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Courtney M. Droms
Butler University, cdroms@butler.edu

Rebecca Walker Naylor

Kelly L. Haws

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Eating with a Purpose: Consumer Response to Functional Food Health Claims in Conflicting Versus Complementary Information Environments

Rebecca Walker Naylor, Courtney M. Droms, and Kelly L. Haws

Marketers of food products have recently introduced a variety of “functional foods” that promise consumers improvements in targeted physiological functions. However, despite the proliferation of functional food health claims promising more than basic nutrition, little is known about consumer responses to these claims, particularly in information environments in which inconsistent information may be available about the efficacy of a particular functional ingredient. Across two studies, the authors demonstrate that consumers with lower health consciousness are particularly sensitive to conflicting information about the validity of a functional food health claim; specifically, the presentation of conflicting (versus complementary) information significantly lowers their likelihood of choosing a functional over a nonfunctional food. In contrast, consumers with higher health consciousness do not reduce their likelihood of choosing a functional food when confronted with conflicting information. The authors demonstrate that this effect is driven by a confirmatory bias to believe the functional food health claim on the part of more health conscious consumers. The authors discuss implications for the successful marketing of functional foods and for public policy makers and consumers.

Keywords: functional foods, functional food health claims, health consciousness, confirmatory bias, Food and Drug Administration

Marketers of food products have recently introduced a variety of “functional foods” to the marketplace—foods that promise consumers improvements in targeted physiological functions, such as lowered cholesterol and improved digestive function (Diplock et al. 1999; Teinowitz 2006; Thompson 2007; Urala and Lähteenmäki 2004, 2007). For example, Dannon recently extended its yogurt line to include Dannon Activia yogurt, which contains *bifidus regularis*, a probiotic that can help regulate the digestive system by reducing long intestinal transit time. However, despite the potential benefits of consuming functional foods, little is known about consumer responses to functional food health claims. Furthermore, the often-conflicting information available about functional food health claims can lead to confusion about whether the

claims are believable. The Institute of Food Technologists (IFT) (2005) has found that many consumers obtain information about functional food health claims from the media (e.g., television, the Internet), which often provide conflicting claims about the health benefits of various functional food components. For example, the International Food Information Council’s (2006) Web site states both that “[a]n increasing body of evidence suggests beneficial effects of the antioxidants present in grapes, cocoa, blueberries, and teas on cardiovascular health, Alzheimer’s disease, and even reduction of the risk of some cancers” and that “[t]here still remains a lack of direct experimental evidence from randomized trials that antioxidants are beneficial to health.” Given this type of conflicting information, it is important for marketers and public policy makers to understand whether consumers believe functional food health claims for which conflicting information about the validity of the claim is available. In addition, it is important for marketers to know whether consumers’ beliefs in these claims affect their choice of a functional versus nonfunctional food.

Many questions about consumer response to functional foods remain unanswered, including questions about how functional food health claims should be labeled in the marketplace. Although considerable work has been done in the area of health claims in general since the passage of the Nutrition Labeling and Education Act (NLEA) (1990), little research has specifically focused on functional food health claims. Functional food health claims describe the role of

Rebecca Walker Naylor is Assistant Professor of Marketing, Fisher College of Business, The Ohio State University (e-mail: naylor_53@fisher.osu.edu). *Courtney M. Droms* is Assistant Professor of Marketing, Langdale College of Business, Valdosta State University (e-mail: cmdroms@valdosta.edu). *Kelly L. Haws* is Assistant Professor of Marketing, Mays Business School, Texas A&M University (e-mail: Khaws@mays.tamu.edu). The second and third authors contributed equally to this research and are listed alphabetically. The authors thank Terry Shimp and Paula Bone for their helpful comments on previous drafts of the article. Lauren Block served as associate editor for this article.

the nutrient or ingredient included in a functional food in providing a targeted physiological improvement. Most prior research has focused on more general health claims, addressing issues such as the believability, simplicity, and clarity of health claims (Calfee and Pappalardo 1991; Garretson and Burton 2000; Levy 1995; Mason and Scammon 2000; Roe, Levy, and Derby 1999; Wansink and Cheney 2005). In the current research, we build on this work and explore the impact of consumers' beliefs in functional food health claims on the choice of a functional food over a non-functional food by examining how these variables are affected by (1) consumers' health consciousness and (2) the presence of conflicting (versus complementary) information about the validity of the claim.

Public Policy and Functional Food Health Claims

Health Claims: A Brief History

Before the NLEA was passed in 1990, there were no formal guidelines to regulate health claims on product packages or in advertising. Indeed, 1988 marked the first formal recognition that diet played a role in certain chronic diseases. However, it was not until the passage of the NLEA that new regulations for voluntary health claims and nutrient content claims were introduced (Golan, Kuchler, and Mitchell 2000). Since the adoption of the NLEA, there has been a significant amount of research investigating consumer responses to the interplay between the Nutrition Facts panel and voluntary health claims on product packages (e.g., Ford et al. 1996; Garretson and Burton 2000; Ippolito and Mathios 1991; Roe, Levy, and Derby 1999). Research has also explored the changing patterns of how products carrying health claims are marketed from the pre- to post-NLEA period (e.g., Balasubramanian and Cole 2002; Caswell et al. 2003; Ippolito and Pappalardo 2002). However, since the NLEA's introduction, the Food and Drug Administration (FDA) has reexamined the health claims appearing in the marketplace and its policies governing these voluntary claims (which include functional food health claims). In 2003, the FDA provided interim industry guidance that proposed four levels of scientific certainty (ranging from "significant scientific certainty" to "extremely low scientific certainty") that should qualify the health claims that food products make.

However, despite this interim guidance, functional food health claims continue to be open for discussion primarily because (1) the FDA does not have a formal definition of functional foods and (2) various governmental and corporate groups have argued that such claims are governed by a range of regulations (from the regulations for conventional foods to the regulations for dietary supplements).

