

Symposium on ‘Nutrition: getting the balance right in 2010’

Session 4: Getting balanced nutrition messages across Nutrition communication: consumer perceptions and predicting intentions

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Health claims on food products, which aim at informing the public about the health benefits of the product, represent one type of nutrition communication; the use of these is regulated by the European Union. This paper provides an overview of the research on health claims, including consumers' perceptions of such claims and their intention to buy products that carry health-related claims. This is followed by a discussion on the results from some recent studies investigating public perceptions and willingness to use products with health claims. In these studies, claims are presented in the form of messages of different lengths, types, framing, with and without qualifying words and symbols. They also investigate how perceptions and intentions are affected by individual needs and product characteristics. Results show that adding health claims to products does increase their perceived healthiness. Claim structure was found to make a difference to perceptions, but its influence depended on the level of relevance, familiarity and individuals' need for information. Further, the type of health benefit proposed and the base product used also affected perceptions of healthiness. The paper concludes that while healthiness perceptions relating to products with health claims may vary between men and women, old and young and between countries, the main factor influencing perceived healthiness and intention to buy a product with health claim is personal relevance.

Health claims: Consumer perceptions: Buying intention

There are a number of different forms of nutrition communication. Some examples of nutrition communication include Campaigns such as: ‘6 a day in Denmark’⁽¹⁾, ‘Saturated fat, to tackle the UK's biggest killer’⁽²⁾, ‘Rise in food poisoning in over 60s’⁽³⁾ and ‘Reduction in salt intake’⁽⁴⁾, and leaflets/booklets such as the ‘eat well plate’⁽⁵⁾ and the food pyramid⁽⁶⁾. In addition to the descriptors included on a product label such as the name of the food, the weight/volume and the ingredients used in the product, labels are also a way of communicating nutrition information.

The nutrition information communicated on the food label may come in three forms: the back of pack information, the front of pack label, and nutrition/health claims.

Although manufacturers are not obliged by law to provide nutrition information unless they are making a nutrition or a health claim, those who do provide it are expected to follow certain rules such as stating the energy value of the food, the amount of carbohydrate and fat included (in grams per 100 g or per serving)⁽⁷⁾.

This paper will provide an overview of the research on health claims, including consumers' perceptions of such claims and their intention to buy products that carry health-related claims. This is followed by a discussion on the results from some recent studies investigating public perceptions and willingness to use products with health claims. In these studies, claims are presented in the form of messages of different lengths, types, framing, with and

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without qualifying words and symbols. They also investigate how perceptions and intentions are affected by individual needs and product characteristics.

What are nutrition claims and health claims?

Nutrition claims are statements that imply that a food has particular beneficial nutritional properties due to the nutrients that it does, or does not, contain e.g. 'low in fat', 'high in fibre' or 'no added sugar'. Thus, it can be a content claim that describes the level of nutrient contained in the food or a comparative claim, where it compares the nutrient levels and/or energy value of two or more foods⁽⁸⁾. In contrast, health claims propose that if you eat a particular product it will improve a specific physiological function or reduce the risk of a certain disease. Functional food is a commonly used term that describes a product that promises to deliver a claimed health-related benefit (there is no official definition). Therefore, health claims aim at informing the public about the health benefits of functional food products. However, this assertion is heavily contested with some people viewing health claims as a marketing tool to increase sales⁽⁹⁾.

A health claim can be made up of three components: an active ingredient, an effective function and a health benefit. For example, 'contains **bioactive peptides** (ingredient) that **help to maintain normal blood pressure** (function) which **reduces risk of heart disease** (benefit)' is a health claim that contains all three components. However, a health claim can address only one or a combination of any of the three parts. For example, 'this product contains omega-3' is an ingredient-only health claim, 'this product reduces blocking of arteries' is a function-only health claim and 'this product promotes cardiovascular health' is a benefit-only health claim.

