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Research Report

Functional foods: health claim-food product compatibility and the impact of health claim framing on consumer evaluation

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Abstract

Two studies are reported, which aim to strengthen the scientific underpinning of strategic decisions regarding functional food development, as to (1) which health benefits to claim, (2) with which product (category), and (3) in which communication format. The first exploratory study is a secondary analysis of 10 different health claims systematically combined with 10 different food carriers to evaluate their combined suitability for functional food positioning. The results show that consumers tend to prefer functional food concepts that primarily communicate disease-related health benefits in carriers with a healthy image or health positioning history. Study 2 examines health claim format and systematically varies the way in which specific health benefits are being communicated to the consumer. Two physiologically oriented claims (heart disease and osteoporosis) and two psychologically oriented food claims (stress and lack of energy) are expressed in enhanced function format versus disease risk reduction format. Also, it includes the individual difference variable of 'regulatory focus' and the health status of the respondent to explore how these factors impact health claim evaluation. The results show that consumer evaluations primarily differ to the extent that health claims are personally relevant in addressing an experienced disease state. Framing is important, but its effect differs by health benefit. No strong effects for consumers' regulatory focus were found. Underlying mechanisms of these effects and their implications for the development of functional foods are discussed.

Keywords: Functional foods; Carriers; Health claims; Framing; Enhanced function; Reduced disease risk; Regulatory focus theory

Introduction

During the last decades, enormous progress has been made in establishing the scientific basis for functional food development in health, nutrition and food processing (Diplock et al., 1999; Mermelstein, 2002). Functional foods are founded on the key premise that, compared to conventional foods, they help to ensure overall good health and/or to prevent/manage specific conditions in a convenient way (i.e. through daily diet) (Poulsen, 1999; Sloan, 2000). Foods with additional health value offer interesting growth opportunities for the food industry. Moreover, there is little question that persuading people to make healthier food choices would provide substantial (public) health effects.

Functional foods have become feasible thanks to the enormous progress in the life sciences. Unfortunately, many functional food products developed from scientific opportunity meet poor market acceptance (Hilliam, 1998; Wennström, 2000). One reason for this poor market performance is that the development and marketing of functional foods differs fundamentally from traditional foods (Heasman & Mellentin, 2001). Even though there is increasing scientific evidence that some food components have beneficial physiological and psychological effects over and above the provision of the basic nutrients, the development of effective persuasive health claims and successful marketing of functional foods has proven to be rather difficult.

In the market place, food products that are positioned on a health platform exist in various forms (ranging from

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content claim to disease risk claims), product categories and communication formats (see e.g. Bradbury, Lobstein, & Lund, 1996; Caswell, Ning, Liu, & Mojduszka, 2003; Parker, 2003). Despite the fact that the content and communication format of health claims are (increasingly) restricted by legal constraints and scientific substantiation requirements, food companies still have several degrees of freedom in terms of (1) which health claims they focus on, (2) through which food product the benefit is being delivered, and (3) the specific way in which the health claim is communicated.

Despite the strategic importance of these three issues, there is surprisingly little scientific research available to support food companies in making these decisions. For example, besides some general rankings of most popular health claims and health concerns (e.g. Young, 2000), little is known about which combinations of health claims and food carriers are most compelling to consumers. Previous research (e.g. Bech-Larsen & Grunert, 2003; Roe, Levy, & Derby, 1999) shows that the evaluation of health claims is partly determined by healthiness perceptions of the base product which would suggest that (some) health claims combine better with some food products. Also, the popular statement in food industry seems to be that health claims on foods that emphasize the positive contributions to life (referred to as life marketing in Euromonitor, 2000) are preferable over food claims that emphasize disease (referred to as death marketing in Euromonitor, 2000) as focal point (see also Coussement, 2000). Yet, framing research in the health area (e.g. Krishnamurthy, Carter, & Blair, 2001; Levin, Schneidner, & Gaeth, 1998) paints a much more complicated picture, suggesting that it depends on contextual (Rothman & Salovey, 1997) and personality factors (e.g. Aaker & Lee, 2001). In other words, this literature is far from consistent suggesting a need for more systematic studies in these areas.

Through two studies, the aim of this paper is to contribute to filling this information gap. Specifically, in a more exploratory context, the first study examines the extent to which consumers perceive specific health claims appropriate with particular food products. The second study extends this to examine how consumer responses to health claims are affected by alternative communication formats, namely whether the claim is defined in an enhanced function format versus a disease risk reduction format. The study looks into selective contextual (disease state) and personality (regulatory focus) determinants of health claim perception.