Functional Foods

Although the FDA does not have a formal definition or a specific regulatory rubric for conventional foods being marketed as "functional foods," it appears to accept a definition offered by the IFT, which defines functional foods as "foods and food components that provide a health benefit beyond basic nutrition (for the intended population)" (*Federal Reg-*

ister 2006, p. 62401). We define a functional food health claim simply as the claim that a food offers such a benefit, and we define functional foods simply as any product that carries a functional food health claim. Thus, unmodified whole foods, such as fruits and vegetables, represent the most basic form of functional foods. For example, functional food health claims can be made about broccoli, carrots, and tomatoes if the claims and associated marketing messages highlight that these foods are rich in the active components sulforaphane, beta carotene, and lycopene, respectively. However, not all groups consider these foods truly functional foods. Some groups (and some consumers) define the primary category of functional foods as modified foods that claim to have been fortified with nutrients or enhanced with phytochemicals or botanicals to provide specific health benefits (IFT 2005). Most new functional foods being introduced to the consumer market (e.g., Dannon's Activia yogurt with an added probiotic) fall into this category of functional foods. However, functional food health claims are not limited to new products. Cheerios, which has been produced since 1941, now bears a "Cheerios can reduce cholesterol" banner on the front of the box, a claim associated with the whole grain oats included in Cheerios (www.cheerios.com).¹

Functional Food Health Claims

In a large-scale consumer survey, Roe, Levy, and Derby (1999) find that health claims can increase perceptions of the healthfulness of food products and increase purchase intentions. Functional food health claims are the statements and claims made on packages and in advertisements about the specific health benefits that a functional food or food component provides (IFT 2005; Wansink, Westgren, and Cheney 2005). Prior research on health claims has shown that, in general, consumers find health claims to be useful, though they are often skeptical of such claims (Williams 2005). Though not always the case, functional food health claims are often made about ingredients (e.g., *bifidus regularis*) that may be unfamiliar to consumers. Functional food health claims are also typically longer and/or more complex than other types of health claims. Previous research has shown that, in general, consumers are unfavorably disposed to longer, more complex health claims (Williams 2005). Thus, the unfamiliarity of the ingredients involved and the length of the claims might lead consumers to be relatively more skeptical of functional food health claims. Therefore, a goal of our research (in addition to exploring beliefs in functional food health claims in conflicting versus complementary information environments) is to explore whether consumers are willing to try a product that makes a functional food health claim.

To do so, we first must distinguish functional food health claims from more general claims about health, such as "good for you," "healthy," and so forth. According to the FDA (2003), currently three general categories of claims can be made about food products. The first category is gen-

¹The FDA recently warned General Mills about the use of specific claims regarding the actual cholesterol-lowering effects of Cheerios. However, at the time of publication, the cholesterol banners remain prominently featured on Cheerios' packaging and Web site.

eral health claims, which are defined as claims that describe a relationship between a food, food component, or dietary supplement ingredient and reduction of the risk of a disease or health-related condition. For example, a permitted health claim could read “Diets high in calcium may reduce the risk of osteoporosis.” The second category is nutrient content claims, which were permitted by the NLEA of 1990. This category of claims contains characterizations of the level of a specific nutrient in a food product (e.g., “2 milligrams of calcium”). The third category of claims is structure/function claims, which describe the role of a nutrient or ingredient intended to affect normal structure or function in humans. For example, claims such as “Calcium builds strong bones” would be permitted as structure/function claims (FDA 2003).

Functional food health claims tend to combine aspects of these different types of claims, primarily the second and third categories. That is, the typical functional food health claim references the food, a specific ingredient it contains (often, but not always, an added ingredient, as is the case in a modified food), and a claim linking the specific ingredient to a health benefit beyond basic nutrition. For example, the functional food health claim made about Dannon’s Activia yogurt—“Activia with Bifidus Regularis is scientifically proven to help with slow intestinal transit” (www.activia.com)—is a combination of a nutrient content and a structure/function claim.

Because of the uncertainty about how to define functional foods and how to regulate functional food health claims, in late 2006 and early 2007, the FDA requested comments on how the agency should evaluate and label conventional foods marketed as functional foods under its existing legal authority (*Federal Register* 2006, 2007). To our knowledge, the FDA has yet to fully resolve this issue. The topic of functional food health claims and consumers’ beliefs in these claims is ripe for research aimed at understanding how consumers respond to such claims in an unclear regulatory environment (in which conflicting information about the validity of such claims is often available).

Consumers’ Response to Functional Food Health Claims

Despite the efforts of policy makers to educate consumers about health claims in general and, more recently, about functional food health claims, one of the main issues confronting all consumers in trying to determine whether to choose a food that makes a functional food health claim or one that does not is the conflicting reports in the media about what is or is not healthful (for a discussion of the “calcium quandary,” see Block and Peracchio 2006). For example, nutritionists and researchers have debated the merits of eggs since the 1970s. Initially, eggs were believed to be high in cholesterol, which leads to a high risk of coronary heart disease. However, over the past several years, researchers have found that the type of cholesterol in eggs (i.e., dietary cholesterol) does not have as much of an impact on plasma cholesterol (which is associated with a higher risk of coronary heart disease) as originally believed (Egg Nutrition Center 2006). In 2004, researchers also found that eggs contain lutein, which promotes eye health

and can prevent age-related muscular degeneration (Chung, Rasmussen, and Johnson 2004). Similar debates are likely to occur for many of the ingredients about which functional food health claims are made. That is, consumers may be unsure whether to believe a functional food health claim that a specific ingredient will truly deliver the health benefit promised. Although most of the ingredients used in functional foods are unlikely to prove harmful, conflicting reports may be found about the efficacy of these ingredients, calling into question not only belief in such claims but also whether it is worth consuming products that make functional food health claims. Conflicting reports about an ingredient’s efficacy (e.g., those cited previously for antioxidants) are even more likely to appear in an unclear regulatory environment.

Prior research has suggested that when people are presented with conflicting information, they allow the perceived inconsistency of the information to undermine its diagnosticity and then disregard the information when making a product choice (Lynch, Marmorstein, and Weigold 1988). However, Wansink and Huckabee (2005) argue that in the presence of conflicting health information, consumers have a confirmatory bias in how they interpret the information. Prior research has also demonstrated that consumers engage in biased processing of health information (e.g., Liberman and Chaiken’s [1992] investigation of a defensive bias in the processing of threatening health messages). How can these two seemingly conflicting research propositions be resolved? A central tenet of our research is that whether consumers (1) dismiss functional food health claims when presented with conflicting information about their validity or (2) rely on a confirmatory bias to believe functional food health claims even in the face of conflicting information depends on consumers’ level of health consciousness.

