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Nutrition and Health Claims as Marketing Tools

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European regulations mandate that only substantiated and approved statements can be used as nutrition and health related claims in food marketing. A thorough understanding of consumer perceptions of these approved claims is needed to assess their impact on both the selection of functional foods and innovative functional food concepts. In this article, a conceptual framework on the European consumers' perception of nutrition and health claims on these functional foods is proposed. Through a literature review, common independent variables are structured, and an analysis of these variables shows that nutrition and health claims are mostly only perceived positive by specific target consumers (who need the product, accept the ingredient, understand the benefit and trust the brand). These consumers indicate that the products with substantiated and approved claims help them in reaching overall health goals. This increased expectation in functional efficacy may mediate an increase in repurchase intent, overall liking, and the amount consumers are willing to spend. Other consumers, however, may have adverse reactions towards nutrition and health claims on functional foods. Implications for the consumer and the industry are discussed.

Keywords: nutrition and health claims, consumer perception, functional foods, food marketing, goal fulfilment

Introduction and background

The current concerns about the impact of diet on health are reflected in the growing economic and social costs associated with diet-related illnesses such as cancer, diabetes, and cardiovascular disease (Amine et al., 2011). The national authorities in the European Union are focusing more and more on cost-effective health care, where the importance of lifestyle and dietary changes for improved health and disease prevention are well-established (Mhurchu, 2010). Hence, in order to address these dietary changes, attention has focussed on the development of numerous functional foods (FFs) by food manufacturers. These FFs are purported to contain health-promoting ingredients. According to the European Commission (EC), general principles and regulations were to be established for these claims in order to ensure a high level of consumer protection, give the consumer the necessary information to make choices in full knowledge of the facts, and create equal conditions of competition for the food industry, as well as stimulate innovation (EC, 2006a). Furthermore, these principles and regulations would strengthen consumer confidence in nutrition and health claims (NHCs), which is a critical concern for both the manufacturer and the consumer. Well-substantiated NHCs should help consumers to make informed choices, as well as help them identify particular foods and food components with health benefits.

This article focuses on consumer perception of these NHCs and on how these claims and the presence of functional ingredients influence consumer evaluation and purchase intent of FFs. These findings provide relevant information for functional food manufacturers and consumers alike.

Background

Throughout shopping sessions, consumers come across different products that carry different label information. Manufacturers often include claims on their products to advertise and set apart their goods from competitors. In this respect, Apple's new iPad now claims to have "over 200 new features" and McDonald's chicken snacks are claimed to be "extra crispy". In the field of linguistics, these claims are defined as declarative propositions which can either be true or false (Long et al., 1997). Back in 1985, most of these claims on food were related to their sensory aspects, and only 10.4% of all claims were related to nutrition and health. Today's food manufacturers are rapidly shifting to nutrition and health related claims. For example, in a recent study in the United States, 65% of claims made on food were classified as NHCs (Kim, Cheong, & Zheng, 2009).

Currently, European legislation directs marketers who use NHCs to provide precise, scientific, and substantiated information on the functional ingredients being used and their potential health benefits. For the purpose of this article, we will focus on the growing market of FFs that use health claims and/or specific nutrition information to differentiate themselves from competitive products.

Research contribution

This topic explores different fields of marketing, consumer behaviour and psychology research. Because NHCs are heavily interlinked with marketing research on FFs, the conceptual background of this review will include research on:

- The *need* for FFs and FBs (Aschemann-Witzel and Hamm, 2010; Landström et al., 2007; Menrad, 2003),
- The *acceptance* of functional ingredients in these foodstuffs (Ares & Gámbaro, 2007; Siro, Kapolna, Kapolna, & Lugasi, 2008; Tuorila & Cardello, 2002; Vidigal, Minim, Carvalho, Milagres, & Goncalves, 2010),
- The *understanding* of NHCs (Agrawal and Wan, 2009; Andrews et al., 1998; Fernández Celemín and Grunert, 2012; Leathwood et al., 2007; Mariotti et al., 2010; Richardson, 2005; Van Kleef et al., 2005; Williams, 2005)
- And whether consumers *trust* the health related claims (Bech-Larsen and Grunert, 2003; Bech-Larsen and Scholderer, 2007; Siegrist et al., 2008; Verbeke et al., 2009; Zwier, 2009).