Study 1: health claim-food product compatibility

Previous research (e.g. Jonas & Beckmann, 1998; Poulsen, 1999) has suggested that the acceptance of functional foods depends on the basic product that serves as carrier for the functional ingredient and/or health claim. However, empirical studies regarding the most appropriate carriers for health claims are scarce and the results are mixed. In a study on the healthiness of products as carriers for functional ingredients (rather than health claims), Bech-Larsen and Grunert (2003) provide some insight in the issue. They explored three enrichment conditions (no enrichment condition, omega-3s, and oligosaccharides) for three different products (orange juice, flavored yoghurt, spread). They found that the two enrichment conditions were seen as less healthy for juice and flavored yoghurt, but quite healthy for spreads. The authors suggested as explanation that in general spread is perceived as a somewhat unwholesome product which could benefit from nutritional improvement to a larger extent than juice and yoghurt, which are perceived as inherently wholesome already. Their results may indicate that consumers in general find enrichment of 'non-healthy' foods more justified than enrichment of foods, which are perceived as healthy per se. Other studies, however, point in the opposite direction. Balasubramanian and Cole (2002) found that consumers' search for nutrition information in a given food category depends on how they perceive that category. Consumers may ignore nutrition information for fun foods such as candy because these foods meet hedonistic (as opposed to health-related) needs. Cereal bars and other snack products are often seen more as treats and therefore as less serious delivery mechanism. Consumers see products that are intrinsically healthy—such as yoghurt, cereals, bread and juice—as credible carriers of functional messages. For example, Poulsen (1999) found that attitudes towards enrichment were generally more positive when the base product already contains the enriched substance (like calcium in milk). Roe et al. (1999) found a similar effect for the perception of healthfulness of functional foods. Prior beliefs about product healthfulness appear to override claim information.

Overall, the research evidence is limited and inconsistent and what is available is based on selective claim-product combinations only. The first study is of an exploratory nature with the purpose to explore food and health claim compatibility more comprehensively and with a broader range of dependent variables. For that purpose, we reanalyzed existing data on 10 health claims systematically varied with 10 food products. These 100 functional food examples were assessed by consumers on attractiveness, credibility and uniqueness in addition to trial intention.

Methods

For the purpose of this study, we reanalyzed data from Van Kleef, Van Trijp, Luning, and Jongen (2002), from which insight into claim-product compatibility was not previously reported.

Participants

Dutch consumer respondents were recruited and selected on the basis that they considered health aspects of foods as

Table 1
Selected health claims and carriers

Selected health claims	Selected carriers
1. Protects against damage to skin from UV-irradiation	1. Brown bread
2. Gives extra energy	2. Bar of chocolate
3. Helps maintaining healthy cholesterol levels	3. Chewing gum
4. Helps keeping a youthful appearance	4. Margarine
5. Strengthens the natural defence of the body against frequently occurring diseases (like a cold)	5. Meat replacer (like vegetarian burger or stir fry mix)
6. Reduces the risk of certain types of cancer	6. Pills
7. Reduces the risk of osteoporosis	7. Ice-cream
8. Reduces the risk of dementia	8. Soup
9. Reduces the risk of heart diseases	9. Tea
10. Reduces stress	10. Yoghurt

an important criterion in their grocery shopping. All respondents had the primary responsibility for grocery shopping in their households. The final sample ($n=50$) for this exploratory study included 27 females and 23 males with an average age of 35.1 (SD = 9.3). Data were collected by a professional market research agency.

Stimuli

For the purpose of this study, functional foods are defined as concepts consisting of two dimensions: carriers (e.g. food products or pills) and health claims (e.g. 'reduces the risk of heart diseases'). Based on an extensive survey of literature and interviews with experts (i.e. director food market research agency, and two nutritionists), 10 instances were selected for the dimensions health claims and carriers (Table 1). The set of products was chosen to reflect a diverse set of carriers for health claims. To not narrow down too much, we also included health claims currently not yet legally allowed.

Procedure

Systematically varied functional food concepts were offered to respondents as so-called mini-concepts (cf. Durgee, O'Connor, & Veryzer, 1998) of two dimensions (carrier × health claim), resulting in a set of 100 health claim–carrier mini-concepts. For example, a mini-concept was described as 'yoghurt, which helps to maintain a youthful appearance'. In this way, a large and diverse set of functional food mini-concepts was obtained, some available in the market place, but most of them were hypothetical concepts (Fig. 1). Note that we have not systematically varied the functional ingredient to avoid incompatibilities and too technical information. The concepts all indicated only that this involved products 'with an added active ingredient'.

Prior to data collection, a small pre-test was conducted to test the phrasing of the questions and the length of the task. Consumer data collection took place at the central test facility of a Dutch market research agency. Respondents' ratings were given on five-point bipolar agree–disagree scales. All mini-concepts, displayed in verbal and visual format, were randomly presented on a computer screen. The entire task was randomly divided over two sessions, which took place at separate days (to avoid tiredness).