Health consciousness is an individual difference variable that assesses the degree to which a person plays an active role in maintaining his or her health (Gould 1988). Gould (1988) finds that more health conscious consumers tend to evaluate health claims more carefully (possessing both greater motivation to do so and perhaps an increased base of health-related knowledge from which to evaluate health claims). Gould also demonstrates that more health conscious people tend to be more open to unorthodox medical alternatives than less health conscious people, implying that highly health conscious consumers may be not only more motivated to think about health-related issues in general but also more likely to believe in the effectiveness of a variety of potential steps designed to improve a person’s health.

On the basis of this prior research, we propose that consumers who are more health conscious are less likely to discount information about functional food health claims in light of conflicting information about the claims’ validity, instead relying on a confirmatory bias when evaluating functional food health claims. In this case, a confirmatory bias involves a person’s tendency to seek out information that is consistent with a belief or hypothesis and to ignore or overlook information that is potentially inconsistent with that belief or hypothesis (e.g., that a functional food health claim is valid) (Davies 2003). Essentially, this bias is a form of motivated reasoning that causes people to attempt to arrive at the conclusion they desire, as long as they can pro-

vide seemingly rational justifications for their decisions (Kunda 1990). The inconsistent nature of the information environment surrounding health claims in general (Roe, Levy, and Derby 1999) and functional food health claims in particular provides opportunities for such rationalizations. Indeed, biased processing of health information is a relatively common occurrence. For example, Liberman and Chaiken (1992) find that when a threatening health message was personally relevant to a consumer, the consumer used defensively biased processing to discount the potentially threatening information.

In the context of the current research, highly health conscious consumers may be more willing to try functional foods (in the hopes that they gain the purported health benefit), even when it is not clear that the claim is fully valid, because such consumers are biased to interpret information in a way that they believe helps them manage and control their health (i.e., in a manner consistent with a functional food health claim). Thus, although highly health conscious people may be more likely to engage in extensive processing about a functional food health claim (e.g., Liberman and Chaiken's [1992] participants, who found the threatening health information to be personally relevant), they are also more likely to discount any information that is inconsistent with a functional food health claim (Gilovich 1983; Lord, Ross, and Lepper 1979) and may perceive ambiguous information about a claim as supporting it (Darley and Gross 1983). More health conscious consumers are less likely to view the functional food ingredient as being potentially nonbeneficial or the functional food health claim as not being believable. To build on Liberman and Chaiken's (1992) findings, more health conscious consumers (who, in general, view information about various aspects of food and their ingredients as more personally relevant) may similarly process information that does not confirm the efficacy of a functional food in a more defensive manner to give the benefit of the doubt to the functional food health claim. When highly health conscious consumers are presented with sequential information that (1) endorses the validity of a functional food health claim and then (2) questions the validity of that claim, we propose that they will show less of a change in beliefs in the face of the conflicting information than less health conscious consumers.²

Less health conscious consumers, who are not as motivated to expend extra effort in processing health claim information and are less likely to exhibit a confirmatory bias when they encounter conflicting information about the potential benefit of a functional food, are more likely to take the conflicting information at face value. The perceived inconsistency will lead these consumers to disregard the functional food health claim (reducing their beliefs in the claim when presented with conflicting information) when making a product choice, and they will simply default to

their usual choice, that is, to a product that does not offer a functional benefit. However, these less health conscious consumers are not necessarily rejecting the idea of consuming more healthful options; they are simply less likely to choose these options in the face of conflicting information about whether the food actually provides health benefits. Therefore, we predict that information that questions the validity of a functional food health claim will reduce the choice of a functional food versus a nonfunctional option for less health conscious people but not for more health conscious people. We test the following hypotheses across two studies:

- H₁: In the presence of conflicting (versus complementary) information about the validity of a functional food health claim, consumers with lower levels of health consciousness are less likely to choose a food that makes a functional food health claim versus a food that does not make such a claim than consumers with higher levels of health consciousness.
- H₂: Consumers with higher levels of health consciousness will report more consistent beliefs in a functional food health claim after the presentation of information that questions the validity of that claim than people with lower levels of health consciousness.
- H₃: The differential consistency in beliefs proposed in H₂ mediates the interaction between health consciousness and conflicting versus complementary health claim information proposed in H₁.

Study 1

We designed Study 1 to test H₁ in the context of consumers' choice of a food option that makes a functional food health claim versus a competing food option that does not. Thus, the main dependent variable in Study 1 is participants' choice between two granola bars, one with a functional food health claim and one without such a claim. The descriptions of the two bars appear in Table 1. With the goal of making the choice task more realistic, we gave the two granola bars different fictitious brand names (i.e., Go Bar and Fuel Bar) and different sets of flavors (i.e., chocolate, peanut butter, and cinnamon versus chocolate, peanut butter, and oatmeal raisin, respectively). However, the primary difference between the two bars was that Fuel Bar was presented with a functional food health claim (i.e., participants were told that the bar contained lignans, described as "Fuel to boost your immune system"), whereas Go Bar was described as being tasty (i.e., "Great taste on the go").

Table 1. Study 1: Granola Bar Descriptions

Go Bar	Fuel Bar
Great Taste on the Go	Contains Lignans, Fuel to Boost Your Immune System
Comes in 3 Flavors: Chocolate, peanut butter, cinnamon	Comes in 3 Flavors: Chocolate, peanut butter, oatmeal raisin
Size: 35 grams 75 calories, 2 grams fat	Size: 35 grams 75 calories, 2 grams fat

²Note that though our predictions pertain to people who are highly health conscious in general, it is likely that these results also hold for people who find the health information in question to be particularly personally relevant (e.g., someone who has digestive issues may consider the functional food health claim made about Activia yogurt relevant), even if that person otherwise has relatively low health consciousness. However, in this research, we focus on more general health consciousness because this is more widely applicable to a variety of specific health claims.

Pretests

To ensure that any differences in granola bar choice are driven by the functional food health claim and not preference for one brand name over the other, we conducted a pretest in which 41 undergraduate student participants rated the two brand names on a scale from 1 (“very bad name”) to 7 (“very good name”) scale. As we expected, there was no significant difference between the rated attractiveness of the two brand names ($t(1, 40) < 1, p = .78$). Similarly, a separate pretest with 24 undergraduate student participants revealed no significant differences between the attractiveness of the two flavor sets ($t(1, 23) = 1.36, p = .19$).

