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# Is this Food Healthy? The Impact of Lay Beliefs and Contextual Cues on Food Healthiness Perception and Consumption

## **Abstract**

Is this food healthy? Understanding how individuals evaluate food healthiness is important because their evaluation can affect their food choices and consumption quantities, potentially leading to obesity and other health problems. However, individuals often find it difficult to process the health information to evaluate food healthiness, so they rely on their intuition or lay beliefs to make the judgment. This paper reviews recent empirical findings to highlight how individuals use lay beliefs that are based on sensory cues (e.g., visual, taste) and cognitive cues (e.g., nutrition label, price) to infer food healthiness and how this perception of food healthiness affects their food consumption. We conclude by discussing possible future opportunities in the domain of lay beliefs and food perception.

Key words: lay beliefs, food, healthy, contextual cues

## **Introduction**

You go to a grocery store to buy some healthy crackers. You notice that there are many different brands with different packaging. For example, some packaging uses blue color, while other crackers are packaged in red color. Various brands of crackers also have different prices. How do you decide which one is healthier? Research has shown that individuals often rely on their lay beliefs based on different cues (e.g., color, price) to judge the food healthiness.

Individuals hold lay beliefs about how people and the world around them work and use their beliefs to guide their everyday decisions [1,2]. Many of these beliefs are naive intuitions that individuals use to understand their environment [3,4]. Lay beliefs can be acquired from a combination of personal experiences, self-observation, and environmental cues [3,5,6]. These lay beliefs are sometimes accurate and can facilitate individuals to make decisions easier and faster [7,8]. However, individuals tend to overgeneralize these lay beliefs to contexts that might not be objectively applicable, leading to systematic biases and suboptimal decisions [1,9,10].

In this review, we spotlight food-related lay beliefs and demonstrate that individuals hold different lay beliefs based on various contextual cues, which, in turn, influence how they perceive food healthiness and their subsequent food consumption decisions [10,11]. Food healthiness refers to individuals' perceptions about the health benefits of food and the expected influence on their health. Understanding how individuals use lay beliefs to judge food healthiness is important as their judgment can have important downstream consequences, including their food choices [10–13] and consumption quantities [14–18].

## **Lay beliefs about the perception of food healthiness**

Food healthiness, presumably, should be determined by the nutritional facts of the food, such as calories content, nutrients, and the amount of fat and sugar (FDA, 2016) [19]. However, in reality, evaluating food healthiness is difficult and subjective. Individuals are not always given this information (e.g., restaurant menus). Even if the nutrition information is provided, individuals often lack the ability and/or motivation to pay attention to it and

comprehend it [20]. As a result, individuals often resort to their intuition, or more specifically, to their lay beliefs, and engage in heuristic processing to guide their judgment of food healthiness [10,11]. These lay beliefs are generally based on easily observable contextual cues (e.g., packaging, price) in the environment. Following recent research that has studied food from both sensory and cognitive perspectives, this review focuses on how individuals use the sensory and cognitive cues to infer food healthiness [21, see Table 1].

Table 1 Lay Beliefs About the Perception of Food Healthiness

Cues		Specifics	What is considered healthy?
Sensory cues	Visual cues	Color	Blue/green Muted color Lighter color
		Material	Matte Surface
		Shape	Angular shape
	Haptic cues	Anesthetics	Pretty
		Temperature	Cold
	Taste cues	Weight	Light
		Taste	Less tasty
Cognitive cues	Name		Healthy name (e.g., salad)
	Nutrition and ingredient labels		Organic/low in cholesterol and fat
	Price		Expensive
	Availability		Abundantly available

*Sensory cues.* Individuals use multiple sensory cues (visual, olfactory, auditory, haptic, and taste) to judge food, and each of these sensory cues provides subjective interpretations. In terms of judging food healthiness, research on lay beliefs has examined the role of visual, haptic, and taste as three major sensory cues about food healthiness [15,22].

