers' evaluations of food products (in terms of attitudes towards the product, willingness to buy and perceived healthiness) are affected when FoPLs and health claims are both present on the front of packs. The primary finding was that FoPLs were the preferred source of nutrition information, particularly if the information in the health claim and the FoPL conflicted. Participants also offered insights into the criteria they consciously used to determine whether each piece of nutrition information should be used in their evaluations. They reported that health claims needed to be trusted, relevant and informative, whereas FoPLs needed to be trusted and easy to understand. Trust in FoPLs was greater than for health claims, which appeared to be largely due to the perception that FoPLs have a stronger factual basis and are more tightly controlled by regulations.

Some of these findings support previous research. For example, studies have found that personal relevance and trust are important motivators for processing information provided in

health claims (Chan et al., 2004; Dean et al., 2012; Lähteenmäki, 2013; Szykman et al., 1997). In the present study, participants were more trusting of FoPLs than health claims. This appeared to be partly a result of participants believing that the health claims were made by the food manufacturer rather than a trusted, credible institution. Future research could explore if and how reactions to health claims change according to the entity making the claim.

Past research has also indicated that evaluative FoPLs are easier to interpret than reductive FoPLs and thus are more likely to be considered in decision making (Hawley et al., 2013; Hersey et al., 2013). However, these studies looked at health claims or FoPLs in isolation while the present study makes an important contribution by exploring how these information sources interact to affect product assessment. The primary finding was that when participants became aware of a discrepancy between FoPLs and health claims, they more often relied on the information contained in the FoPL to assist them in evaluating the food. Discrepancies were more readily noticed by adults when the HSR was present (compared to the DIG and MTL) and were only noticed by children in the HSR condition. This is consistent with the finding that participants found the HSR the easiest FoPL to understand, which may be due to the reduced cognitive load that comes with interpreting a single, star-based rating system as opposed to the multiple pieces of information in the MTL and DIG. However, further research is needed to clarify this.

The present findings could explain the results of Maubach et al. (2014). In their study, participants preferred and were more accurate at rating the healthiness of foods containing an MTL compared to a DIG or star FoPL. This was the case regardless of whether a health claim

was present alongside the MTL. This is consistent with the current finding that participants will prioritise information in the FoPL over a health claim in decision making if the FoPL is easy to understand. Of note is that the star rating system used in Maubach et al.'s study differed from the HSR in the present study in that it assigned foods a rating of 1 – 7 stars. This may go some way toward explaining the differences in outcomes between their research and the present study.

This study demonstrates that FoPLs can help consumers gain a comprehensive impression of the nutritional value of a product in the face of health claims that only promote positive attributes. This is especially important given that health claims frequently appear on foods that are not high in nutritional quality (Hughes et al., 2013; Kelly et al., 2009). For example, a survey examining the energy density of products with a 'Reduced Fat', 'Low Fat', or 'Fat Free' claim made in relation to their full fat counterparts found that although the former were lower in fat and energy density, they were still more energy dense than most foods in the average Australian diet (La Fontaine, Crowe, Swinburn, & Gibbons, 2004). Thus if health claims are not adequately regulated, they can be misleading. Given that past research indicates that the NIP often cannot attenuate the positivity bias created by a health claim (Ford et al., 1996; Kozup et al., 2003; Labiner-Wolfe et al., 2010; Mazis & Raymond, 1997; Mitra et al., 1999; Wong et al., 2013, 2014), the present findings suggest that mandating the inclusion of FoPLs whenever health claims appear on packs may be more effective than mandating an NIP. Specifically, the provision of more comprehensive nutrition information via FOPLs appears to bolster consumers' ability to evaluate the veracity of health claims that

refer to individual nutrients. Currently consumers must refer to the NIP located on the back or side of the pack to obtain more complete nutritional information.