Participants and Procedure

One hundred seventy-eight students at a large southwestern university (77 men, 101 women) participated in this study for course extra credit. To simulate two distinct information environments, participants were first asked to read two articles about lignans, purportedly from two credible health publications, the *New England Journal of Medicine (NEJM)* and the *Harvard School of Public Health (HSPH)*. The first article presented always contained positive information about lignans, describing their cancer-preventing properties and promotion of a healthy immune system. To manipulate the presence of conflicting or complementary information, the second article contained information that either complemented the information presented in the initial article or cast doubt on the validity of the claims made in the initial article. Note that the conflicting information presented simply made the initial claim questionable by weakening the probability that consuming the functional food would give consumers the purported benefit and did not suggest any potential harm from the functional food. Therefore, the conflicting articles presented a benefit versus no-benefit context, while the complementary articles both presented benefits. We counterbalanced the purported source of the article between subjects (for the text of the articles, see the Appendix).

Thus, the study had a three-factor design: 2 (order: *NEJM* versus *HSPH* presented first) \times 2 (information about health claim: conflicting versus complementary) \times measured health consciousness. After reading each article, participants were asked to evaluate the readability and believability of the articles, both to give face validity to the task and to serve as a manipulation check. Next, participants completed an anagram distracter task to reduce hypothesis guessing. Then, as part of a purportedly separate study, participants were asked to imagine that they wanted to buy a snack from a vending machine and were asked to choose one of two new granola bars that would soon be available in their local market. After making their granola bar choice, participants rated each option on its healthfulness and tastiness. Finally, participants completed the health consciousness scale (Gould 1988).

Results and Discussion

Manipulation Check

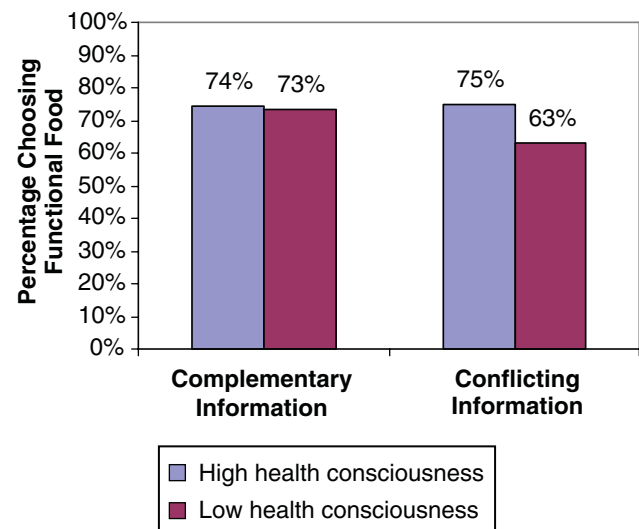
To ensure that the two sources for the articles were not perceived differently, we compared the believability and read-

ability ratings for both sources in the complementary information condition (holding the valence of information presented constant). As we expected, the sources did not differ in their believability ($t = .95, p = .34$) or readability ($t = .88, p = .38$). The order in which the sources were presented had no significant effect on these ratings.

Granola Bar Choice

To test H_1 , we conducted a logistic regression on the participants’ granola bar choice, with information condition (conflicting versus complementary) as a dichotomous independent between-subjects variable and health consciousness as a continuous independent between-subjects variable. We coded choice of the functional granola bar as 0 and choice of the nonfunctional granola bar as 1. There was no main effect of information condition (Wald $\chi^2 = .41, p = .52$), and the effect of health consciousness achieved only marginal significance (Wald $\chi^2 = 2.27, p = .13, b = .03$). As we expected, granola bar choice was driven by the interaction of these two variables (Wald $\chi^2 = 3.96, p < .05, b = -.05$), such that conflicting information greatly reduced the likelihood of choosing Fuel Bar (the granola bar that made a functional food health claim) for low health conscious consumers. This effect was still significant when we controlled for the order of presentation of the purported source of the articles (with order in the model, Wald $\chi^2 = 3.89, p < .05, b = -.05$). For highly health conscious consumers, reading conflicting information did not significantly reduce their likelihood of choosing Fuel Bar (for details, see Figure 1).

Figure 1. Study 1: Influence of Health Consciousness and Conflicting Information on Choice of a Granola Bar with a Functional Food Health Claim Versus a Granola Bar Without a Functional Food Health Claim



Notes: We conducted the analysis on which this figure was based using continuous scores on the health consciousness scale. For ease of presentation purposes, however, we graph high and low levels of health consciousness using a median split.

An encouraging result from the choice analysis is that many consumers seem to be willing to try functional foods when no information is presented that questions the validity of the functional food health claim. Seventy-four percent of the highly health conscious consumers and 73% of the less health conscious consumers chose the functional granola bar in the complementary information condition. These results suggest that even less health conscious consumers are willing to try functional foods. Given the relative lack of research on functional foods, this is a significant finding in and of itself because it suggests that consumers are open to selecting functional food products designed to improve their health. However, conflicting information significantly hampers the potential trial of functional foods by consumers with low health consciousness. Less health conscious consumers seem to use a rule that if any conflicting information exists, a health claim is less valid and adopting the functional food is less worthwhile. Indeed, these less motivated consumers may simply be ignoring health claims when presented with conflicting information. The default tendency in this study was to try the functional option unless one was lower in health consciousness and presented with conflicting information.

Inferences About Health and Taste

Prior research has suggested that consumers balance their concerns about health with the pleasure they receive from eating and enjoying the food consumption experience (Rozin, Bauer, and Catanese 2003), but as Raghunathan, Naylor, and Hoyer (2006) show, many consumers explicitly or implicitly believe that unhealthy foods taste better than healthy foods. As a result, when conflicting information is present (and given their low motivation to think critically about this conflicting information), less health conscious consumers may rely more on the tastiness dimension than the healthfulness dimension when making food choices. According to the “unhealthy = tasty” intuition (Raghunathan, Naylor, and Hoyer 2006), these consumers should assume that a food that makes a functional food health claim (i.e., a “healthy” food) does not taste as good as a food without such a claim.