European Community health claims were defined by legislation in 2006⁽¹⁰⁾, but the rules are also followed by many of the non-member countries in Europe⁽¹¹⁾. The legislation states that health claims will be accepted for food products and supplements if they are based on substantiated scientific evidence. The strength of this evidence is assessed by the European Food Safety Authority and based on their advice, the European Commission will make the decision on approving claims. The regulation states that the claims should be understandable to an average consumer where the average consumer is defined as someone who is 'reasonably well-informed and reasonably observant and circumspect, taking into account social, cultural, and linguistic factors'⁽¹²⁾. The average consumer test is not a statistical one and national courts and authorities must exercise their own judgement according to the case law of the court of justice, and determine the typical reaction of the average consumer⁽¹⁰⁾.

Health claims as nutrition communication

Health claims convey a positive health message to consumers, highlighting which products should be consumed, so that they may positively enhance their bodily functions and reduce the risk of diseases. Thus, health claims propose

benefits by advocating the consumption of specific well-defined single products and differ greatly from the usual nutrition communication that emphasises the role of balanced whole diets⁽¹¹⁾. On the whole, the reward for following a nutritionally balanced diet is the promise of being in good health for longer and reducing the risk of getting lifestyle-related diseases. However, compliance to a healthy diet does not necessarily deliver the desired outcome and in most cases the results may not be directly observable. Food with health claims on the other hand, promises specific outcomes that are more easily achievable. However, while some effects of consumption such as 'lowering blood cholesterol level' can be easily measured, others such as 'improving immune defence' have to be taken into account, because for many of the claimed functions there are no biomarkers that could be used as indicators to verify the promised effects. Thus, in order to gauge what information health claims are communicating to the public, it is important to investigate the public's perceptions to health claims and how the public intend to use the claims when they make purchase decisions.

Consumer perceptions of health claims

Health claims are linked to different products, and the attitudes towards and acceptability of these products depend both on the type of claim made, the benefit promised and the type of base carrier product used. Studies have measured perceptions in different ways: 'How healthy do you perceive this product to be?'⁽¹³⁾, 'How beneficial is this product to you?'⁽¹⁴⁾, 'How credible do you find the claim?'⁽¹⁵⁾ and 'How understandable is the claim?'⁽¹⁵⁾ are a few that have been utilised. People's intentions to buy products with health claims have been obtained by asking consumers to state their willingness to buy these products.

Preference of carrier products and added ingredients

The acceptance of products with health claims is shown to depend on the carrier product to which the health claim is attached⁽¹⁶⁾. In one study, margarine and yoghurt feature as attractive carriers, followed by bread and pills, which were considered more attractive than the indulgent products, chewing gum, ice cream and chocolate⁽¹⁷⁾. Also meat replacers (such as Quorn) were poorly received as carriers. These results have been replicated in other studies where food with a healthy image such as bread, yoghurt and cereal were accepted as carriers when compared with hedonistic foods such as biscuits, chocolate or chewing gum^(14,18). However, in Bech-Larsen and Grunert's study⁽¹³⁾ enriched spread was seen as healthier than enriched yoghurt or juice. The authors argue that this is because people perceive unhealthy spread being made healthier by the enrichment, whereas the other two products already have a healthy image. Further, unlike the Dutch in another study⁽¹⁷⁾, Uruguayans^(19,20) evaluated the healthiness of the product based on both carrier and the ingredient added for enrichment. The Uruguayans saw yoghurt as the best carrier to increase healthiness only

when it was enriched with calcium. Studies have shown that familiar ingredients (calcium) and topical terms (probiotic) produced positive responses even when mentioned on their own without any mention of their positive consequences⁽²¹⁾.

The production method (that is, whether it was produced using genetic modification or organic) affects perceptions, although it is argued that if there are clear health and environmental benefits then these products too may gain acceptability^(22–25). However, the preferences for different production methods were demonstrated to be country specific in Bech-Larsen and Grunert's study⁽¹³⁾, where Danes and Finns perceived organic products as healthier than conventional ones, whereas Americans saw no difference. From this we can conclude that the base product used, together with the ingredient added and the way the food is produced, affects consumer perceptions of products with health claims but these perceptions may be country specific and depend on how familiar they are to the public.