These four factors; need, accept, understand and trust can be aligned with an approach by Wennström (2000, 2009) and Mellentin (2002) who discuss the marketability of FFs. The data indicate that most consumers only look at NHCs on products for a very short time (< 4 seconds), which is insufficient for extensive processing of information (Fernández Celemín and Grunert, 2012), and that actually only 7 to 10 percent can recall looking at the claim (Aschemann-Witzel and Hamm, 2010; Fernández Celemín and Grunert, 2012). This suggests that it is important that novel consumer research focuses on understanding the consumer perception of the presence of NHCs rather than the consumer understanding of particular NHC wordings.

European regulatory status of nutrition and health claims

Multiple large-scale projects preceded changes in the European regulatory landscape which intended to help consumers to make the right food choices. The Functional Foods in Europe (FUFOSE) and Process for the Assessment of Scientific Support for Claims on Foods (PASSCLAIM) projects underpinned the laws and provided criteria against which the quality of the totality of the available data could be judged (Richardson, 2012). By tightly regulating what can, and cannot, be claimed on a foodstuff, the EU followed internationally recognized standards for food labeling as set out by the Codex Alimentarius Commission on Food Labeling (CA, 2001). To claim the presence or absence of certain substances in foods, the food manufacturer can use a nutrition claim (NC) on the packaging. To claim a relation between an ingredient and a health benefit from that ingredient, a health claim (HC) can be used. The conditions of use for these claims are regulated in Europe by Regulation (EC) no 1924/2006 (EC, 2006a).

The academic community has discussed the implications of this regulation thoroughly. Some argue that the regulation places greater burden on food manufacturers' research and development resources (Leathwood et al., 2007). The strict conditions of use for NHCs are based on recommendations by the Panel on Dietetic Products, Nutrition, and Allergies (NDA) of the European Food Safety Authority (EFSA). EFSA-NDA panelists Verhagen, et al. (2010) reviewed the status of the relevant regulation concerning both NCs and HCs in Europe and note that consumers make "only little or no distinction between nutrition and health claims". However, according to the 'new' definitions as set out by Regulation (EC) no 1924/2006 of the

European Parliament and of the Council, of 20 December 2006, there is a clear distinction between nutrition and health claims made on foods (EC, 2006a). The food manufacturers and product developers understand this difference greatly. The costs in research and development efforts, reformulation, marketing efforts, and regulatory affairs, are much higher when the use of a HC is desired compared to NCs. Moreover, a development process which includes the substantiation of health benefits to consumers greatly reduces the speed to market compared to a NC (Wollgast, 2011).

The objective of Regulation (EC) no 1924/2006 was to harmonize the national rules on NHCs. Whilst ensuring the free distribution and sale of foods, it also provides a high level of consumer protection. Furthermore, it aimed to permit consumers to choose products in full understanding of the facts and to ensure fair competition. The scope of the regulation is to include all aspects of food products made in commercial communications to the final consumer: labeling, descriptive presentation, advertising, and in some cases brand names, and trademarks.

Claims are generally defined as *“any message or representation, which is not mandatory under Community or national legislation, including pictorial, graphic or symbolic representation, in any form, which states, suggests or implies that a food has particular characteristics”*(EC, 2006a).

According to Article 3 and 6 of the regulation, these claims shall (a) not be false, ambiguous or misleading; (b) not give rise to doubt about the safety and/or the nutritional adequacy of other foods; (c) not encourage or condone excess consumption of a food; (d) not state, suggest or imply that a balanced and varied diet cannot provide appropriate quantities of nutrients in general; (e) refer to changes in bodily functions which could give rise to exploit fear

in the consumer, either textually or through pictorial, graphic or symbolic representations.