Indeed, there is some evidence in Study 1 that less health conscious participants in the conflicting information condition may be simply relying on taste inferences in making their granola bar choice. To determine how participants perceive functional foods on the two key dimensions identified by Rozin, Bauer, and Catanese (2003), recall that after making their granola bar choice, all participants were also asked to indicate how healthful and how tasty they perceived both bars to be on a seven-point scale. Across all participants in the study, Fuel Bar (the functional food) was rated as significantly more healthful ($M = 4.93$) than tasty ($M = 4.01$; $F(1, 164) = 29.72, p < .0001$), and Go Bar was rated as significantly more tasty ($M = 5.18$) than healthful ($M = 3.86$; $F(1, 164) = 107.25, p < .0001$). Notably, in separate regressions for the two granola bars with the healthful–tasty difference score as the dependent variable and health consciousness as the independent variable, there was a significant difference between Fuel Bar health and taste ratings for highly health conscious consumers ($F(1, 163) = 3.82, p = .05, b = -.03$), such that these consumers, though they

still believed that Fuel Bar was more healthful than tasty, reported a smaller difference between health and taste ratings than less health conscious consumers. There was no difference between Go Bar (the nonfunctional food) health and taste ratings by health consciousness ($F = .64$).

These results for Fuel Bar share some similarities with findings from the “phantom ingredients” literature. Researchers have found that the taste stigma of including a healthful ingredient, such as soy, on a food label (i.e., a phantom ingredient that the consumer cannot actually taste and that is not actually included in the food) gives “non-lovers” of the ingredient a reason to dislike the taste of the food but does not improve the perceived taste for “lovers” of these foods (Wansink 2003; Wansink and Park 2002; Wansink, Van Ittersum, and Painter 2004). Here, we find that highly health conscious consumers do not infer as much of a taste decrease for a granola bar with lignans as less health conscious consumers, but they also do not infer a taste benefit based on lignans.

Study 2

The results of Study 1 suggest that highly health conscious consumers are more likely to have a confirmatory bias in how they interpret conflicting information about a functional food health claim, discounting information that questions the validity of a health claim when it is presented after information that supports the claim. However, we did not test this explanation for our results directly. Therefore, the primary purpose of Study 2 is to test H_2 and H_3 to provide direct evidence that (1) highly health conscious consumers exhibit more of a confirmatory bias than less health conscious consumers in how they interpret conflicting information about the validity of a functional food health claim and (2) the resulting differences in belief in the claim mediate the difference in choice of a food that makes a functional food health claim versus one that does not make such a claim between high and low health conscious consumers. As such, our procedure and measures in this study are designed to be more sensitive to capturing consumers’ consistency of beliefs (or lack thereof) in the efficacy of functional foods when confronted with conflicting information and the relationship between belief consistency and food choice for consumers with varying levels of health consciousness.

Participants and Procedure

Two hundred seven undergraduate students at a large southwestern university (58 men, 147 women, 2 respondents completed the study but did not report their sex) participated in this study for course extra credit. The study employed similar procedures and stimuli to Study 1, using the same three factors plus an order factor that varied which granola bar appeared first in a vertical presentation for a 2 (order of articles presented about lignans: *NEJM* versus *HSPH* presented first) \times 2 (information about health claim presented in the second article: conflicting versus complementary) \times 2 (order of granola bar presentation: Fuel Bar versus Go Bar presented first) \times measured health consciousness design. The primary difference between Study 1 and Study 2 was that before reading the articles, participants

were first presented with a definition of functional foods as “foods that make a functional health claim.” Participants read that “[f]unctional health claims promise consumers improvements in targeted physiological functions such as lowered cholesterol, improved immune systems, etc.” and were asked to respond to two questions that assessed (1) their belief in the efficacy of functional foods in general (“How effective do you think foods that make functional health claims are in improving consumers’ health?”) and (2) their belief in the ability of an ingredient to improve a person’s immune system (“Do you, personally, believe that eating foods that contain a specific ingredient can boost your immune system?”). Participants then read the same two articles about lignans used in Study 1 and completed an anagram distracter task.

Next, as part of a purportedly separate study, participants were asked to make the same choice between the two granola bars presented in Study 1. After making this choice, they were then asked to rate their beliefs in the health claim made about Fuel Bar (i.e., “contains lignans, fuel to boost your immune system”) using the following three items ($\alpha = .85$): (1) “How believable is the claim in Fuel Bar’s description that lignans actually boost your immune system?” (2) “Do you believe that eating Fuel Bar can help people improve their immune system?” and (3) “How much benefit would you, personally, receive from eating a product that contains lignans?” Finally, after some unrelated filler measures, participants completed the health consciousness scale (Gould 1988).

Results

Health Claim Beliefs Before and After the Presented Articles

We first examined participants’ beliefs before they read the presented articles about lignans. We found that participants higher in health consciousness expressed greater beliefs in both the general efficacy of functional foods ($F(1, 201) = 18.36, p < .0001, b = .05$) and the idea that a specific ingredient could improve the immune system ($F(1, 200) = 16.17, p < .0002, b = .06$). This finding is consistent with our proposition (and Gould’s [1988]) that, in general, health conscious consumers are more open to believing in the efficacy of actions that could improve their health (e.g., consuming foods that make a functional food health claim). As a group, all participants were inclined to believe that consuming a specific ingredient could improve their immune system ($M = 5.39$ on a seven-point scale) and that functional foods in general are effective ($M = 4.68$, significantly above the midpoint of the seven-point scale).