Types of benefits mentioned in the health claims

Siegrist *et al.*⁽¹⁸⁾ showed that the Swiss prefer to buy foods with physiological health claims rather than psychological ones. Similarly, physiology-based health benefits are preferred over psychological/behavioural-based benefits in Denmark⁽¹⁷⁾. Within the physiological risk area, heart health or CVD-related health claims were considered to be more influential (54–59% of participants), followed by stomach cancer (34–48%)⁽¹³⁾. A cross-cultural study, looking at the UK, USA, Italy and Germany, found that products with infection-benefit claims were perceived to be the healthiest, whereas the same products with soft health benefits related to stress and concentration were perceived as less healthy⁽¹⁵⁾. Overall, these studies suggest that consumers prefer health claims that address physiological issues, especially in the area of cardiovascular risks.

Health claim architecture

Wansink *et al.*⁽²⁶⁾ found that in the USA people rated products with short claims more favourably in terms of what they believed about the product, viewing these products as more beneficial to health and having greater appeal, compared to when the same products had longer claims. However, Bech-Larsen and Grunert⁽¹³⁾ found that people said they were more likely to buy a product when the ingredient, function and benefit were all included in the claim, rather than when it mentioned the ingredient and function or ingredient only. Van Trijp and van der Lans⁽¹⁵⁾ argued that when it comes to preference, the nationality of the consumer and type of benefit claimed was more critical than the structure of the claim. In addition, Verbeke *et al.*⁽²⁷⁾ found that people perceived health claims to be convincing and attractive, but there was no difference in perceived credibility or their intention to buy. Also they found that disease risk claims were rated lowest for credibility and intention to buy when compared with other types of health and nutrition claims. As these studies used

different designs and addressed different research questions the results are difficult to compare and are sometimes contradictory⁽¹¹⁾. Thus, so far there is no clear consensus as to which type of claim structure is preferred by the public.

Qualifiers. Hooker and Teratanavat⁽²⁸⁾ investigated whether the type of evidence presented to substantiate health claims had an effect on people's perceptions. In the USA, four different types of claims are allowed: A, Significant scientific agreement; B, good to moderate scientific agreement; C, low level of scientific agreement and D, very low level of scientific agreement. Hooker and Teratanavat found that consumers in the USA do not differentiate between different levels of claim unless they are prompted by a visual aid that showed all the four claim types in the form of a US Food and Drug Administration health claim report. This seems to imply that the US system of qualifying the health claims by giving information relating to the supporting evidence does not affect people's perceptions of the health claims.

Framing. A health claim can be framed as either gaining a positive or as avoiding a negative outcome⁽²⁹⁾. Kahnemann and Tversky⁽³⁰⁾ argue that people are more sensitive towards possible losses than possible gains, so that negatively framed health claims should be perceived as more persuasive than positive ones. However, results are inconclusive. Van Kleef *et al.*⁽¹⁷⁾ showed that the framing effect depends on the type of outcome and is thus context specific. In their study, the promise of a reduction of disease risk is perceived as more attractive than claims of enhanced physiological functions. However, for CVD, the reduced risk claim increased willingness to buy the product in comparison with the enhanced heart function claim, whereas for energy level claim, enhanced function is preferred to risk reduction. It is argued that this is because heart-related function is easily associated with diseases, whereas increased energy/activity only improves overall well-being. It may be that whether you can easily imagine the consequences or not may influence the effect of framing⁽²⁹⁾.

Who are influenced by health claims?

In general, women are more positive than men about products with health claims^(31,32). However, although Ares and Gabaro⁽²⁰⁾ found differences between men and women in terms of perceived healthiness and willingness to try, this depended on the carrier product used and whether the ingredient added related to women's needs. Thus, women perceived more advantage than men on many claims when they were relevant to them as women, such as osteoporosis and breast cancer⁽³²⁾. Siegrist *et al.*⁽¹⁸⁾ found that for soup, men were more willing than women to buy the product with health claims, implying that the difference between men and women may be product specific^(21,32). Further, the type of claim, whether it was functional or risk reduction, also had an impact on men's perceptions⁽³¹⁾. On the other hand, Verbeke⁽³³⁾ argues that demographics play only a minor role in the acceptance of food with health claims. Thus, the results are mixed. Dean *et al.*⁽¹⁴⁾ showed that

although men's perceptions of healthiness and their willingness to buy was generally lower than women's, when it was personally relevant, men's perceptions were as high as those of women. Thus, it could be argued that while, in general, women are more health conscious than men⁽³⁴⁾ because the relevance of the health benefit is gender related, perceptions may be product specific, and so need to be assessed on a product-by-product basis.