As part of the informed consent procedure, participants were advised that the focus group discussions would relate to food and nutrition. This could be seen as a limitation of this study since the sample members, although diverse in age, gender and SES, were likely to have a higher level of nutrition knowledge and/or interest than the general population. Another limitation was the fact that the focus group methodology resulted in participants looking at nutrition information purposively and in a communal context, as opposed to a time-constrained, individual context as is usually the case when shopping. The negativity towards health claims expressed by the study participants is somewhat at odds with previous studies showing that health claims can induce a positivity bias (Abrams et al., 2015; Faulkner et al., 2014; Gorton et al., 2010; Harris et al., 2011; Saba et al., 2010; Soldavini et al., 2012; Wansink & Chandon, 2006). This is likely to have been at least partially the result of the intentional mismatch between the health claims and the nutrition profiles indicated by the FoPLs, but could also have been compounded by the focus group setting where participants may have been reluctant to appear gullible to marketing messages in front of their peers. Reactions to health claims may be less negative when FoPLs communicate a more favourable nutrition profile and further research is needed that combines a greater range of FoPLs and health claims to assess whether different results are obtained when more congruent forms of nutrition information are provided. In particular, future research could assess whether these findings hold for moderately healthy products where healthiness is more ambiguous and participants may not be as aware of any discrepancy between the FoPL and the health claim.

Finally, it is likely that the information provided on products affects consumers at a subconscious level, which they are unable to articulate in focus groups. A growing body of research demonstrates that consumers' choices can be subconsciously influenced by even very subtle product branding and packaging attributes (Chartrand & Fitzsimons, 2011; Chartrand, Huber, Shiv, & Tanner, 2008; Fitzsimons, Chartrand, & Fitzsimons, 2008). The present qualitative study explored more deliberative, conscious processes involved in consumers' evaluations of food products as a function of the types of front-of-pack nutrition information presented. Future research could explore the extent to which conscious and unconscious processes operate in 'FoPL only', 'health claim only' and 'combined FoPL and health claim' contexts, and how these impact on more distal outcomes such as product choice or purchasing behaviour.

In conclusion, the findings from the present study provide original insights into how consumers process different forms of front-of-pack nutrition information and have implications for policy makers' decisions about how such information should be presented. Evaluative FoPLs were found to have the potential to reduce any positivity bias created by health claims on unhealthy foods. This effect is likely to be due to the higher level of trust consumers place in evaluative FoPLs relative to health claims and the ease with which they are understood. This study contributes to the limited research on the interaction between different types of front-of-pack information by showing (i) the conditions under which combinations of health claims and FoPLs can add value to consumers and (ii) how the halo effect created by health claims can be overcome by FoPLs. Of note is that the findings were

554 generally consistent among age and gender groups, indicating that Australian consumers in
555 general would benefit from a requirement for health claims to be accompanied by an
556 evaluative FoPL. Further research is needed to assess the extent to which the findings apply
557 to larger samples and to consumers in other countries.

References

Abrams, K. M., Evans, C., & Duff, B. R. L. (2015). Ignorance is bliss. How parents of preschool children make sense of front-of-package visuals and claims on food. *Appetite*, *87*, 20–29. http://doi.org/10.1016/j.appet.2014.12.100

Antúnez, L., Giménez, A., Maiche, A., & Ares, G. (2015). Influence of Interpretation Aids on Attentional Capture, Visual Processing, and Understanding of Front-of-Package Nutrition Labels. *Journal of Nutrition Education and Behavior*, *47*(4), 292–299.e1. http://doi.org/10.1016/j.jneb.2015.02.010

Australian Bureau of Statistics. (2011). *Census of Population and Housing: Socio-Economic Indexes for Areas (SEIFA), Australia*. Retrieved from http://www.abs.gov.au/websitedbs/censushome.nsf/home/seifa2011?opendocument&navpos=260

Australian Department of Health. (2015). *Health Star Rating System: Information for Educators.* Canberra. Retrieved from http://www.healthstarrating.gov.au/internet/healthstarrating/publishing.nsf/Content/factsheet-educators