However, we were primarily interested in whether, after reading the articles presenting either conflicting or complementary claims about the efficacy of lignans as a functional ingredient, participants’ specific beliefs in the lignan’s functional food health claim stayed consistent with their general beliefs in the efficacy of functional foods (measured before seeing the conflicting or complementary information). To explore whether a participant’s beliefs remained consistent, we averaged the two measures collected before the articles were presented to form a “premeasure” of belief and the three measures collected after the articles were presented

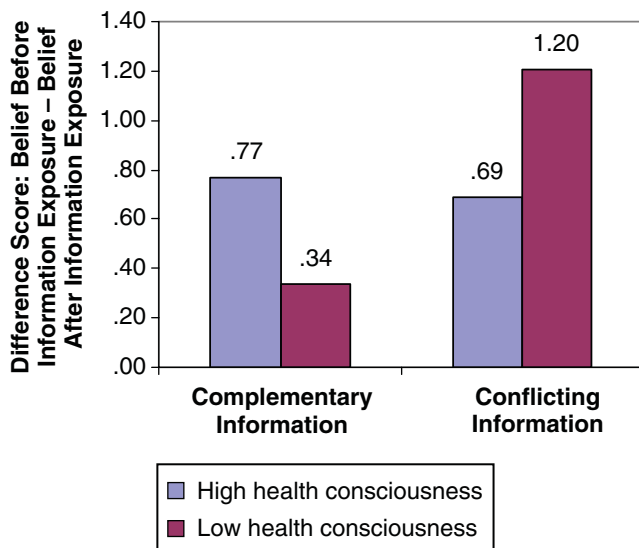
(and after participants had read about the granola bars) to form a “postmeasure” of belief. Across all participants, the mean for the postmeasure ($M = 4.30$), which assessed beliefs in the specific granola bar claim, was significantly lower than the mean for the premeasure ($M = 5.03$), which assessed beliefs in the efficacy of functional food health claims in general, suggesting that consumers are less inclined to believe a specific health claim made by a marketer (perhaps because of a schemer schema per Friestad and Wright 1995) than to believe in the efficacy of such claims in general. Thus, overall, the general beliefs (measured by the premeasure items) were not as consistent with the specific beliefs (measured by the postmeasure items), as might be expected.

However, we were primarily interested in whether the difference in the pre- and postmeasures was less pronounced for participants high in health consciousness—that is, whether these participants’ general beliefs in the efficacy of functional foods were more consistent with their specific beliefs in the lignan-related functional food health claim. To test H_2 , we conducted a 2 (information condition: conflicting versus complementary) \times health consciousness regression with the difference between the pre- and the postmeasure as the dependent variable. Information condition was a dichotomous between-subjects variable, and health consciousness was a continuous between-subjects variable. Order of presentation of the source of the articles had no main or interactive effects, and therefore we dropped this from further analysis of claim belief. As might be expected, there was an overall main effect of information condition, such that there was a greater difference between the pre- and the postmeasure in the conflicting information condition ($F(1, 193) = 4.72, p < .05, b = .04$). The main effect of health consciousness was not significant ($F = .06$). In support of H_3 , however, there was a significant information condition \times health consciousness interaction ($F(1, 193) = 6.55, p < .05$) (for details, see Figure 2). Follow-up analyses fitting the model at one standard deviation above and one standard deviation below the mean health consciousness score in the sample (see Irwin and McClelland 2001) revealed that participants with high health consciousness showed the same amount of consistency from the pre- to the postmeasure regardless of whether they were in the conflicting versus complementary information condition ($F = .09$), while participants with low health consciousness showed a significantly greater difference between the pre- and the postmeasures in the conflicting information condition than in the complementary information condition ($F(1, 193) = 11.37, p < .0001, b = .43$). These results support our hypothesis that consumers higher in health consciousness are more susceptible to a confirmatory information bias than consumers lower in health consciousness.

Granola Bar Choice and the Confirmatory Bias

Next, we conducted a logistic regression on participants’ granola bar choice with information condition (conflicting versus complementary) and health consciousness as independent between-subject variables. Replicating the results of Study 1, there was an interactive effect of health consciousness and information condition on granola bar choice (Wald $\chi^2 = 3.20, p = .07$), such that the presence of conflict-

Figure 2. Study 2: Consistency of Belief in Functional Food Health Claims (Before and After Exposure to Articles Containing Complementary Versus Conflicting Information) by Health Consciousness

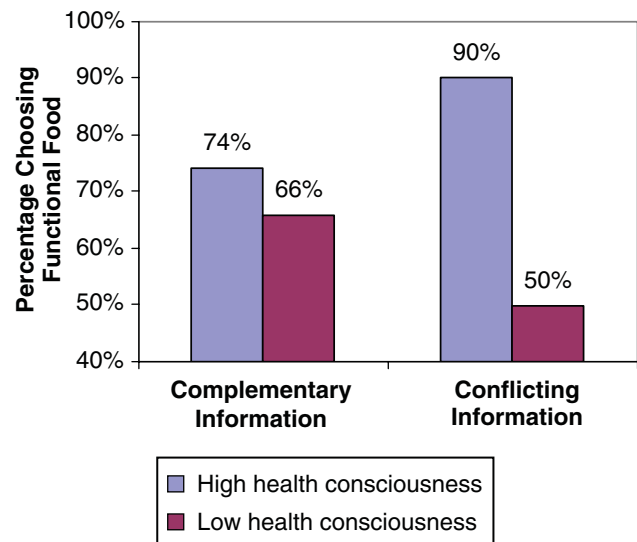


Notes: We created this figure from analyses using continuous scores on the health consciousness scale. We graph health consciousness scores at one standard deviation above the mean to represent high levels of health consciousness and one standard deviation below the mean to represent low levels of health consciousness (per procedures recommended by Aiken and West 1991; Irwin and McClelland 2001).

ing information significantly reduced the likelihood of choosing Fuel Bar (the functional food) for less health conscious consumers, as H_1 predicted. Including both order factors (order of presentation of the article source and order of presentation of the granola bar options) in the model as control variables yielded the same results (Wald $\chi^2 = 3.36$, $p = .07$). Note in Figure 3 that the results of this interaction are slightly different in Study 2 than they are in Study 1; rather than finding no change in choice of granola bar for highly health conscious consumers in the conflicting versus complementary conditions, in Study 2, highly health conscious consumers were actually more likely to choose the functional food in the conflicting versus complementary information condition. These results, though initially surprising, provide additional support for our confirmation bias explanation. Given the design of Study 2 (in which all participants first read about functional foods in general before being exposed to the conflicting or complementary articles), highly health conscious consumers were given even more information on which to “anchor” as the basis for their confirmation bias, producing a backlash when conflicting information was introduced, which appears to have increased choice of the functional food in this condition. The percentage of highly health conscious consumers choosing the functional food in the complementary condition was identical (74%) across Studies 1 and 2.