Furthermore, all claims need to be based on and substantiated by generally accepted scientific data (EC, 2006a; Verhagen et al., 2010). It should be noted that the words “generally accepted” are rather vague, in this respect. The regulation, however, does put forth clear definitions of the different categories of claims wherein a NC is defined as follows (EC, 2006a, Art. 2(4)):

“‘nutrition claim’ means any claim which states, suggests, or implies that a food has particular beneficial nutritional properties due to: (a) the energy (calorific value) it (i) provides; (ii) provides at a reduced or increased rate; or (iii) does not provide; and/or (b) the nutrients or other substances it (i) contains; (ii) contains in reduced or increased proportions; or (iii) does not contain;”

HCs are defined broader (EC, 2006a, Art. 2(5)):

“‘health claim’ means any claim that states, suggests or implies that a relationship exists between a food category, a food or one of its constituents and health;”

Then, there is a separate definition for a specific type of HC, the reduction of disease risk claim (EC, 2006a, Art. 2(6)):

“‘reduction of disease risk claim’ means any health claim that states, suggests or implies that the consumption of a food category, a food or one of its constituents significantly reduces a risk factor in the development of a human disease;”

The regulation continues to set out different subcategories of NCs and HCs, which are conveniently overviewed in **Table 1**, modified from Verhagen, et al. (2010). Within this table, one can see that the NCs are subdivided into content claims and comparative claims. HCs are subdivided in function claims and reduction of disease risk claims, where the former are again subdivided in the so-called article 13(1), and article 13(5) claims. Note that the examples are all substantiated claims and, under certain conditions, can be used on food packaging (Gilsenan, 2011).

Insert Table 1 here

New article 13(5) and article 14 claims are based on newly developed (proprietary) data, and to use such claims a substantiation document has to be submitted to EFSA (EC, 2006a, Art. 15). Within this document, companies have to prove a causal relationship between the ingredient and the proposed beneficial effect. In many cases, a substantial number of controlled nutrition intervention studies are required to obtain conclusive evidence. Consequently, there are high costs involved to get a new claim approved. Both NCs and article 13(1) HCs are compiled on approved lists. On these lists, you can find the claim and the conditions that apply to use such a claim. Interestingly, in both categories the European Commission also approves claims that are

likely to have the same meaning for consumers. This upholds a certain degree of flexibility in the NHC wording for the manufacturers. An example of the conditions of use for a NC, which are given on the approved list for NCs, is given below:

A claim that a food is a source of vitamin C, and any claim likely to have the same meaning for the consumer, may only be made where the product contains at least a significant amount of vitamin C (15% of recommended daily amount = 9mg per 100g or 100ml) (EC, 1990, 2006a, b).

Table 2 is an example of how claims on Vitamin C, and the related conditions of use, appear on the list of permitted Art. 13(1) HCs (EC, 2012).

Insert Table 2 here

Conceptual framework

These stricter regulations gave ingredient-manufacturers the opportunity to market their ingredients with clear, well substantiated, HCs, which the food-manufacturers could then use on their final products. With a proprietary and regulated HC, the ingredient-manufacturer could establish their component with a particular claimed beneficial, physiological effect apart from their competitors. These functional ingredients have given rise to numerous, mostly unsuccessful, novel FF concepts (Menrad, 2003). Food manufacturers blatantly marketed their functional products with the same claim that the ingredient manufacturer had used to secure their

purchase of the ingredient. The marketing teams seemingly failed to understand that mass market food consumers want to realize quick effects, rather than wait for long-term health effects (Faro, 2010).