Campos, S., Doxey, J., & Hammond, D. (2011). Nutrition labels on pre-packaged foods: a systematic review. *Public Health Nutrition*, *14*(08), 1496–1506. http://doi.org/10.1017/S1368980010003290

Chan, C., Patch, C., & Williams, P. (2004). Australian consumers are sceptical about but influenced by claims about fat on food labels. *European Journal of Clinical Nutrition*, *59*(1), 148–151. http://doi.org/10.1038/sj.ejcn.1602038

581 Chartrand, T. L., & Fitzsimons, G. J. (2011). Nonconscious Consumer Psychology. *Journal*
582 *of Consumer Psychology*, *21*(1), 1–3. http://doi.org/10.1016/j.jcps.2010.12.001
583 Chartrand, T. L., Huber, J., Shiv, B., & Tanner, R. J. (2008). Nonconscious Goals and
584 Consumer Choice. *Journal of Consumer Research*, *35*(2), 189–201.
585 http://doi.org/10.1086/588685
586 Dean, M., Lampila, P., Shepherd, R., Arvola, A., Saba, A., Vassallo, M., … Lähteenmäki, L.
587 (2012). Perceived relevance and foods with health-related claims. *Food Quality and*
588 *Preference*, *24*(1), 129–135. http://doi.org/10.1016/j.foodqual.2011.10.006
589 Dixon, H., Scully, M., Niven, P., Kelly, B., Chapman, K., Donovan, R., … Wakefield, M.
590 (2014). Effects of nutrient content claims, sports celebrity endorsements and premium
591 offers on pre-adolescent children's food preferences: experimental research. *Pediatric*
592 *Obesity*, *9*(2), e47–e57. http://doi.org/10.1111/j.2047-6310.2013.00169.x
593 Dixon, H., Scully, M., Wakefield, M., Kelly, B., Chapman, K., & Donovan, R. (2011).
594 Parent's responses to nutrient claims and sports celebrity endorsements on energy-
595 dense and nutrient-poor foods: an experimental study. *Public Health Nutrition*,
596 *14*(06), 1071–1079. http://doi.org/10.1017/S1368980010003691
597 Faulkner, G. P., Pourshahidi, L. K., Wallace, J. M. W., Kerr, M. A., McCaffrey, T. A., &
598 Livingstone, M. B. E. (2014). Perceived "healthiness" of foods can influence
599 consumers' estimations of energy density and appropriate portion size. *International*
600 *Journal of Obesity*, *38*(1), 106–112. http://doi.org/10.1038/ijo.2013.69
601 Feunekes, G. I. J., Gortemaker, I. A., Willems, A. A., Lion, R., & van den Kommer, M.
602 (2008). Front-of-pack nutrition labelling: Testing effectiveness of different nutrition

labelling formats front-of-pack in four European countries. *Appetite*, *50*(1), 57–70. http://doi.org/10.1016/j.appet.2007.05.009

Fitzsimons, G. M., Chartrand, T. L., & Fitzsimons, G. J. (2008). Automatic Effects of Brand Exposure on Motivated Behavior: How Apple Makes You "Think Different." *Journal of Consumer Research*, *35*(1), 21–35. http://doi.org/10.1086/527269

Food Standards Australia New Zealand. (2014). *Standard 1.2.7: Nutrition, health and related claims*. Retrieved from https://www.comlaw.gov.au/Series/F2013L00054

Ford, G. T., Hastak, M., Mitra, A., & Ringold, D. J. (1996). Can Consumers Interpret Nutrition Information in the Presence of a Health Claim? A Laboratory Investigation. *Journal of Public Policy & Marketing*, *15*(1), 16–27.