Unlike in Study 1, there was also a main effect of health consciousness on choice, such that, overall, highly health

Figure 3. Study 2: Influence of Health Consciousness and Conflicting Information on Choice of a Granola Bar with a Functional Food Health Claim Versus a Granola Bar Without a Functional Food Health Claim



Notes: We conducted the analysis on which this figure was based using continuous scores on the health consciousness scale. For ease of presentation purposes, however, we graph high and low levels of health consciousness using a median split.

conscious consumers were more likely to choose the functional granola bar even in the complementary information condition (i.e., the percentage of high health conscious consumers in the complementary information condition choosing the functional granola bar was 74%, compared with 66% of low health conscious consumers in the same condition). Perhaps drawing more attention to whether participants believed the functional food health claims before presenting the granola bar choice (i.e., by asking participants to indicate their level of belief in functional food health claims in general) led more of the less health conscious consumers to simply default to the granola bar without a functional food health claim (an option that requires no evaluation of the potential validity of a health claim). It is also possible that drawing attention to the functional food health claim elicited reactance among less health conscious consumers (Brehm 1966; Fitzsimons and Lehmann 2004) if these consumers perceived drawing attention to the claim as a recommendation of functional foods. If so, reactance could lead these consumers to be less likely to choose the (recommended) functional granola bar over the nonfunctional granola bar than highly health conscious consumers.

Beyond examining the interactive effect of health consciousness and information condition, our primary goal in the granola bar choice analysis for Study 2 was to test H_3 . Recall that in H_3 , we predicted that the differential belief consistency for high versus low health conscious consumers in the face of conflicting versus complementary information would mediate the interaction between health consciousness and conflicting versus complementary health claim infor-

mation. Following procedures established by Baron and Kenny (1986), we tested for this mediated moderation by running the same logistic regression described in the choice analysis with the difference score for the pre- and postmeasures included in the model. As we predicted, when we included the difference score in the model, the interaction between health consciousness and information condition was no longer even marginally significant (Wald $\chi^2 = 1.32$, $p = .25$), in support of our claim that the difference in choice of a food with a functional food health claim versus a food without such a claim for high versus low health conscious consumers is indeed mediated by highly health conscious consumers' susceptibility to the confirmation bias. A Sobel (1982) test provided further evidence that the mediation is significant ($z = 2.31$, $p < .05$).

Discussion

The results of Study 2 support our hypothesis that highly health conscious consumers are less susceptible to the influence of conflicting information because of a confirmatory bias to believe positive health claims. In other words, these consumers may be more willing to choose foods that make a functional food health claim (in the hopes that they gain the purported health benefit), even when conflicting information is present and it is not clear that the claim is fully valid. In contrast, less health conscious consumers seem to use a rule that if any conflicting information exists, a health claim is less valid.

General Discussion

A large body of recent literature has focused on examining the health consequences of food consumption (e.g., Chandon and Wansink 2007; Howlett, Burton, and Kozup 2008; Kozup, Creyer, and Burton 2003; Seiders and Petty 2004; Urala and Lähteenmäki 2004, 2007; Wansink and Chandon 2006; Wansink and Huckabee 2005). However, most of this research has focused on the potential negative health consequences of consuming certain foods or food groups (e.g., Rucker and Petty's [2006] research on communicating risk information). Although many consumers now seem to be aware of the negative consequences of consuming certain foods (or, more accurately, overconsuming certain foods) on their health, they may not be aware of the potential beneficial health consequences functional foods can offer, despite the FDA's somewhat ambiguous treatment of this category of foods.

As Urala and Lähteenmäki (2007) report, between 2001 and 2004, the factors influencing people's attitudes toward functional foods changed, and since then, consumers have become more accepting of functional foods in general, partly because they now perceive a greater reward from consuming such foods and because they have more confidence in the safety of these foods for consumption. However, given the relatively low market shares of many functional food products, it is clear that not all consumers are taking advantage of the benefits they offer. By definition, functional foods offer consumers the opportunity to experience improvements in targeted physiological functions. As such, it is critical that researchers focus attention on understanding how consumers respond not just to potential

threats to their health from food consumption but also to claims that consuming a certain food can actually improve their health.

Our focus on improvements to a person's health rather than threats is a key distinction between our findings and the results of Liberman and Chaiken's (1992) seminal article on defensive processing of personally relevant health messages. Although we also focus on a different individual difference variable than Liberman and Chaiken do (health consciousness, which can be understood as the extent to which a person finds all types of health messages personally relevant) and on the impact of an information environment in which conflicting information may be present, the most significant difference between their exploration of biased processing and ours is that their work focuses on a defensive bias with the intent to reduce self-threat from a negative health message, whereas we focus on a positive bias in the processing of health information by demonstrating a confirmatory bias on the part of highly health conscious people who want to believe that they can take steps to actively manage and promote their own health. Notably, despite these differences, consumers who perceive the information as more relevant still process the information in such a way to conclude what they want to conclude, consistent with motivated reasoning (Kunda 1990).

Key Findings and Implications for Marketers

The results of both Studies 1 and 2 point out that though marketers do not have control over all the information available to the consumer regarding their functional food products and ingredients, it is critical that they monitor and respond to this information. The high receptivity of the participants to trying foods marketed using functional food health claims suggests that such foods can appeal to a wide target audience. In situations in which conflicting information about the benefits of consuming foods that make functional food health claims is available to consumers, however, these products are more likely to be perceived favorably by highly health conscious consumers. Unfortunately, marketers of functional foods face two realities: (1) Many consumers are likely not to be highly health conscious (for a discussion of the lack of motivation most consumers exhibit in making repeat purchases and Wansink and Huckabee's [2005] proposition that this type of decision making is likely the norm for food choices, see Hoyer 1984), and (2) conflicting information about the validity of functional food health claims is prevalent and, at times, covered heavily by the media. Given that controlling the information released by the media is not a feasible course of action for marketers, marketers of functional foods might benefit from trying to enhance the situational health consciousness of consumers through reminders of the importance of health at the point of purchase, on packaging, and in advertising and by providing additional nutritional information in a prominent and appealing way (a related study conducted by the authors suggests that simple package cues can temporarily increase a consumer's level of health consciousness).³ Even temporarily enhanced health conscious-

³Details are available on request.

ness may make consumers more resistant to discounting a functional food health claim when confronted with (or remembering) conflicting information about the validity of the claim.