So how can manufacturers use NHCs as marketing tools to reach targeted consumers? Which claims should they use? Moreover, how should the claims be phrased within the scope of the legislation? To answer these questions, it is important to understand the basic consumer decision-making process. Before a consumer decides to purchase, he or she has identified an unfulfilled need. To fulfill these needs, consumers will search for information about possible solutions. After evaluating this information, consumers then decide to purchase. This is followed by a post-purchase evaluation that incorporates their experience to ensure a quicker decision process in the future.

To understand this construct better, we analyzed relevant literature on the marketing and consumption of functional food products. Specifically, research on whether consumers *need* FFs, *accept* the functional ingredient, *understand* the benefits of this ingredient, and *trust* NHC on a branded product were reviewed. For the purpose of this discussion, it is most relevant to know how people perceive and understand NHCs. With this, further insights can be gained in how different claim formats play a role in consumer decision-making processes for healthy eating behavior.

Need the product

In a recent article by Wills, et al. (2012), a framework was proposed which outlines the important variables determining FF purchasing behavior. Wennström and Mellentin (2002) discussed similar predictors of successful FFs marketing. Both concur that the food category is an important independent variable affecting the dependent consumer attitude towards a NHC. There is also evidence that HCs and specific nutritional information on product labels can influence the consumer evaluation of the product (Chandon and Wansink, 2011; Kozup et al., 2003). For an adequate understanding of NHCs, consumers should categorically *need* the functional product.

The general expectation that healthiness is needed by consumers within their diet was tested in Swedish consumers in 2009. This expectation was tempered by data that shows that Swedish consumers will only justify the use of FFs to improve health when a normal healthy lifestyle is incapable of improving people's health. This complex impression shows that consumers do not place FFs high as a tool to improve their state of health. (Landström et al., 2009). Another study in Sweden aimed to investigate the actual use of FFs, and whether demographic variables and attitudes to diet and health could predict consumption of FFs. Through a questionnaire (n = 972), Swedish respondents were asked about different aspects of FFs. The results revealed that an astonishing 84% of respondents were familiar with the concept of FF and, of those who had consumed a FF, 25% had perceived a beneficial effect of it. The characteristic Swedish FFs consumer has a high level of education, is health-conscious and interested in healthy foods, and believes in the health effect of FFs (Landström et al., 2007).

It is suspected that presenting information about health can influence the need for the FF. Therefore, it is important to have a good notion on how consumers relate the need for a benefit as specified with a NHC to the need to purchase a FF. This was researched in a conjoint analysis by Hailu, et al. (2009). Through an intercept survey in a shopping mall in Canada consumers were asked to rank attributes of FFs containing probiotics. The relationship between the respondents' characteristics and preferences for product variants was analyzed. Within this study, it was shown that consumers place a strong premium on truly substantiated HCs on FFs.

It can be concluded that, although the consumers prefer to see substantiated claims on FF, not all consumers need FFs. The health functionality of a product is an important driver in the purchasing and consumption behavior of functional products. However, there are other determinants that moderate purchasing behaviour, such as consumer acceptance of the ingredient.

Accepted ingredients and/or food types

Theoretically, "functional foods can enable the consumer to lead a healthier life without changing eating habits" (Bech-Larsen and Grunert, 2003). The consumer can embrace this proposition if they *accept* that the functional ingredient is placed within a carrier they know and already consume. If the functional ingredient does not alter the taste or convenience of the carrier, consumers believe they can be healthier without putting extra effort into it.

Therefore, both the type of product and the brand are of utmost importance to the acceptance of an ingredient. This entails that consumers should both accept the functional

ingredient and the interaction between the claim and the carrier. For example, most consumers do not accept constipation-related HCs on a soft drink containing a soluble fiber, but might accept the same claim on a functional yogurt-drink. Among others, Leathwood, et al. (2007) discussed that carrier products have the largest effect on consumers' perception of healthiness and willingness to try the food.