Garretson, J. A., & Burton, S. (2000). Effects of Nutrition Facts Panel Values, Nutrition Claims, and Health Claims on Consumer Attitudes, Perceptions of Disease-Related Risks, and Trust. Journal of Public Policy & Marketing, 19(2), 213–227. http://doi.org/10.1509/jppm.19.2.213.17133

Gorton, D., Ni Mhurchu, C., Bramley, D., & Dixon, R. (2010). Interpretation of two nutrition content claims: a New Zealand survey. *Australian and New Zealand Journal of Public Health*, *34*(1), 57–62. http://doi.org/10.1111/j.1753-6405.2010.00474.x

Gorton, D., Ni Mhurchu, C., Chen, M., & Dixon, R. (2008). Nutrition labels: A survey of use, understanding and preferences among ethnically diverse shoppers in New Zealand. *Public Health Nutrition*, *12*(09), 1359–1365. http://doi.org/10.1017/S1368980008004059

Graham, D. J., & Jeffery, R. W. (2011). Location, Location, Location: Eye-Tracking Evidence that Consumers Preferentially View Prominently Positioned Nutrition

Information. *Journal of the American Dietetic Association*, *111*(11), 1704–1711. http://doi.org/10.1016/j.jada.2011.08.005

Grunert, K. G., Wills, J. M., & Fernández-Celemín, L. (2010). Nutrition knowledge, and use and understanding of nutrition information on food labels among consumers in the UK. *Appetite*, *55*(2), 177–189. http://doi.org/10.1016/j.appet.2010.05.045

Hall, L., Johansson, P., Tärning, B., Sikström, S., & Deutgen, T. (2010). Magic at the marketplace: Choice blindness for the taste of jam and the smell of tea. *Cognition*, 117(1), 54–61.

Hamlin, R. P., McNeill, L. S., & Moore, V. (2014). The impact of front-of-pack nutrition labels on consumer product evaluation and choice: An experimental study. *Public Health Nutrition*, 1–9. http://doi.org/10.1017/S1368980014002997

Harris, J. L., Thompson, J. M., Schwartz, M. B., & Brownell, K. D. (2011). Nutrition-related claims on children's cereals: what do they mean to parents and do they influence willingness to buy? *Public Health Nutrition*, *14*(12), 2207–2212. http://doi.org/10.1017/S1368980011001741

Hastak, M., & Mazis, M. B. (2011). Deception by Implication: A Typology of Truthful but Misleading Advertising and Labeling Claims. *Journal of Public Policy & Marketing*, *30*(2), 157–167. http://doi.org/10.1509/jppm.30.2.157

Hawkes, C. (2010). Government and voluntary policies on nutrition labelling: A global overview. In J. Albert (Ed.), *Innovations in food Labelling* (pp. 37–58). Cambridge: Woodhead Publishing Ltd.

Hawley, K. L., Roberto, C. A., Bragg, M. A., Liu, P. J., Schwartz, M. B., & Brownell, K. D. (2013). The science on front-of-package food labels. *Public Health Nutrition*, *16*(03), 430–439.

Hersey, J. C., Wohlgenant, K. C., Arsenault, J. E., Kosa, K. M., & Muth, M. K. (2013). Effects of front-of-package and shelf nutrition labeling systems on consumers. *Nutrition Reviews*, *71*(1), 1–14. http://doi.org/10.1111/nure.12000

Hughes, C., Wellard, L., Lin, J., Suen, K. L., & Chapman, K. (2013). Regulating health claims on food labels using nutrient profiling: what will the proposed standard mean in the Australian supermarket? *Public Health Nutrition*, *16*(12), 2154–2161. http://doi.org/10.1017/S136898001200540X

Ippolito, P. M., & Mathios, A. D. (1991). Health Claims in Food Marketing: Evidence on Knowledge and Behavior in the Cereal Market. *Journal of Public Policy & Marketing*, *10*(1), 15–32.

John, D. R. (1999). Consumer Socialization of Children: A Retrospective Look At Twenty-Five Years of Research. *Journal of Consumer Research*, *26*(3), 183–213. http://doi.org/10.1086/209559

Johansson, P., Hall, L., Tärning, B., Sikström, S., & Chater, N. (2014). Choice blindness and preference change: You will like this paper better if you (believe you) chose to read it! *Journal of Behavioral Decision Making*, 27(3), 281–289.