Evaluative measures

All functional foods mini-concepts were rated on four dependent measures. Respondents were asked to express the extent to which they considered a particular mini-concept as attractive. Credibility was measured by requesting respondents to indicate the degree to which they considered a mini-concept as credible. The uniqueness was measured by asking respondent to what extent they found the mini-concept 'new and different'. Attractiveness, credibility and uniqueness were measured on 5-point scale with end-points labeled 'not at all attractive/credible/new and different' to 'very attractive/credible/new and different'. Finally, consumers trial intention was measured by asking 'would you

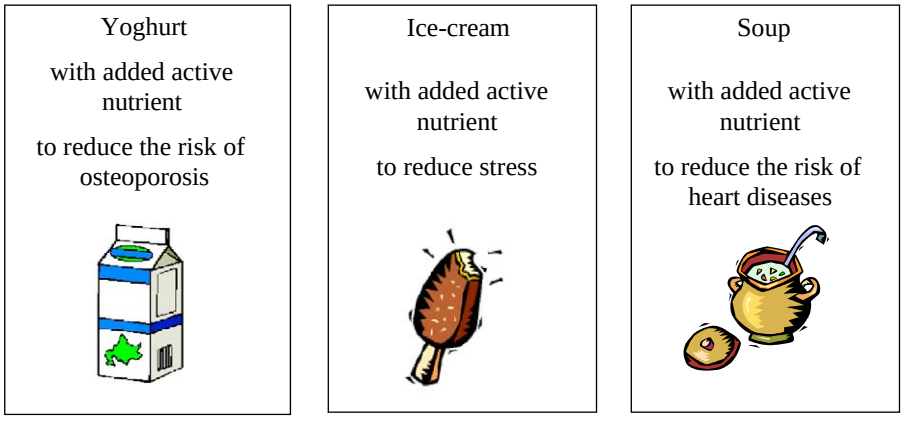

Fig. 1. Examples of mini-concepts presented to consumers.

like to try this food product?' on a 5-point scale, anchored by 'absolutely not' and 'absolutely'.

Data analysis

Consumer perceptions of attractiveness, newness and credibility are regarded as important choice criteria underlying 'intention to try'. Through regression analysis it was determined how the three variables contribute to consumers' intention to try the mini-concept. The reported standardized regression coefficients allow for a direct comparison between coefficients concerning their relative explanatory power of the dependent variable. In addition, correlations were used to assess the association between the variables. Analysis of variance was applied to respondent's ratings to calculate the main effects of health claim and carrier, and also the interaction between health claim and carrier. Student–Newman–Keuls multiple range tests were applied to examine differences between means.

Results

Determinants of consumers' intention to try functional foods

The regression analysis revealed that consumers' intention to try a functional food is driven by its attractiveness ($\beta=0.67$, $p<0.001$), credibility ($\beta=0.21$, $p<0.001$), and uniqueness ($\beta=0.11$, $p<0.001$). Together these three explanatory variables account for 66% of the variation in 'intention to try'. Bivariate correlations with 'intention to try' confirm that attractiveness drives intention to try ($r=0.79$, $p<0.01$) with smaller contributions for credibility ($r=0.52$, $p<0.01$) and uniqueness ($r=0.24$, $p<0.01$). Interestingly, the credibility of a functional food concept correlates negatively with its uniqueness ($r=-0.11$, $p<0.01$), suggesting that consumers tend to evaluate new concepts as less credible.

Analysis of variance (ANOVA) for each of the four consumer measures as dependent variables revealed that the main effects of health claim and carrier are significant on all four consumer measures (Table 2). For 'intention to try', the health claim is the main driver, while perceptions of 'uniqueness' are driven primarily by the carrier to which the health claim is attached. Perceptions of intention to try and attractiveness follow a main effects model without interactions between the health claim and the carrier. Small, but statistically significant two-way interactions were found for 'credibility' and 'uniqueness', which indicates that certain combinations of health claims and carriers were evaluated as more/less credible and unique than would be expected from the separate health claim and carrier evaluations.[1]

Table 2
Results ANOVA for 'intention to try', 'attractiveness', 'credibility', and 'uniqueness'

	Intercept	Health claim	Carrier	Health claim×carrier
Intention to try	805.0*	26.5*	6.1*	0.9 (NS)
Attractiveness	1060.1*	16.9*	12.3*	0.9 (NS)
Credibility	168.8*	30.9*	16.7*	2.9*
Uniqueness	1752.2*	4.3*	11.7*	1.6**

*$p<0.001$, **$p<0.05$.