Use of products with health claims were found to be higher among the older age groups⁽³⁵⁾; even when different age groups perceived the products to be equally healthy, the older age group are more willing to buy the product compared to the younger ones^(18,31). However, not all studies found this to be the case⁽²¹⁾. Further, the studies that have been conducted in different countries did find differences in perceptions^(13,15). For example, van Trijp and van der Lans⁽¹⁵⁾ found differences between Italy, Germany, the UK and USA; they attribute these differences to the availability of products with health claims and hence familiarity with the claims.

A person's own belief in their self-efficacy and their belief in the product's effectiveness are strong motivating factors for intending to choose products with health claims⁽²⁴⁾. Personal relevance is also shown to affect perceptions and willingness to buy^(32,33). In addition, Verbeke⁽³³⁾ demonstrated that relevance does not necessarily need to be personal to be a motivating factor, and it can also motivate if it is relevant to other people who are close to the participants.

Willingness to pay for products with health claims

The effect of health claim on willingness to buy was generally lower than perceptions of healthiness. Even when people perceived the product with a health claim to be healthy, this did not automatically translate into them saying that they will buy the product. The best predictors of the consumption of products with health claims were the reward people thought they would get for using them and how necessary they thought these products were⁽³⁶⁾. In another study, willingness to buy products with health claims were predicted by how attractive, how credible and unique participants considered the products with health claims to be (66% of variance explained)⁽¹⁷⁾. In addition, familiarity increases willingness to use⁽³⁷⁾. However, Ares *et al.*⁽³⁸⁾ found that brand name had the greatest impact on buying food with health claims. They claim that there are different types of people. The first group were willing to sacrifice liking for health and for these the brand of the product and the type of enrichment are equally important but the price and claim type are least relevant. The second group will not sacrifice taste for health and for them brand is the most important attribute followed by the type of enrichment, then price and finally claim type. This suggests that people's willingness to buy a product with health claim depends not only on their perceptions of the product and the perceived rewards it will bring but also on other factors such as the brand, price and the perceived attractiveness of the product.

Recent studies on public perceptions and willingness to use products with health claims

Nordic study

The Nordic study investigated health claim perceptions using a web-based instrument with 4612 participants from Denmark, Finland, Iceland, Norway and Sweden. Here participants were asked to compare pairs of claims to say which sounded better, was easier to understand and was more convincing. Then the claims were linked to products and the participants were asked to say which product was attractive to them, was healthy, reduces the risk of disease, was natural and was tasty. Claims were constructed by combining different base products (bread, pork and yoghurt) with different active ingredients (no ingredient, omega-3-familiar and bioactive peptides-unfamiliar), type of benefit (cardiovascular, memory function and weight management) and claim structure (function only, health outcome only, ingredient+function, ingredient+health outcome, function+health outcome and ingredient+function+health outcome). The claims were framed either positively (achieving something positive) or negatively (avoiding something negative) and with/without the use of the qualifier 'may'^(39,40). An example of a claim used would be: 'This bread contains omega-3 which enhances memory function and therefore increases the likelihood of good memory retention'.

The study found that respondents could be divided into two equal-sized groups who differed in the type of claims they preferred. The first group reported that simple claims stating only the benefit sounded better, was easier to understand and was more convincing, whereas the second group reported that when all the information from ingredient to outcome was included in the claim, it sounded better, was easier to understand and was more convincing. The second group who wanted all the information were more likely to be women and younger respondents, who had more trust in independent sources of information. They also had positive attitudes towards foods with health claims and were more likely to come from Finland and Sweden than from Denmark, Norway or Iceland. The researchers argue that as the Finns and Swedes had exposure to products with health claims earlier than those in the other three countries, this may explain their preference to longer claims.