Keller, S. B., Landry, M., Olson, J., Velliquette, A. M., Burton, S., & Andrews, J. C. (1997). The Effects of Nutrition Package Claims, Nutrition Facts Panels, and Motivation to Process Nutrition Information on Consumer Product Evaluations. Journal of Public Policy & Marketing, 16(2), 256–269.

Kelly, B., Hughes, C., Chapman, K., Louie, J. C. Y., Dixon, H., Crawford, J., … Slevin, T. (2009). Front-of-pack food labelling: Traffic light labelling gets the green light. *Faculty of Health and Behavioural Sciences - Papers (Archive)*. Retrieved from http://ro.uow.edu.au/hbspapers/2813

Kemp, E., Burton, S., Creyer, E. H., & Suter, T. A. (2007). When Do Nutrient Content and Nutrient Content Claims Matter? Assessing Consumer Tradeoffs Between Carbohydrates and Fat. Journal of Consumer Affairs, 41(1), 47–73. http://doi.org/10.1111/j.1745-6606.2006.00068.x

Kozup, J. C., Creyer, E. H., & Burton, S. (2003). Making Healthful Food Choices: The Influence of Health Claims and Nutrition Information on Consumers' Evaluations of Packaged Food Products and Restaurant Menu Items. *Journal of Marketing*, *67*(2), 19–34. http://doi.org/10.1509/jmkg.67.2.19.18608

Labiner-Wolfe, J., Lin, C.-T. J., & Verrill, L. (2010). Effect of Low-carbohydrate Claims on Consumer Perceptions about Food Products' Healthfulness and Helpfulness for Weight Management. *Journal of Nutrition Education and Behavior*, *42*(5), 315–320. http://doi.org/10.1016/j.jneb.2009.08.002

La Fontaine, H. A., Crowe, T. C., Swinburn, B. A., & Gibbons, C. J. (2004). Two important exceptions to the relationship between energy density and fat content: foods with reduced-fat claims and high-fat vegetable-based dishes. *Public Health Nutrition*, *7*(04), 563–568. http://doi.org/10.1079/PHN2003572

Lähteenmäki, L. (2013). Claiming health in food products. *Food Quality and Preference*, *27*(2), 196–201. http://doi.org/10.1016/j.foodqual.2012.03.006

Lalor, F., Kennedy, J., Flynn, M. A., & Wall, P. G. (2010). A study of nutrition and health claims – a snapshot of what's on the Irish market. *Public Health Nutrition*, *13*(05), 704–711. http://doi.org/10.1017/S1368980009991613

Maubach, N., Hoek, J., & Mather, D. (2014). Interpretive front-of-pack nutrition labels. Comparing competing recommendations. *Appetite*, *82*, 67–77. http://doi.org/10.1016/j.appet.2014.07.006

Mazis, M. B., & Raymond, M. A. (1997). Consumer perceptions of health claims in advertisements. *Journal of Consumer Affairs*, *31*(1), 10.

McLean, R., Hoek, J., & Hedderley, D. (2012). Effects of alternative label formats on choice of high- and low-sodium products in a New Zealand population sample. *Public Health Nutrition*, *15*(5), 783–791. http://doi.org/10.1017/S1368980011003508

Mitra, A., Hastak, M., Ford, G. T., & Ringold, D. J. (1999). Can the Educationally Disadvantaged Interpret the FDA-Mandated Nutrition Facts Panel in the Presence of an Implied Health Claim? *Journal of Public Policy & Marketing*, *18*(1), 106–117.