Table 3
Attractiveness and intention to try of 10 health claims and 10 carriers measured as part of mini-concept (mean and standard deviation)

	Mean ratings (SD)	
	Attractiveness	Intention to try
Health claims		
Reduces the risk of heart diseases	3.47 (1.39) a	3.29 (1.41) a
Reduces the risk of certain types of cancer	3.44 (1.41) a	3.13 (1.44) a
Helps maintaining healthy cholesterol levels	3.43 (1.36) a	3.34 (1.39) a
Gives extra energy	3.38 (1.40) a	3.29 (1.43) a
Reduces the risk of osteoporosis	3.36 (1.36) a	3.22 (1.43) a
Strengthens the natural defense of the body against frequently occurring diseases (like a cold)	3.33 (1.42) a	3.25 (1.43) a
Reduces stress	3.14 (1.47) b	2.94 (1.43) b
Reduces the risk of dementia	2.96 (1.40) c	2.60 (1.40) c
Helps keeping a youthful appearance	2.91 (1.42) c	2.55 (1.49) c
Protects against damage to skin from UV-irradiation	2.84 (1.46) c	2.70 (1.48) c
Carriers		
Yoghurt	3.59 (1.33) a	3.33 (1.39) a
Margarine	3.48 (1.35) a,b	3.15 (1.43) a,b
Brown bread	3.34 (1.38) b,c	3.14 (1.44) a,b
Pills	3.33 (1.44) b,c	2.96 (1.40) b,c
Tea	3.25 (1.43) c,d	3.08 (1.44) b,c
Bar of chocolate	3.15 (1.44) c,d,e	3.00 (1.50) b,c
Soup	3.08 (1.41) d,e	2.98 (1.43) b,c
Ice-cream	3.05 (1.50) d,e	2.94 (1.55) b,c
Chewing gum	3.04 (1.49) d,e	2.91 (1.53) b,c
Meat replacer	2.96 (1.38) e	2.82 (1.43) a

a,b,c,d,e mean values sharing the same letter within a column are not significantly different ($p=0.05$).

Given the absence of significant interactions between health claims and carriers, Table 3 reports the means and standard deviations for 'attractiveness' and 'intention to try' separately, together with the Student–Newman–Keuls multiple comparisons tests. Health claims relating to disease conditions (e.g. heart disease, cancer, cholesterol, osteoporosis) were rated as more attractive than the more psychologically (stress, dementia) and appearance-related (youthfulness, skin protection) benefits. The delivery of extra energy and natural defense are also well received by consumers both in terms of attractiveness and intention to try. Margarine and yoghurt feature as attractive carriers for functional foods, much more so than the indulgence-type products such as chewing gum, ice cream and chocolate. Meat replacers are received very poorly as functional food carrier.

[1] Specific data about the nature of interactions between health claim and carrier regarding credibility and uniqueness can be obtained from the first author.

Discussion

Despite its exploratory nature, this study has yielded two important insights into the market of functional food positioning. First, consumers' willingness to try a functional food is driven by more than its attractiveness. The perception of the credibility of the functional food also significantly enhances the intention to purchase. Likewise, the uniqueness of the functional food increases the intention to purchase, although to a lesser extent.

Second, the lack of significant interaction between health claim and carrier for attractiveness and trial intention indicates that in their value perceptions of functional foods consumers consider the contributions of health claims and carriers independently from each other. This suggests substantial flexibility in functional food design in that popular health claims can be applied to several (popular) food products. It is not so that the attractiveness of certain health benefits depends on the carrier to which the claim is applied. Popular health claims are those that address relevant disease states which is in accordance with results of previous studies showing important health concerns of consumers or top rankings of health claims in different countries (Hilliam, 1998; Sloan, 2000). To some extent these findings may reflect familiarity with what is available in the market place, but the presence of cancer as desirable health benefit (not currently marketed) suggests that findings extend beyond sheer familiarity. However, it is important to note that although there is an increasing interest in functional foods, which influence appetite, satiety, vitality, stress and other states of mood and well-being (Verschuren, 2002), not many products are yet available in the Dutch market.

Highly ranked carriers include yoghurt, margarine, brown bread and pills. The convenience aspects of these products may be particularly important for consumers, since the first three carriers are often substantive part of the daily diet (Baltas, 2001). Pills are also highly valued carriers for health claims, probably because of the medical and curative associations consumers have with this carrier. Again, this finding may reflect availability in the market place as yoghurt, margarine and supplements feature well in the functional food supply (Hilliam, 2000; Menrad, 2003). Although carriers and health claims contribute independently to perceived attractiveness and intention to try, perceptions of credibility and (to lesser extent) uniqueness are dependent on the specific claim–carrier combination. For credibility this is in line with Poulsen (1999), who reported similar findings.

Overall, this study has identified that consumers tend to prefer functional food concepts, which primarily communicate disease-related health benefits in carriers that have an image or history in healthiness. However, this exploratory study has a number of limitations that prevent us from: (1) exploring the differences as to how the claim is being communicated, as these were not systematically varied in Study 1, and (2) the effect of relevant individual difference factors in claim perception, as the exploratory sample was too small to allow such analyses. These two issues will be explored in Study 2 with larger sample size and systematic variation in whether the claims are communicated in terms of a gain for the consumer (i.e. enhance function format) versus the reduction of loss (i.e. disease risk reduction format).