Results also showed that a familiar ingredient such as omega-3 was strongly preferred to the unfamiliar bioactive peptides by all respondents. Also qualifier and framing only had a very small impact on claim perception. Further change in the attractiveness of a product with a health claim (in comparison with one with no health claim) can be explained by changes in perceived healthiness, naturalness and tastiness. Although respondents in Iceland perceived products with health claims as slightly more healthy, attractive and natural than products without health claims, in all the other countries health claims had a negative influence on the measured product attributes.

When the three types of products with claims were compared with those without claims, perceived healthiness for bread and yoghurt remained the same but the products with claims were perceived to be less tasty and less

attractive. In addition, pork chop with a health claim was perceived far more negatively than the other two products on all the attributes. While omega-3 on its own was perceived to be healthier when compared with other claim types, products with claims relating to bioactive peptides were perceived as less healthy than the product with no claim. However, when bioactive peptide was the active ingredient, then a full claim that addressed ingredient, function and health outcome was perceived to be healthier than any other combination. Further, the type of benefit also had an effect on perceived healthiness, such that when the active ingredient omega-3 addressed a heart-related health effect it was perceived to be healthier than when it addressed a memory- or weight-related problem. Also when bioactive peptides were linked with a heart health effect this was viewed less negatively than when it was not linked to any disease or linked to memory or weight problems.

In conclusion, it can be said that the choice of the base product had the greatest influence on perceptions. Also how perceptions are measured is important as people may see products with health claims as healthy but not as attractive or tasty, which may affect their intention to buy the products. The level of familiarity with the added ingredient and the type of benefits addressed makes a difference to the type of claim preferred. Also, there are individual differences and country differences shown in preference for claims.

Healthgrain study

The second study to be reported was part of the Healthgrain project⁽⁴¹⁾. Using a conjoint format, the Healthgrain study investigated the impact of personal factors such as perceived relevance, information processing tendency (need for cognition)⁽⁴²⁾ and desire for accurate information (need for information)⁽⁴³⁾ on consumers' perceptions of healthiness and likelihood of buying cereal-based products that had health claims^(44,45). The data were collected from a sample of 2395 members of the public in Finland, Germany, Italy and the UK. The claims were presented as a combination of verbal health claims, pictorial symbols and a wholegrain label. Three different base products representing different perceived levels of healthiness and naturalness of food were used: 'bread' as example of a staple grain food (with a positive health image), 'cake' as occasional/hedonistic grain food (with neutral/negative health image) and 'yoghurt with cereals' as a non-cereal carrier (with a neutral/positive health image). The health claim addressed blood sugar levels and the risk of type 2 diabetes in the form of a functional claim: 'Promotes regulation of blood sugar balance' and a complete risk reduction claim: 'Contains cereal-based compounds which balance the blood glucose levels and therefore lower the risk of type 2 diabetes'. A symbol arousing associations with naturalness and a symbol arousing associations with medical use of food as well as a wholegrain label 'contains wholegrain', were used as cues. The perceived healthiness and willingness to buy the products were measured.

The base product was the most important dimension influencing the perception of 'healthiness' and the

'likelihood to buy' the food product. Cake as a base product had a negative influence on the perception of healthiness and likelihood to buy. All the respondents were positive about bread in terms of 'healthiness' and in their 'likelihood to buy'. Cereal-containing yoghurt was perceived to be healthier than bread, but people did not rate it highly in terms of buying. The verbal and visual messages used in this study⁽⁴⁴⁾ were found to be less important than the carrier, but more important than the presence of the wholegrain label, both in perceiving foods as healthy and in showing intention to buy it. Small differences across the countries were found in the relative importance of product, claim type, cues and wholegrain label in perceiving foods as healthy. The importance of the base product was higher in Finland and lower in Germany, whereas the Italian sample attached slightly less importance to the 'presence of wholegrain' label compared to respondents from the other countries.

Claim architecture results showed that a product carrying the claim 'contains cereal-based compounds which balance the blood glucose levels and therefore lower the risk of type 2 diabetes' was perceived as being healthier than the claim 'promotes regulation of blood sugar balance'. However, although people perceived the product to be healthy, they did not say they would buy the product with such a claim. Also when the product carried a medical symbol it was perceived as being healthy, but again it did not increase people's intention to buy the product. However, when the product had a 'contains wholegrain' label, it increased both perceptions of healthiness and also people's intention to buy the product, except in Italy. So full claims, symbols and wholegrain label all increased perception of healthiness when added to food products, although people's intention to buy did not always follow their perceptions.