The carrier of a claim can be evaluated using certain characteristics that are listed below. We chose these characteristics because it is suspected that changes in these characteristics have the strongest impact on the perception of NHCs. For the purpose of the research question at hand, FFs, and therefore carriers of claims, are defined by product category, brand, packaging, and location.

Product category

The carrier of a claim always falls within a certain product category. For the purpose of this discussion, FFs can be defined as the investigated product category. However, for consumers it is more relevant to categorize products on the way they appear on their shopping lists (e.g., juice, sports-drink, energy-drink, etc.). This categorization is also used by most supermarket layouts (Bezawada et al., 2009).

In all product categories an interesting effect is observed which is coined the “unhealthy equals tasty” intuition (Raghunathan et al., 2006). This intuition describes the effect of health information on taste perception. Generally, consumers tend to think that products that they consider unhealthy are tastier, and products that they consider healthy taste inferior.

Initially, it was often thought by food developers that excellent taste is not a prerequisite for selling functional foods. This thought pattern came from pharmaceutical and OTC preparations experiences which seldom taste well. Users do not care about taste, as long as the medication is functionally sound. To the contrary, the fact that food behaved differently was demonstrated painstakingly after the launch of one of the line of Novartis Aviva functional foods products in 1992. Although the products were clearly substantiated in terms of health, they lacked a good taste and flopped completely. Interestingly, in a study by Tuorila and Cardello (2002), the researchers measured consumer responses after altering the taste of the juice with potassium chloride, a bitter ingredient. The acceptance of taste differences due to a health benefit was investigated. With different levels of off-flavoring and specific HCs, it was shown that the consumption of a functional juice is inversely related to the severity of off-flavor and to the required frequency and duration of consumption. The researchers found no support for the notion that a slight off-flavor is a positive marker of health benefits to consumers. In the other direction, Vidigal, et al. (2010) concluded that, provided that there is sensory pleasure, the information on health benefits can even positively influence sensory acceptance in juices.

Brand

Some, more habitual, loyal, consumers emphasize brands over product categories (e.g., Minute Maid[®] or Powerade[®]). In Europe the main categories within brands are: *national brands*, *generic brands*, and *low-cost brands* (Clow and Baack, 2004; Keller, 2003). Wennström and Mellentin (2002) imply that, like the product category, well known and trusted brands have

a strong influence on the acceptance of a functional ingredient. This influence can be so strong that when a major trusted food brand launches a product with a new ingredient and health benefit, the consumer will trust the product at first sight and purchase it. Additional information on a trusted brand is given further on in the discussion.

Packaging

There has been limited research on the exact role of carrier packaging within NHC perception and the acceptance of functional ingredients in FFs. We suspect that the type of packaging (cans, bottles) has some influence, since cans are mostly used by unhealthy sugar-based sparkling drinks in contrast to bottles or paper. One article (Hawkes, 2010) proposes that the size of the package, and therefore mostly the size of the NHC, plays a significant role in NHC perception. In this light, it is interesting to consider the success of the highly convenient ‘one-shot’ bottles from Yakult and Danone, which offer a sweetened yogurt-drink with functional ingredients.

More important, the placement of the information on a carrier’s package is deemed important for consumer perception. The placement of a NHC on a carrier’s package is divided between ‘front-of-pack’ labeling (FOP) and ‘back-of-pack’ labeling (BOP). Research shows that FOP is more effective in driving the recall of a NHC (Van Kleef et al., 2008).

Location

The location of the claim on a package is discussed in the section above; however, the location of the carrier might also be relevant on the perception of NHCs. Within this, there are determinant variables such as the place and time where the carrier is encountered. FFs can be purchased in a gas station or in a supermarket, and can be consumed in the morning or in the evening. Surrounding factors, and even the variety of products surrounding the carrier, influence NHC perception (Fernández Celemín and Grunert, 2012).