Oh, C. H. (2010). *Measuring the relative prominence of graphic symbols vs. text for nutrition labels using eye tracking*. Michigan State University. Retrieved from http://gradworks.umi.com/14/87/1487171.html

Ozturk, O., Shayan, S., Liszkowski, U., & Majid, A. (2013). Language is not necessary for color categories. *Developmental Science*, *16*(1), 111–115. http://doi.org/10.1111/desc.12008

Roe, B., Levy, A. S., & Derby, B. M. (1999). The Impact of Health Claims on Consumer Search and Product Evaluation Outcomes: Results from FDA Experimental Data. *Journal of Public Policy & Marketing*, *18*(1), 89–105.

Ro, T., Singhal, N. S., Breitmeyer, B. G., & Garcia, J. O. (2009). Unconscious processing of color and form in metacontrast masking. *Perception & Psychophysics*, *71*(1), 95–103. http://doi.org/10.3758/APP.71.1.95

Saba, A., Vassallo, M., Shepherd, R., Lampila, P., Arvola, A., Dean, M., … Lähteenmäki, L. (2010). Country-wise differences in perception of health-related messages in cereal-based food products. *Food Quality and Preference*, *21*(4), 385–393. http://doi.org/10.1016/j.foodqual.2009.09.007

Soldavini, J., Crawford, P., & Ritchie, L. D. (2012). Nutrition Claims Influence Health Perceptions and Taste Preferences in Fourth- and Fifth-Grade Children. *Journal of Nutrition Education and Behavior*, *44*(6), 624–627. http://doi.org/10.1016/j.jneb.2012.04.009

Strauss, A., & Corbin, J. (1990). *Basics of Qualitative Research*. Newbury Park: CA: Sage.

Szykman, L. R., Bloom, P. N., & Levy, A. S. (1997). A Proposed Model of the Use of Package Claims and Nutrition Labels. *Journal of Public Policy & Marketing*, *16*(2), 228–241.

Van Der Bend, D., Van Dieren, J., Marques, M. D. V., Wezenbeek, N. L., Kostareli, N., Rodrigues, P. G., … Verhagen, H. (2014). A Simple Visual Model to Compare Existing Front-of-pack Nutrient Profiling Schemes. *European Journal of Food Research & Review*, *4*(4), 429–534. http://doi.org/DOI: 10.9734/EJNFS/2014/10305

van Herpen, E., & van Trijp, H. C. M. (2011). Front-of-pack nutrition labels. Their effect on attention and choices when consumers have varying goals and time constraints. *Appetite*, *57*(1), 148–160. http://doi.org/10.1016/j.appet.2011.04.011

Viswanathan, M. (1996). A Comparison of the Usage of Numerical Versus Verbal Nutrition Information by Consumers. *Advances in Consumer Research*, *23*(1), 277–281.

Wansink, B. (2003). How Do Front and Back Package Labels Influence Beliefs About Health Claims? *Journal of Consumer Affairs*, *37*(2), 305–316. http://doi.org/10.1111/j.1745-6606.2003.tb00455.x

Wansink, B., & Chandon, P. (2006). Can "Low-Fat" Nutrition Labels Lead to Obesity? *Journal of Marketing Research*, *43*(4), 605–617.

Wilkinson, S. (1998). Focus Groups in Health Research Exploring the Meanings of Health and Illness. *Journal of Health Psychology*, *3*(3), 329–348. http://doi.org/10.1177/135910539800300304

Wong, C. L., Arcand, J., Mendoza, J., Henson, S. J., Qi, Y., Lou, W., & L'Abbé, M. R. (2013). Consumer attitudes and understanding of low-sodium claims on food: an analysis of healthy and hypertensive individuals. *The American Journal of Clinical Nutrition*, *97*(6), 1288–1298. http://doi.org/10.3945/ajcn.112.052910

Wong, C. L., Mendoza, J., Henson, S. J., Qi, Y., Lou, W., & L'Abbe, M. R. (2014). Consumer attitudes and understanding of cholesterol-lowering claims on food: randomize mock-package experiments with plant sterol and oat fibre claims. *European Journal of Clinical Nutrition*, *68*(8), 946–952. http://doi.org/10.1038/ejcn.2014.107

Figure 1. FoPLs used in mock pack images: A). The Health Star Rating (HSR), B). The Daily Intake Guide (DIG) and C). Multiple Traffic Lights (MTL).