Study 2: the impact of health claim framing on consumer evaluation

Study 1 explored health claim perceptions across systematically varied combinations of claimed benefits and carrier types. Study 2 focuses more in depth on one of these carriers (yoghurt) and systematically varies the way in which specific health benefits are being communicated to the consumer. Specifically, two more physiologically oriented claims (related to heart disease and osteoporosis) and two more psychologically oriented food claims (stress and lack of energy) are expressed in enhance function format as well as disease risk reduction format. Also, it includes the individual difference variable of 'regulatory focus' (e.g. Higgins, 1997) that has recently received considerable attention in the health framing literature (e.g. Lee & Aaker, 2004; Shiloh, Eini, Ben-Neria, & Sagi, 2001). Finally, we include the health status of the respondent to explore how this contextual variable affects perceptions of health claims.

This design allows us to explore three important research questions with respect to the framing of health claims. First, are enhanced function claims indeed more appealing than disease risk reduction health claims, as the popular belief in food industry seems to be? Second, does this preference change on the basis of personal relevance of the health claim (e.g. Maheswaran & Meyers-Levy, 1990) in that reduced disease risk claims are more appealing when they relate to health problems that one is actually experiencing him/herself? Third, does an individual's regulating motivational system impact on the evaluation of health claims?

Theoretical background and hypotheses

The extent to which consumers find health claims appealing depends on a number of factors, including the content and format of the message (Mazis & Raymond, 1997). For legislative purposes, a distinction is made between 'enhanced function' health claims and 'reduced disease risk' health claims (Diplock et al., 1999; Ovesen, 1999). 'Enhanced function' claims relate to the consumption of a food or food component that contributes beneficially to health (e.g. 'improves cognitive performance'). 'Reduced disease risk' claims relate to the consumption of a food or food component that helps to

reduce the risk of a specific disease or otherwise undesirable health condition (e.g. 'reduces risk on heart diseases'). As such, health claims may be formulated to focus attention on its potential to provide a benefit or gain or on its potential to prevent or avoid a loss. Both frames should enhance the evaluation of the issue, but the question is which type of goal has the greater persuasive impact. The most common finding in literature is that, in the context of attribute framing, people respond more favorably to positive than negative framing (Krishnamurthy et al., 2001; Levin et al., 1998). Hence, we expect that enhanced function claims are more appealing to consumers, because they evoke positive associations from memory, which make them being rated more positively by consumers. Reduced disease risk claims activate negative information in memory. Although they provide consumers with the opportunity to maintain their present healthy status, they confront consumers with illnesses and problems they might fall victim to, which makes them less appealing. Hence, in line with the popular belief in food industry, we expect that enhanced function health claims will have a greater persuasive impact than reduced disease risk claims:

H1 Enhanced function claims are more appealing to consumers than reduced disease risk claims

Personal illness

Although we expect that on average consumers find enhanced function claims more appealing, it has been found that consumers look at health claims differently when a change occurs in their health status. Personal experience with a health issue makes people more aware and involved and hence influences one's receptiveness to information addressing those relevant health issues. For example, a family history of cancer may lead people to be more susceptible for health claims relating to cancer. In general, the more involved people are, the more motivated they are to pay attention to messages and spend more cognitive effort processing the message (Petty & Cacioppo, 1981). When people feel vulnerable, they tend to process health information more carefully. In contrast, individuals without health problems typically engage in defensive tendencies to avoid health messages. Block and Keller (1995) found that when individuals process information in-depth, negative frames are more persuasive than positive frames. Similarly, Maheswaran and Meyers-Levy (1990) found that negative information is more effective than positive information when people thoroughly evaluate the information. Hence, we expect that consumers who evaluate a personally relevant health claim, they are more likely to prefer reduced disease risk claims.

H2 Reduced disease risk claims are more appealing to consumers than enhanced function claims when the health claim involves a personal relevant illness

Regulatory focus

The regulatory focus theory (Higgins, 1997) distinguishes between two most important categories of desired goals that individuals strive to achieve: those that relate to achieving a desired end-state (termed promotion goals) and those that relate to avoiding an undesired end state (termed prevention goals). According to the regulatory focus theory, promotion versus prevention focus are fairly stable personality characteristics although to some extent under the control of contextual requirements (i.e. state properties). Individuals with a promotion focus will quite consistently regulate their behaviors towards positive outcomes and those with a prevention focus will regulate their behaviors away from negative outcomes. The predominant focus of an individual in life impacts on the emotions experienced, perceptions of value and more (Higgins, 2000). Differences in the predominant focus of individuals are generally caused by differences in upbringing (Higgins, 1989). Importantly, Higgins, Idson, Freitas, Spiegel, and Molden (2003) found that people are especially sensitive to information that is consistent with their dominant regulatory focus. When people pursue goals in a strategic way that conform to their regulatory focus, they feel right about what they are doing. This experience of correctness and importance is transferred to the subsequent evaluation of a particular object, thereby increasing its perceived value (Camacho, Higgins, & Luger, 2003; Higgins et al., 2003). Enhanced function claims emphasize the gain to be obtained, while reduced disease risk claims emphasize the prevention of pain. This would imply that people with a predominant promotion focus should prefer enhanced function-framed health claims and people with a predominant prevention focus should prefer reduced disease risk-framed health claims. Hence,

H3A Enhanced function claims will be more appealing to persons with a predominant promotion focus

H3B Reduced disease risk claims will be more appealing to persons with a predominant prevention focus

Methods

Participants

The study was conducted among 124 adults (42 males, 82 females). As people age, they are more likely to experience health problems themselves or someone in their close environment (one of our independent variables). Participants were recruited through choral groups to ensure sufficient representation of older participants. Participants aged 27–80 years with an average of 48.9 years (SD = 10.2).