Perceived relevance influenced the way the claims were perceived: the more relevant diabetes was to participants the more they saw the product with a claim, especially with a complete claim, as healthy and were more likely to buy. Interestingly, although increase in relevance (to both self and others) increased the perception of healthiness of products with complete claims, only those who said that diabetes was relevant to them personally were willing to buy them. Relevance also affected perceptions when the medical symbol was added but not intention to buy. However, the level of influence of relevance on the impact of symbols was much smaller than that on verbal claims. Further, regardless of relevance, people perceived the product to be healthy when the wholegrain label was present. However, only when diabetes risk was personally relevant were they willing to buy it. Thus, the level of perceived healthiness was not fully reflected in their likelihood of buying. So when relevant, complete claims and medical symbols influence perceptions of healthiness, and when personally relevant, strong claims and wholegrain labels affect the intention to buy.

Two factors were added to explain people's responses to health-related information; these were need for accurate information⁽⁴³⁾ and need for cognition⁽⁴²⁾ as personal information-processing tendencies. People who have a higher need for information were influenced by the full

claim, the symbols and the wholegrain label, so that they perceived greater healthiness compared to those whose need for such information was lower. However, this increase in perception was not reflected in their intention to buy products when all the information was displayed. In contrast, people with a high need for cognition were only influenced by the presence of the wholegrain label, so that they perceived more healthiness when this label was present. Thus, the study showed that processing tendency was not as important an individual characteristic as need for information when assessing health claims.

Discussion

Perceptions related to health claims depend on the base product used. In the Nordic study, pork was perceived more negatively than bread or yoghurt and in the Healthgrain study bread and yoghurt (with added cereal) were perceived more positively than cakes. This suggests that the base product chosen for modification has to be selected with care if it is to be accepted and consumed by the public. These results are in line with previous findings^(14–18).

Familiarity of the ingredient added to the carrier interacts with the claim architecture to affect public perception. When the ingredient is a familiar one, then, in general, people prefer shorter claims, although there are some individual differences. However, when the added ingredient is not known, then a full claim is preferred. It could be that until the product becomes familiar, people like to see a full claim that details the ingredient, its function and the proposed health benefit. These results add support to previous research⁽²¹⁾.

The benefits advocated by food with health claims influence perceptions; when claims address physiological functions, especially heart-related claims, the product is seen as healthier than when a claim addresses a psychological function or weight loss. Similar findings are reported in previous studies^(13,15,17–18). In addition, people's preferences for different claim architecture and whether they prefer a positive or negative frame depend on the type of benefit proposed. This may explain some of the contradictory results of earlier research^(13,26,27).

Personal relevance and people's perceived need for information affect perceptions of health claims with different architecture. While the change in perceptions relating to the level of relevance is similar to what was observed in previous studies^(14,34), the link between people's reaction to different claim architecture and their need for information (rather than their processing capacity) was demonstrated in the Healthgrain study. This shows the influence of different personal characteristics on perceptions related to different types of health claims.

As in previous studies^(13,15,31,32), gender, age and country differences in perceptions were noted in both studies. Most of these differences can be argued to be linked to familiarity, the length of exposure to food with health claims as well as individual and group perceived needs (male/female, younger/older and country)⁽¹⁴⁾.

People's intention to buy food with health claims is not totally dependent on their perceptions of healthiness of the products. Unless the health claim is related to a disease risk that is personally relevant, people are influenced by factors such as the taste, attractiveness and the method of production of the product. This adds to previous work that showed that brand, price, credibility and uniqueness also affect willingness to buy^(17,38).

Conclusions

Adding health claims to products does increase their perceived healthiness. Thus, it could be argued that health claims are communicating nutrition information to the public. Further, although claim structure does make a difference to perceptions its influence depends on the level of relevance, familiarity and individuals' need for information. The type of health benefit proposed and the base product used also affect perceptions of healthiness. Healthiness perceptions relating to products with health claims may vary between men and women, older and young and between countries. However, the main factor influencing perceived healthiness and intention to buy a product with a health claim is personal relevance.