Marketers should also be cautious of the potential for the types of effects observed in the phantom ingredient studies and should avoid highlighting ingredients that may have become stigmatized, for example, for their lack of taste. In addition, although we do not specifically consider skepticism in this research, the role of consumer skepticism in response to functional food health claims should be examined in greater detail (Obermiller and Spangenberg 1998). Finally, marketers who promote functional foods also need to be wary of the possible reactance that could be elicited when consumers are exposed to marketing messages that recommend consumption of functional foods. Consumers who experience reactance to a recommendation tend to ignore the promoted product and choose other similar options (e.g., foods without a functional food health claim) instead (Brehm 1966; Fitzsimons and Lehmann 2004). From the results of Study 2, it appears that less health conscious consumers may be particularly susceptible to experiencing reactance.

Key Findings and Implications for Consumers

Much prior research has examined the impact of health claims on food packages and restaurant menus on food consumption, product inference, and evaluations (Andrews, Netemeyer, and Burton 1998; Balasubramanian and Cole 2002; Kozup, Creyer, and Burton 2003; Raghunathan, Naylor, and Hoyer 2006; Wansink and Chandon 2006). The current research complements this work but makes a unique contribution in that we focus on potential health benefits. Much of the prior research on health claims and nutrition labeling has focused on helping consumers make more healthful choices by avoiding potentially harmful ingredients (e.g., fat, sodium). In general, research on helping consumers lead more healthful lives has been focused on discouraging behaviors, including overeating, smoking, and underage alcohol consumption (e.g., Andrews et al. 2004; Goldberg et al. 2006). The current research is aimed at understanding what factors lead consumers to believe beneficial functional food health claims and to increase choice and consumption of foods marketed using these claims, especially when there is conflicting information about the related health benefits.

Many consumers are likely to be highly receptive to an action they can easily take to improve their health through the foods they eat if marketers and public policy makers can understand how to best convey the potential benefits. Otherwise, consumers may default to choices based primarily on taste (Raghunathan, Naylor, and Hoyer 2006). An encouraging result from the current research, however, is that across all conditions and both studies, consumers chose the functional food option 50% or more of the time, with the average rate of choice for the granola bar with a functional food health claim at 70.6%. Additional actions on the part of marketers and/or public policy makers to encourage the adoption of functional food alternatives could indeed ultimately benefit consumers' health.

Key Findings and Implications for Public Policy

Given the current debate and uncertainty regarding how functional food health claims should be regulated, this research has clear implications for public policy makers in that the results of both studies suggest that many consumers are receptive to at least trying functional foods, attesting to the need for attention to be given to how the FDA should regulate these claims. However, the studies also reveal that willingness to try functional foods is dependent on the information environment for less health conscious consumers.

If the goal of public policy regulation is to encourage consumption of foods that have true functional benefits, public policy makers should promote an information environment that encourages the acceptance of these foods by minimizing conflicting information about the credibility of functional food health claims. We acknowledge that this is not an easily achievable objective, because the science behind evaluating ingredients and their health benefits is constantly evolving. Regardless of such obstacles, however, the results indicate that when conflicting information is present, consumers with a low level of health consciousness use the presence of discrepant information to undermine the diagnosticity of the information and revert to their usual choices. It is this same group of consumers (i.e., those low in health consciousness) who would likely benefit most from clear and convincing communication of functional food benefits that encourage adoption of such foods into their diet. If the goal of labeling functional food health claims is to benefit consumers who may not have the necessary motivation to process these messages, this research shows that the best way to accomplish this goal is to enact a clear regulatory policy that gives credence to scientifically proven claims (thus minimizing the impact of conflicting opinions about the validity of such claims, which may abound in an unclear regulatory environment).

Appendix: Articles Describing the Potential Health Benefits of Lignans

We adapted these articles using information from the following Web sites about lignans and their potential health benefits:

- <http://www.fatsforhealth.com/library/libitems/flax.php> (no longer active),
- <http://www.soulhealer.com/1583-6.htm> (no longer active),
- <http://healthlibrary.epnet.com/GetContent.aspx?token=e0498803-7f62-4563-8d47-5fe33da65dd4&chunkid=21801>, and
- <http://www.flaxcouncil.ca>.

First Article Presented (Positive Information About Lignans, Held Constant Across Conditions)

Lignans are antioxidants and phytoestrogens being investigated for their anticancer properties. They are called phytoestrogens because they are plant chemicals that can have estrogen-like actions in human and animal cells. Lignans are found in most fiber-rich plants, including grains such as

wheat, barley, and oats; legumes such as beans, lentils, and soybeans; and vegetables such as garlic, asparagus, broccoli, and carrots. Current medical evidence shows that lignans have strong cancer preventing properties. In a mouse model of melanoma, lignans decreased the number of tumors, size of tumors, and rate of metastasis. In human studies, lignans have been conclusively linked to prevention of breast, prostate, and colon cancer and have been shown to play an important role in maintaining a healthy immune system.

Second Article Presented in the Complementary Information Condition

Several animal studies have shown that lignans from flaxseed reduce cancer tumors. Since lignans are digested into estrogenic compounds, many of the health benefits of lignans may be attributable to their hormonal effects. Lignans have been found to help the body excrete estrogen in the urine, decreasing its potential health risks. Studies show that women who excrete higher amounts of lignans in their urine (indicating higher dietary levels of lignans) maintain better breast health. Men who consume high amounts of lignans appear to have prostate benefits. Thus, plant lignans have been shown to reduce the risk of developing hormone-sensitive cancers, such as prostate and breast cancer.

Second Article Presented in the Conflicting Information Condition

Many so-called nutrition experts tout the cancer prevention benefits of lignans. Although, according to observational studies, people who eat more lignan-containing foods have a lower incidence of breast and perhaps colon cancer, this does not prove that lignans are the cause of the benefit, for other factors in these foods, or in the characteristics of the people who consume these foods, may have been responsible. Until more and better designed trials are done, we will not know lignans' precise effects on the human body, or the precise dose needed to prevent cancer, if this is even possible. The results to date are inconclusive as to whether lignans provide any cancer prevention or immune system benefits.

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