Figure 2. A proposed framework of consumers' use of health claims and FoPLs when there is a discrepancy in nutritional information

Figure 1

A.


4.5
HEALTH STAR RATING
ENERGY
1520kJ
SAT FAT
0.3g
LOW
SUGARS
0.8g
LOW
SODIUM
5mg
LOW
PER 100g

B.


ENERGY
870 kJ
DI*
10%
FAT
0.7 g
DI*
1%
SAT FAT
0.3 g
DI*
1%
SUGARS
9.5 g
DI*
11%
SODIUM
115 mg
DI*
5%
PER 60g SERVE

C.

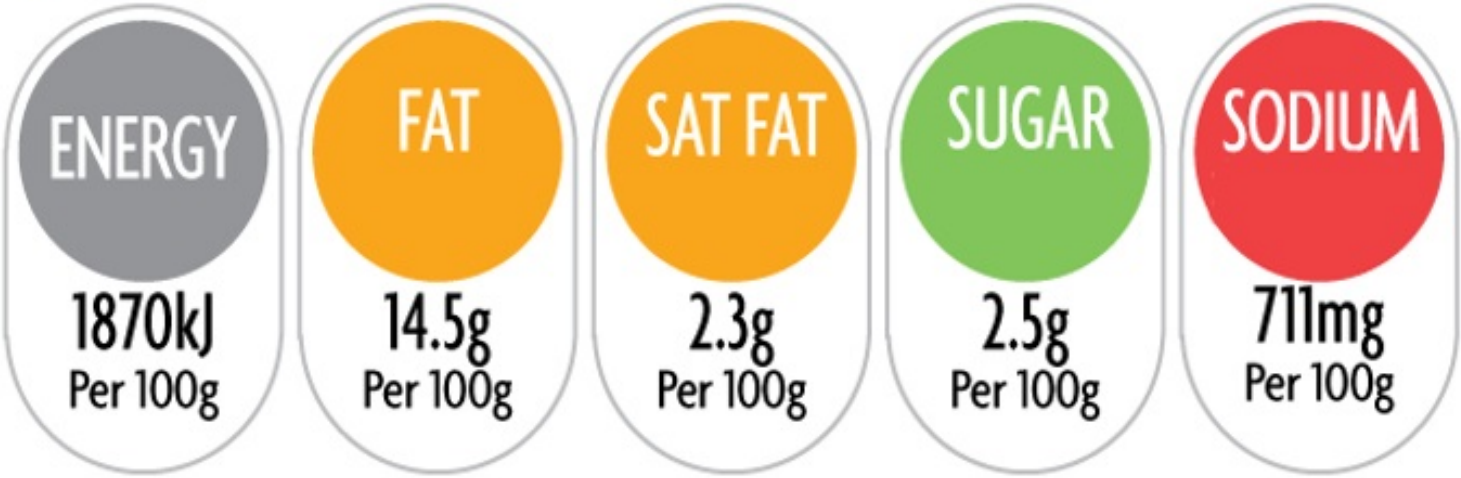
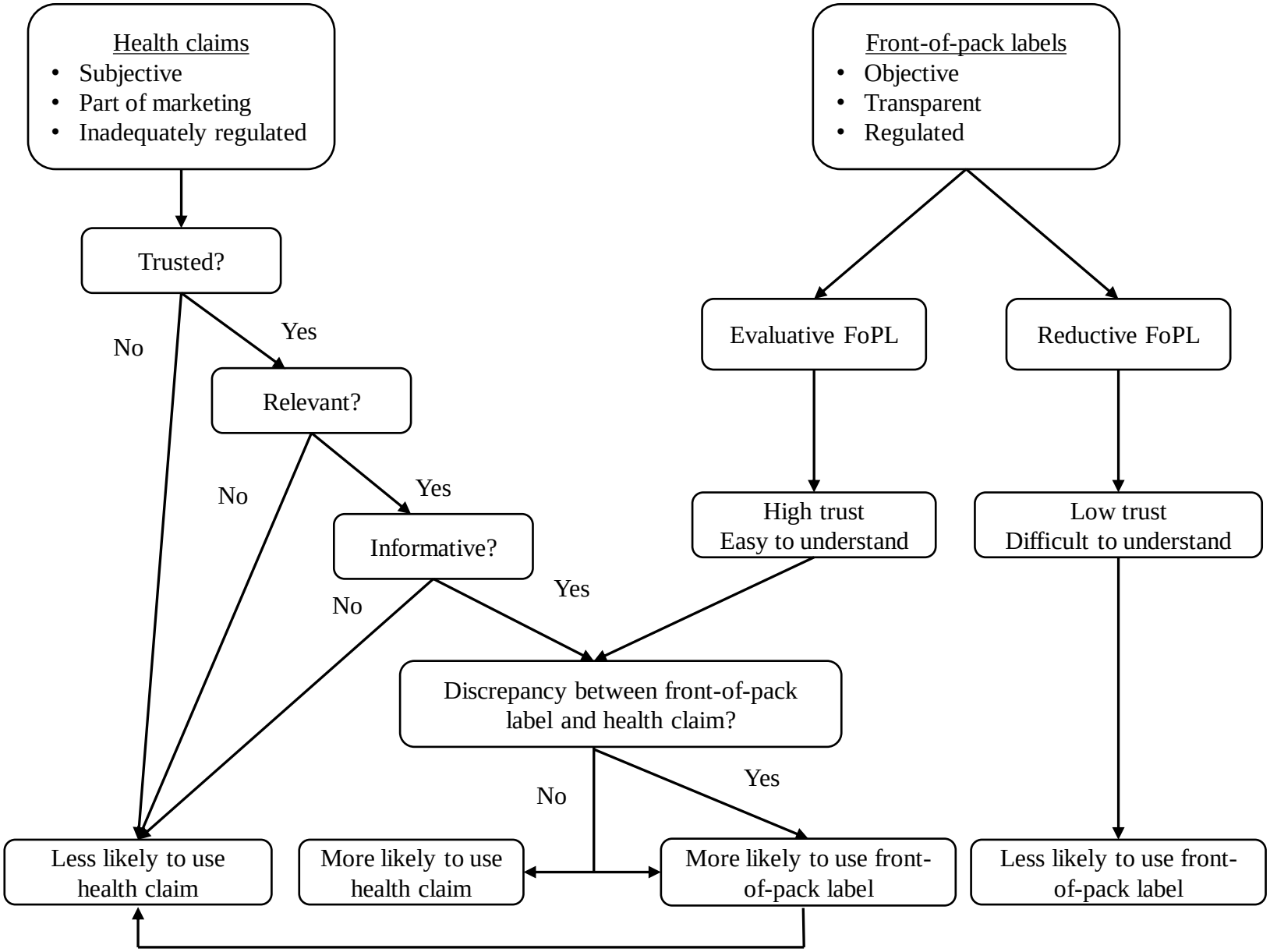

ENERGY
1870kJ
Per 100g
FAT
14.5g
Per 100g
SAT FAT
2.3g
Per 100g
SUGAR
2.5g
Per 100g
SODIUM
711mg
Per 100g

Figure 2


Health claims
• Subjective
• Part of marketing
• Inadequately regulated
Front-of-pack labels
• Objective
• Transparent
• Regulated
Trusted?
No
Yes
Relevant?
No
Yes
Informative?
No
Yes
Evaluative FoPL
Reductive FoPL
High trust
Easy to understand
Low trust
Difficult to understand
Discrepancy between front-of-pack label and health claim?
No
Yes
Less likely to use health claim
More likely to use health claim
More likely to use front-of-pack label
Less likely to use front-of-pack label