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References

1. Six a day Research Project (1999) Six a day. <http://www.6aday.com/> (accessed 20 September 2010).
2. Food Standards Agency (2009) Saturated fat campaign launched to tackle UK's biggest killer. <http://www.food.gov.uk/news/newsarchive/2009/feb/satfatcamp> (accessed 12 August 2010).
3. Food Standards Agency (2009) Campaign launched to tackle rise in over 60's food poisoning. <http://www.food.gov.uk/news/newsarchive/2009/jun/campaignfood> (accessed 12 August 2010).
4. Food Standards Agency (2009) Salt reduction strategy. <http://www.food.gov.uk/healthiereating/salt/strategy> (accessed 12 August 2010).
5. Food Standards Agency (2009) Using the eat well plate. <http://www.food.gov.uk/healthiereating/eatwellplate/> (accessed 12 August 2010).
6. United States Department of Agriculture (2010) My pyramid. <http://www.mypyramid.gov/> (accessed 20 September 2010).
7. British Nutrition Foundation (2010) Food labelling and health claims. <http://www.nutrition.org.uk/nutritionscience/foodfacts/food-labelling-and-health-claims> (accessed 12 August 2010).
8. Richardson DP, Affertsholt T, Asp NG *et al.* (2003) PASSCLAIM – synthesis and review of existing processes. *Eur J Nutr* **42**, L96–L111.
9. Hawkes C (2004) *Nutrition Labels and Health Claims: The Global Regulatory Environment*. World Health Organisation. WHO: Geneva.
10. Regulation (EC) No 1924/2006 of the European Parliament and of the Council of 20 December 2006 on nutrition