Experimental design

The overall design of this study was a two (frame type: enhanced function versus reduced disease risk) by four (type of health benefit: cardiovascular diseases, osteoporosis,

Table 4
This study's health claims framed as enhanced function or reduced disease risk health claim

Health problem	Enhanced function health claims	Reduced disease risk health claims
Heart diseases	Product name®, strengthens your heart. Drink product name®, and get a healthier heart-function!	Product name®, lowers the risk of cardiovascular diseases. Drink product name®, and prevent clogged arteries!
Osteoporosis	Product name®, strengthens your bones. Drink product name®, and get extra strong bones!	Product name®, lowers the risk of osteoporosis. Drink product name®, and prevent frail bones!
Stress	Product name®, brings you body in a total relaxed state. Drink product name®, relax and afterwards you can live your life to the fullest!	Product name®, helps to prevent the negative consequences of stress. Drink product name®, prevent restlessness!
Lack of energy	Product name®, increases your energy level. Drink product name®, and get more from life!	Product name®, helps to prevent fatigue. Drink product name®, and prevent listlessness!

stress, fatigue) mixed design. Two physiologically-based diseases (cardiovascular disease and osteoporosis) and two psychologically-based health problems (stress and fatigue) are included. Each health benefit was expressed in an enhanced function and reduced disease risk frame (Table 4). Each participant responded to four of these hypothetical health claims: one health claim frame for each health benefit, in total two enhanced function-framed health claims and two reduced disease risk-framed health claims. To make the evaluation task more realistic for consumers, all health claims were tested in the context of yoghurt as an appropriate (see Study 1) base product stimulus. Also, to enhance realism all functional food product concepts were presented with a hypothetical brand name which was systematically varied across research conditions. As brand name did not affect consumer evaluations, it is therefore not discussed any further. In Table 4, the brand name variable is reported as Product name®.

Evaluative measures

Participants were asked to rate the extent to which they found the yoghurt concept attractive, convincing and credible. All three items were assessed on 7-point scale with end-points labeled 'absolutely not attractive/convincing/credible' and 'absolutely attractive/convincing/credible'. Similarly, one item assessed participant's intention to buy the product by asking the question 'Can you imagine yourself buying his drink?' to be answered on a 7-point scale with end-points labeled 'absolutely not' to 'absolutely'.

Measurement predominant focus

Respondents' dominant focus was measured through a shortened version of the Lockwood, Jordan, and Kunda (2002) scale. To reduce the burden for respondents, six items were selected from both the promotion and prevention subscales (Table 5). Respondents indicated the extent to which they endorse items relevant to promotion goals (e.g. 'I frequently imagine how I will achieve my hopes and aspirations'; 'Overall, I am more oriented toward achieving success than preventing failure') and items relevant to prevention goals (e.g. 'In general, I am focused on preventing negative events in my life'; 'I am anxious that I will fall short of my responsibilities and obligation'). All items were rated on the extent to which they reflected the participants own behavior on a 7-point scale with end-points labeled 1 (fully disagree) and 7 (fully agree). Factor analysis with varimax rotation was applied to confirm the two-dimensional structure of the scale. As Table 5 shows items

Table 5
Factor loading pattern (after varimax rotation) and internal reliability for prevention and promotion subscales

	Factor loadings		Cronbach's alpha
	Factor 1	Factor 2	
Predominant promotion focus			0.75
I frequently imagine how I will achieve my hopes and aspirations	0.680	0.248	
I typically focus on the success that I hope to achieve in the future	0.679	0.154	
I see myself as someone who is primarily striving to reach my 'ideal self'—to fulfill my hopes, wishes, and aspirations	0.768	0.061	
In general, I am focused on achieving positive outcomes in my life	0.558	−0.152	
I often imagine myself experiencing good things that I hope will happen to me	0.615	0.261	
Overall, I am more oriented toward achieving success than preventing failure	0.640	−0.269	
Predominant prevention focus			0.70
In general, I am focused on preventing negative events in my life	0.157	0.536	
I am anxious that I will fall short of my responsibilities and obligations	−0.038	0.631	
I see myself as someone who is primarily striving to become the self I 'ought' to be—fulfill my duties, responsibilities, and obligations	0.202	0.616	
I frequently think about how I can prevent failures in my life	0.273	0.722	
I often imagine myself experiencing bad things that I fear might happen to me	−0.068	0.707	
I am more oriented toward preventing losses than I am toward achieving gains	−0.190	0.531	

loaded properly on the subscales and both subscales exhibited adequate (Nunnally, 1978) internal reliability (i.e. Cronbach's alpha 0.70 and above).