In conclusion, the carrier strongly determines which ingredients and its related functionality are of benefit to consumers. It should be noted that consumers need to be aware of the existence of the ingredient and be interested in it. These factors are highly influenced by trends within the consumer group. Consumers should both accept the ingredient, as well as accept the benefit. In the development of FFs, manufacturers can achieve this by helping consumers understand the benefit of that ingredient. An alternative is to create 'ingredient trust'. For example, added vitamin C may be sufficient for making a purchase decision irrespective of the reason why it is added because of its widely accepted use.

Understand the benefit

From a public health aspect, it is important that consumers understand which ingredients and foods confer what kind of specific health benefits. Numerous researchers have tried to find better ways to communicate relevant health aspects towards consumers. On the whole, it can be

concluded that most consumers only understand health related messages if the right things are communicated to the right people on the right product (Daniel et al., 2009), advice which undoubtedly needs some further context. In principle, NHCs on FFs should be adapted to their target group and to the specific carrier to ensure adequate understanding. A question that remains is how the claims exactly should be adapted.

In this respect, consumers do not sufficiently process NHCs in real life due to their short exposure. Therefore, some current research data is not coherent with empirical observations. For example, participants in a controlled research setting in which they are instructed to review FFs might understand elaborate claims quite well (i.e.: “plant sterols may inhibit cholesterol absorption. This product contains plant sterols and may therefore helps to maintain cholesterol levels” (Kim et al., 2010)). However, in real life situations consumers rarely take the time, and may have insufficient backgrounds, to read and process such difficult sentences.

Furthermore, it is suspected that most consumers often only perceive specific words of some NHCs, and base their understanding from these words. Claims containing negation (e.g.: *not* fattening) can therefore even result in opposite understandings (the product is fattening) (Grant et al., 2004). Furthermore, researchers have shown that consumers understand the overall health effects of a product differently even if only one ingredient (contains plant sterol) or one benefit (lowers cholesterol) is mentioned in the claim. This “halo” effect of NHCs may even discourage consumers from seeking further nutrition information (Williams, 2005). Thus to make claims more effective (in terms of actual understanding), longer claims should be adapted to short, and to the point, statements (Wansink et al., 2004).

This notion, however, conflicts with the current strict legal environment. The new European legislation has led to the incorporation of more scientific terms to follow rules on adequate substantiation (EC, 2006a). A balance between substantiation and understandability is preferred. Thus, food manufacturers now have the task to make non-misleading, well-substantiated, understandable claims, a task in which there are certain difficulties. Mariotti, et al. (2010) identified six sources of confusion associated with this task.

A first pitfall is the *lexical issue*. The average consumer may find it difficult to understand the scientific terms that the food regulatory authorities prescribe in NHCs. Even though consumers might be familiar with a term (such as metabolism), the exact meaning of the term often remains to be unknown. A good example, in this respect, are the approved article 13(5) claim wordings formulated by the EFSA. As an illustration, we can take the first ingredient that ever obtained such a HC. The following wording was advised: “FruitFlow[®] helps maintain normal platelet aggregation, which contributes to healthy blood flow”. Although this claim is fully substantiated, it is not understandable by the average consumer. Broader wording may make the function more comprehensible to these consumers, but often renders the claim to be misleading (Mariotti et al., 2010).

A second pitfall is that HCs could go *beyond scientific truth*. Although the HC “lipids provide energy to the body” is nutritionally correct, consumers might interpret it as “lipids are energizing”. The third and fourth pitfalls relate to matching *consumer understanding and reality*. Some consumers confuse between *food and diet* in a way that they tend to think that one product with a HC could balance out another healthier product (3). Or that the more they take of a

product, the stronger the effect will be (4). Consumer perception should be emphasized when defining a HC wording to avoid misleading the consumer.

The last two hazards for public wellbeing, according to Mariotti, et al. (2010), are related to the *interpretation* of HCs. Some consumers might disregard the multifactorial nature of food related illnesses and think that a mere healthy diet is enough to prevent diseases such as cardiovascular disease, diabetes type 2 and cancer (5). Manufacturers should direct the right HCs to the right consumer groups to ensure an adequate effect (6).