- and health claims made on foods. *Official Journal of the European Union* **L 404**, 9–25.
11. Lähteenmäki L (2010) Consumers and health claims. In *Functional Foods: From Concept to Product* [M Saarela, editor]. Cambridge: Woodhead (In the Press).
 12. Leathwood PD, Richardson DP, Sträter P *et al.* (2007) Consumer understanding of nutrition and health claims: Sources of evidence. *Br J Nutr* **98**, 474–484.
 13. Bech-Larsen T & Grunert KG (2003) The perceived healthiness of functional foods. A conjoint study of Danish, Finnish and American consumers' perception of functional foods. *Appetite* **40**, 9–14.
 14. Dean M, Raats MM, Shepherd R *et al.* (2007) Consumer perceptions and expectations for healthy cereal products. *J Cereal Sci* **46**, 188–196.
 15. Van Trijp HCM & van der Lans IA (2007) Consumer perceptions of nutrition and health claims. *Appetite* **48**, 305–324.
 16. Urala N & Lähteenmäki L (2003) Reasons behind consumers' functional food choices. *Nutr Food Sci* **33**, 148–158.
 17. Van Kleef E, van Trijp HCM & Luning P (2005) Functional foods: health claim – food product compatibility and the impact of health claim framing on consumer evaluation. *Appetite* **44**, 299–308.
 18. Siegrist M, Stampfli N & Kastenholtz H (2008) Consumers' willingness to buy functional foods: The influence of carrier, benefit and trust. *Appetite* **51**, 526–529.
 19. Ares G & Gambaro A (2007) Influence of gender, age and motives underlying food choice on perceived healthiness and willingness to try functional foods. *Appetite* **49**, 148–158.
 20. Ares G, Gimenez A & Gambaro A (2008) Influence of nutritional knowledge on perceived healthiness and willingness to try functional foods. *Appetite* **51**, 663–668.
 21. Urala N, Arvola A & Lähteenmäki L (2003) 'Strength of health-related claims'. *Int J Food Sci Tech* **38**, 1–12.
 22. Frewer L, Scholderer J & Lambert N (2003) Consumer acceptance of functional foods: issues for the future. *Br Food J* **105**, 714–73.
 23. Lähteenmäki L, Grunert K, Ueland O *et al.* (2002) Acceptability of genetically modified cheese presented as real product alternative. *Food Qual Preference* **13**, 523–533.
 24. Cox DN, Koster A & Russell CG (2004) Predicting intentions to consume functional foods and supplements to offset memory loss using an adaptation of protection memory theory. *Appetite* **43**, 55–64.
 25. Cox DN, Evans G & Lease HJ (2008) Australian consumers' preferences for conventional and novel sources of long chain omega-3 fatty acids: A conjoint study. *Food Qual Preference* **19**, 306–314.
 26. Wansink, B, Sonka, ST, & Hasler, CM (2004) Front-label health claims: when less is more. *Food Policy* **29**, 659–667.
 27. Verbeke W, Scholderer J & Lähteenmäki L (2009) Consumer appeal of nutrition and health claims in three existing product concepts. *Appetite* **52**, 684–692.
 28. Hooker NH & Teratanavat R (2008) Dissecting qualified health claims: evidence from experimental studies. *Crit Rev Food Sci* **48**, 160–176.
 29. Broemer P (2004) Ease of imagination moderates reactions to differently framed messages. *Eur J Soc Psychol* **34**, 103–119.
 30. Kahneman D & Tversky A (1979) Prospect theory: An analysis of decision under risk. *Econometrica* **47**, 263–291.
 31. Ares G, Gimenez A & Gambaro A (2009) Consumers perceived healthiness and willingness to try functional milk desserts. Influence of ingredient, ingredient name and health claim. *Food Qual Preference* **20**, 50–56.
 32. De Jong N, Ocké MC, Branderhorst HAC *et al.* (2003) Demographic and lifestyle characteristics of functional food consumers and dietary supplement users. *Br J Nutr* **89**, 273–81.
 33. Verbeke W (2005) Consumer acceptance of functional foods: socio-demographic, cognitive and attitudinal determinants. *Food Qual Preference* **16**, 45–57.
 34. Rozin P, Fischler C, Imada S *et al.* (1999) Attitudes to food and the role of food in life in the USA, Japan, Flemish Belgium and France: possible implications to diet-health debate. *Appetite* **33**, 163–180.
 35. Herath D, Cranfield J & Henson S (2008) Who consumes functional foods and nutraceuticals in Canada? Results of cluster analysis of the 2006 survey of Canadians' demand for food products supporting health and wellness. *Appetite* **51**, 256–265.
 36. Urala N & Lähteenmäki L (2004) Attitudes behind consumers' willingness to use functional foods. *Food Qual Preference* **15**, 793–803.
 37. Urala N & Lähteenmäki L (2007) Consumers' changing attitudes towards functional foods. *Food Qual Preference* **18**, 1–12.
 38. Ares G, Gimenez A & Deliza R (2010) Influence of three non-sensory factors on consume choice of functional yogurts over regular ones. *Food Qual Preference* **21**, 361–367.
 39. Lähteenmäki L, Lampila P, Grunert KG *et al.* (2010) The impact of health-related claims on the perception of other product attributes. *Food Policy* **35**, 230–239.
 40. Grunert KG, Lähteenmäki L, Boztug Y *et al.* (2009) Perception of health claims among Nordic consumers. *Consumer Policy* **32**, 269–287.
 41. Poutanen K, Shepherd R, Shewry P *et al.* (2008). Beyond whole grain: the European HEALTHGRAIN project aims at healthier cereal foods. *Cereal Foods World* **53** (1), 32–35.
 42. Chaiken S & Trope Y (1999) *Dual-Process Theories in Social Psychology*. New York: Guilford.
 43. Cacioppo JT, Kao CF, Petty RE *et al.* (1986) Central and peripheral routes to persuasion – an individual difference perspective. *J Pers Soc Psychol* **51**, 1032–1043.
 44. Saba A, Vassallo M, Shepherd R *et al.* (2010) Country-wise differences in perception of health-related messages in cereal-based food products. *Food Qual Preference* **21**, 385–393.
 45. Dean M, Shepherd R, Lampila P *et al.* (2010) The effect of relevance and information processing on perceptions and likelihood of buying products with health claims. *J Psychol Health* (In the Press).