Regardless of the strength of each participant's promotion and prevention goals, it is important to determine the relative strength of each participant's promotion and prevention goals. The relative strength may determine which regulatory concerns will gain salience and drive behavior (Lockwood et al., 2002). In accordance to Lockwood, Jordon and Kunda, predominant regulatory focus was determined by subtracting scores on the prevention goal subscale from scores on the promotion goal subscale. Scores higher than zero on this measure reflect relatively greater promotion than prevention focus. On average, promotion goal strength (mean = 4.21, SD = 0.92) was greater ($t = 5.9$; $p < 0.01$) than prevention goal strengths (mean = 3.58; SD = 0.97). Scores equal to zero on this measure were removed from analysis (four respondents). As a result, 72% of the respondents were classified as predominantly promotion focused and 28% of the respondents as predominantly prevention focused.

Measurement of personal illness

At the end of the questionnaire, respondents were asked whether they or someone in their close environment suffer from lack of energy, osteoporosis, stress or heart diseases. A dummy variable was created indicating whether the respondent's health claim rating concerned a personal relevant illness or not. Of all respondents, 42% indicated that they or someone in their close environment suffered from lack of energy. For stress, heart diseases and osteoporosis, percentages were 37, 24 and 19%, respectively.

Data analysis

Analysis of variance was applied to the four consumer evaluation measures separately: (1) convincing, (2) attractive, (3) credible, and (4) buying intention, with both the main effects and the two- and three-way interactions included.

Results

Table 6 shows the results from the analysis of variance for each of the included factors (benefit type of claim, framing claim, dominant focus respondent and relevant illness of respondent). Results in this table reveal that the largest contributions come from the main effects of benefit type and whether or not a health claim relates to a personally relevant health problem and to lesser extent from the benefit × framing interaction. The type of benefit being claimed has a strong effect on all four consumer measures (all Fs(1,123) > 4.96, $p < 0.01$). The osteoporosis health claim has the highest mean ratings on all consumer measures (ranging from $M = 3.56$ (SD = 1.90) for purchase intention to $M = 4.00$ (SD = 1.61) for convincing). This may reflect the fact that the sample was composed of somewhat older respondents.

H1: reduced disease risk claim versus enhanced function claims

Contrary to Hypothesis 1, it was found that overall reduced disease risk-framed health claims have significantly higher purchase intention ratings than enhanced function-framed health claims ($F(1,123) = 3.84$, $p = 0.05$). The main effect of health claim framing was not significant for attractiveness ($F(1,123) = 0.02$, $p = 0.88$), credibility

Table 6
Analysis of variance of evaluative measures on key factors

	Attractiveness (df in brackets)		Credible (df in brackets)		Convincing (df in brackets)		Willingness to buy (df in brackets)	
	F	*p*	*F*	*p*	*F*	*p*	*F*	*p*
Main effects								
Benefit type of claim	4.96	0.002	10.18	<0.001	9.65	<0.001	9.38	<0.001
Framing claim	0.02	0.883	2.46	0.117	0.24	0.623	3.84	0.051
Dominant focus respondent	0.006	0.936	3.27	0.071	1.24	0.266	1.00	0.319
Relevant illness	12.68	<0.001	2.48	0.116	11.07	0.001	11.81	0.001
Two-way interaction effects								
Benefit type × framing claim	2.59	0.052	4.89	0.002	3.40	0.018	4.09	0.007
Benefit type × dominant focus respondent	0.30	0.824	1.04	0.410	0.36	0.783	0.20	0.895
Benefit type × relevant illness	0.27	0.849	0.31	0.821	0.31	0.819	0.20	0.895
Framing claim × dominant focus respondent	0.08	0.773	0.85	0.357	0.37	0.545	1.64	0.201
Framing claim × relevant illness	0.22	0.643	0.03	0.860	0.08	0.781	0.68	0.409
Dominant focus respondent × relevant illness	3.54	0.061	0.13	0.718	2.30	0.130	1.02	0.314
Three-way interaction effects								
Benefit type × framing claim × dominant focus respondent	1.12	0.342	0.76	0.519	2.07	0.104	2.06	0.104
Benefit type × framing claim × relevant illness	0.92	0.429	1.60	0.189	3.31	0.020	1.24	0.295
Benefit type × dominant focus respondent × relevant illness	0.33	0.802	1.02	0.384	0.79	0.503	0.49	0.690
Framing claim × dominant focus respondent × relevant illness	0.24	0.627	0.00	0.997	0.12	0.726	0.56	0.456

($F(1,123)=2.46$, $p=0.12$) and convincing ($F(1,123)=0.24$, $p=0.62$). Rather, the impact of framing depended on the health benefit described in the claim (all Fs$(1,123)>2.59$, $p\leq 0.05$). An examination of the means of the separate benefit types reveals that reduced disease risk-framed *cardiovascular disease* claims were rated higher on all consumer measures than enhanced function-framed cardiovascular disease claims ($p<0.05$), whereas reduced disease risk-framed energy claims were rated lower on all consumer measures than enhanced function-framed energy claims ($p<0.05$).