From the above, we can conclude that NHCs are often misinterpreted and that the current research methods on NHC understanding might be inadequate. Furthermore, even if the consumers understand the claim, and are not misled by it, there remains the issue of trusting the claim.

Trust the brand

Previous sections have shown that there are differences in need, acceptance, and understanding of NHCs. The last point on which NHC perception research has focused is developing tools to answer the questions when consumers trust the NHC and the brand that carries the health related claim. In cosmetics, another field of fast moving consumer goods, there have been numerous market failures observed due to untrustworthy pseudo-scientific claims. It is suspected that most consumers did not trust the brand which made the claim (Darke and Ritchie, 2007), an effect that can be generalized to the FFs market.

Foodstuffs fall within the boundaries of the health and life sciences industry, and manufacturers have an important role in marketing disease preventative products (Stremersch, 2008). A content analysis of magazine food advertisements in 1990 through 2008 shows that there was an increase in the use of NCs and HCs. This increase is coined the “medicalisation” of food advertising (Zwier, 2009). Often images of the body and mind as malfunctioning, unless remedied by the use of advertised products, are promoted. Furthermore, this medicalisation resulted in lack-of-trust in HCs and food brands (Zwier, 2009).

In the specific case of FFs, the food industry manufacturers have shaped consumers’ awareness of these products through these adverts and commercials. However, they have also shaped skepticism and distrust due to the use of low trusted information sources (Bech-Larsen and Scholderer, 2007; Verbeke et al., 2009). The new European regulation concerning HCs tries to make the trust-issue obsolete by establishing a framework for well-substantiated claims.

Svederberg and Wendin (2011) suggest that a minimum of trust is needed for consumers to even use the claim information. Furthermore, their research indicates that HCs are significantly more trusted if manufacturers combine claims with nutrition labeling. Other research shows that consumers who trust the food industry are more likely to buy FFs compared to consumers who do not have trust in the food industry (Siegrist et al., 2008). Thus, it is of importance that trust is restored in health communication towards consumers.

In order to grasp the full understanding of the effect of health claims, the health claim must be seen in its full context, and not in isolation. In addition to the physical context (product category, brand, package, and location and distribution channel) which heavily influence the

perception of the health benefit, there are other, maybe even more important, contexts in which the health claim should be studied.

The cultural context, such as the country, ethnic group, subcultures, consumer segments (defined by demographic, socio economic, professional, and psychographic factors) will create different interpretations of the same health claim. Another context is the user centric context. Modern communication models can be defined as user centric. Old models are based on an antiquated idea of sender and receiver. This is a belief that the sender is in control of the communication. However, this is not the case. The receiver is the one who decides to use the information that gratifies and supports his or her belief system.

A last important context is the academic context. This means that HCs are representing the rational communication culture of the academic society who have the tools to decipher and interpret the message in a consistent way across nations and academic groups (in theory). HCs will subsequently be misunderstood and misinterpreted outside this culture.

Implications for research and development

NHCs appear to provide relevant information for consumers to decide for more healthy choices. However, our research has suggested a backfire effect of labeling foods with some NHCs. The current review examined whether there are common variables which determine functional food purchasing behavior and efficacy expectations. Our conclusion is that that not all functional foods can be treated equally and that the consumer perception of specific NHCs should be studied in depth. Although the European food industry now has clear guidelines as to how to

substantiate health claims (Aggett et al., 2010), there are no guidelines addressing how to properly communicate these health statements. We suggest that the consumer perception of health claims is studied vigorously by both food industry and academia to truly improve consumer health.