H2: personal relevant illness

Overall, health claims relating to a personally relevant illness were considered more attractive ($F(1,123)=12.68$, $p<0.001$) and convincing ($F(1,123)=11.07$, $p<0.001$) and had higher purchase intention ratings ($F(1,123)=11.81$, $p<0.001$) compared to health claims not relating to a personally relevant illness. Contrary to Hypothesis 2 regarding framing and personal relevancy of evaluated health claims, reduced disease risk claims were not rated higher than enhanced function health claims when the evaluation involved a personal relevant illness (all Fs$(1,123)<0.68$, NS). However, the three-way interaction between benefit type, framing claim and relevant illness was significant for convincing ($F(1,123)=3.31$, $p=0.02$). In case a health problem was considered to be personally relevant, a reduced disease risk frame relating to stress and cardiovascular disease was more convincing than an enhanced function frame, whereas lack of energy was more convincing in an enhanced function frame compared to reduced disease risk frame.

H3: predominant focus measurement

Overall, individuals with a predominant promotion focus give higher ratings when evaluating health claims, although this difference is only (marginally) significant for 'credible' ($F(1,123)=3.27$, $p=0.07$). In contrast to Hypothesis 3, a health claim is not more appealing when it matches the regulatory focus of respondents (all Fs$(1,123)<1.64$, NS). For cardiovascular diseases, the reduced disease risk frame is more appealing, regardless of predominant focus of respondent. An exception is the health claim relating to stress. Although both frames are in general equally assessed, predominant prevention focused participants shift their preference to the reduced disease risk frame. The opposite effect, however, occurs for lack of energy. Here, respondents find enhanced function framed claims more appealing even though their predominant focus is prevention.

Discussion

Study 2 aimed to extend Study 1 to include alternative framing formats and a selection of relevant individual difference variables. Health claim perceptions primarily differ to the extent that they are personally relevant to the consumer in addressing an experienced disease state. In line with Study 1, physiology-based benefits are considered more attractive, credible, convincing and compelling to induce trial, and particularly so for osteoporosis. Framing is important, but its effect differs by health benefit to the extent that disease risk reduction framing is considered more attractive for heart diseases while enhanced function formats are preferred for low energy levels. We find no strong effects for consumers' regulatory focus. Promotion focused consumers do not respond more positively to enhanced function claims as suggested by one of our hypotheses.

General discussion and conclusion

In the context of functional foods, this study was motivated by the need to strengthen the scientific underpinning of the managerial decisions as to (1) which health benefit to claim, (2) with which product category, and (3) in which communication format. It also explored selective individual difference variables. Overall (see also Sections 2.3 and 3.4), our results suggest that physiology-based health benefits (e.g. heart health, osteoporosis, cancer) are preferred over the 'softer' psychology/behavior-based benefits (e.g. stress, lack of energy, appearance). This may be contradicting common belief in food industry, but is generally in line with the health framing literature (Levin et al., 1998) stating that negative information is more informative, attracts more attention and stimulates deeper information processing than positive information. Our finding that claims are best received when attached to products with a positive health image and health claim history (such as yoghurt and margarine) are most likely due to existing marketing activity in these areas. These product categories have invested lots of marketing effort in functional food development and communication and this seems to pay off. Other product categories have a longer way to go in educating consumers that they can be functional food platforms.

We do not find evidence for the hypothesized superiority of enhanced function claims over disease risk reduction claim formats. The preferred framing depends on the type of benefit being claimed. Enhanced function claims are preferred for energy levels, whereas reduced risk reduction formats are preferred for heart disease. Also, we do not find evidence that promotion focused respondents prefer enhanced function claims in general. Again, this depends on the benefit being claimed. This finding contradicts findings reported by Aaker and Lee (2001) and Lee and Aaker (2004), but this may be due to the fact that we have exploited more realistic claim formulations than they used in their studies.

In sum, this study has progressed the understanding of consumers' health claims perceptions in several areas, but not supported our theoretical expectations in other areas. More scientific work is certainly justified within this

strategically important yet poorly understood area. Such future studies should address some of the limitations inherent in this study, such as relatively small and selective samples. Extensions to other target groups may further refine these insights. Further extensions may include other individual difference measures beyond regulatory focus and personal illness as determinants of health claim perceptions. Finally, regulatory focus may be a concept worth exploring further in the food choice behavior area, which may result in a food-specific application of this relevant individual difference characteristic.

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