In a recent article by Nocella and Kennedy (2012), the urgency to assess consumer understanding of health claims is stressed. In our review, we concur that more research is needed to improve the use and effectiveness of health claims as marketing tools. The European regulations impacted the balance between marketing and R&D efforts in FF development and innovation. We believe that through this regulation, the industry's resources have shifted to proper substantiation of nutrition and health effects of particular foods and ingredients. With this, the parallel increasing costs for the more complex marketing efforts have not been taken into account. Although often seen as a final step in development and innovation, the proper marketing of a functional product is the key to success and should be incorporated early on in the R&D process. In our review, we see that different NHCs, on the same carrier, have a measurable effect on how consumers evaluate the functional efficacy of a food. This is directly attributable to certain characteristics of the claims as well as attributes in the carrier.

Fundamentally, literature indicates that the *type of claim* (NCs, HCs), *consumer group* (need, acceptance, understanding, trust), *carrier* (category, brand, packaging, location) and *claim wording* play an important role in consumer perception of FFs, which results in different *functional efficacy expectations* and *(re)purchase intent*.

To increase the understanding and attitude towards NHCs, future consumer studies should look much more to the relation between the understudied determinants such as body mass

index, personal and cultural beliefs, sensory attributes, wording, and nutrition knowledge.

Furthermore, available studies that investigate consumer perceptions across a wide range of different health benefits and claim types are highly limited, indicating a need for more research. This, and the greatly varying methodologies described in the available publications, make it hard to compare results between existing research on the correct use of NHC as marketing tools. We also believe that all future research should focus on obtaining actual consumer behavior data, rather than self-reported preferences to ensure reliable and comparable data. NHC perception should be studied on a subconscious level to minimize confounding effects. One important limitation of consciously measuring decision processes is that it significantly changes behavior (Morwitz et al., 1993).

This detailed analysis of determinants of NHC perception is a helpful tool in understanding the more general implications of correctly communicating nutrition and health benefits on foods and beverages. The research fits in the multidisciplinary approach which is used in finding solutions for the detrimental effects of an unwholesome diet on health. Moreover, it provides a benefit to companies who want to understand how to make consumer communication more effective. This could also benefit public policy makers, as they better understand how to design the health claims system to achieve the desired effect on consumer choices.

Although from a public health standpoint, one could argue that claims, which have been approved and authorized, are mostly only well-established nutrient function claims. These may stimulate the addition of nutrients to fortified foods rather than true functional foods leaving the regulation to stifle true innovation. Only time will tell.

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Table 1: Overview of nutrition and health claims in regulation (EC) no 1924/2006

Regulation (EC) no 1924/2006

	What it contains		What it does		
Type of claim:	NCs		HCs		
Name:	Content claims	Comparative claims	Function claims		Reduction of disease risk claims
Parameter:			Based on generally accepted scientific evidence	Based on newly developed scientific data	(includes claims on growth and development of children)
Reference:	Art. 8	Art. 9	Art. 13(1)	Art. 13(5)	Art. 14
Example:	<i>“Source of vitamin</i>	<i>“Light” or “Reduce</i>	<i>“Vitamin C increases iron absorption”</i>	<i>“Cocoa flavanols help maintain endothelium-</i>	<i>“Plant sterols have been shown to</i>

<i>C”</i>	<i>d sugar”</i>		<i>dependent vasodilation, which contributes to normal blood flow”</i>	<i>lower/reduce blood cholesterol. High cholesterol is a risk factor in the development of coronary heart disease”</i>
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Table 2: Example of conditions of use for article 13(1) health claims

Nutrient, substance, food or food category	Claim	Conditions of use of the claim
Vitamin C	Vitamin C contributes to the normal function of the immune system	The claim may be used only for food that is at least a significant amount of vitamin C (9 mg per 100 g or 100 ml)
Vitamin C	Vitamin C contributes to maintain the normal function of the immune system during and after intense physical exercise	The claim may be used only for food that provides a daily intake of 200 mg vitamin C. In order to bear the claim, information shall be given to the consumer that the beneficial effect is obtained with a daily intake of 200 mg in addition to the recommended daily intake of vitamin C.
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