One well-known adage is “we eat with our eyes.” Visual elements in the presentation and packaging of food not only attract attention and differentiate products visually, but also convey information. Individuals often rely on package elements (e.g., colors, material, shape, and aesthetic) as sensory cues to derive lay beliefs and draw conclusions about food healthiness [16]. For instance, due to the widespread association between the colors blue/green and safety, individuals have the lay belief that food in blue/green packaging is healthier than food in red packaging (e.g., candy bars) [23,24]. Besides hue, individuals also infer healthiness from color lightness and saturation. Since consumers often see muted packages for healthier food (e.g., diet products) and vivid packages for unhealthy food (e.g., potato chips), they tend to believe that food with lighter colored and less color-saturated packaging is healthier [25–28]. These beliefs also influence how individuals interpret packaging with glossy versus matte surfaces. They believe that food with matte-surface packaging is healthier than food with glossy-surface packaging [29]. Another visual cue that can influence the perception of food healthiness is the shape of the packaging. As a slim (vs. wide) package shape simulates a slim (vs. wide) body shape, individuals believe in an “Angular = Healthy” intuition that food in packages with a slim or angular shape is healthier than food in packages with a wide or circular shape [17,30]. In addition to colors and shapes, individuals also use the overall aesthetics of the food to infer food healthiness. They have the lay belief that “Pretty = Healthy.” Since these aesthetic features make the food appear more natural, food with pretty aesthetics (defined by order, symmetry, and balance) is perceived as healthier [31].

Apart from visual cues, haptic cues can also affect perceptions of food healthiness through food temperature and weight. Individuals believe that cold (warm) food contains fewer (more) calories. The belief that “Warm = Calorie-rich” is due to the deep-rooted association that cold food is less filling and less tasty than warm food [18]. Besides temperature, individuals also infer food healthiness from the haptic sensation of physical weight. As the word “light” can have two connotations (being light in weight and fewer calories), individuals develop the intuition that physically lighter food is healthier than heavier food [32]. Finally, taste, as being one of the most important sensory cues for food choices, can also affect individuals’ judgment of food healthiness. Since individuals often adhere to the compensatory heuristic, they believe that taste needs to be sacrificed for another attribute, such as health. As a result, individuals hold the lay belief of “Unhealthy = Tasty,” believing that the less tasty the food is, the healthier it is, and vice versa [11].

*Cognitive cues.* Individuals also develop lay beliefs based on cognitive contextual cues to infer food healthiness. Earlier research has shown how using a relatively unhealthy (vs. healthy) name (e.g., pasta vs. salad) affects the perception of healthiness [33]. Other research has examined different nutrition and ingredient labels and found that individuals believe that food labeled “organic” or “low in cholesterol and fat” is healthier [9,34]. Besides ingredient information, price, as a marketing cue, can also influence perceived food healthiness. Given that marketers often set a higher price for healthier food, individuals develop the lay belief that “Healthy = Expensive,” such that the more expensive the food is, the healthier it is believed to be. Finally, recent research has also shown that individuals can infer food healthiness from environmental cues that are normatively irrelevant. For example, individuals believe that food that is limited (vs. abundant) in availability has more calories because they erroneously infer scarce food to be more valuable [35].

### **The influence of food healthiness on food consumption decisions**

Although these beliefs may be accurate in some cases, individuals tend to overgeneralize them to contexts that may not objectively hold, creating systematic biases in estimating food healthiness and subsequently leading to suboptimal food consumption decisions. When health goals are salient, individuals increase their selection of foods that they perceive to be healthy based on their lay beliefs. For instance, individuals holding a health goal prefer to consume food that has a slim (vs. wide) and matte (vs. glossy) package [17,29].

However, the perception of food healthiness can also have an ironic effect on the consumption quantity. When food is deemed healthy, individuals are subject to a health halo effect. They mistakenly believe that healthy food is always good, so they underestimate its calorie content and weight gain potential. As a result, they erroneously consume larger quantities of food that they perceive to be healthy [10–14,18]. For instance, individuals consume more light-colored or lightweight food as they believe it to be healthier and, hence, good for them [28,32]. Another reason for the increased consumption is that individuals subscribe to the “Healthy = Less filling” intuition. Since healthy food is perceived to be less filling, individuals consume larger quantities to feel equally full [14]. Besides showing how food healthiness affects consumption via functional qualities (e.g., calories content), other research examines the role of emotion and demonstrates that consuming seemingly healthy food reduces the anticipated feeling of guilt and licenses individuals to consume more [36].

Taken together, while it is reassuring that lay beliefs can sometimes increase individuals' preference for healthy food, they can also exert paradoxical effects on the consumption quantities, which can potentially lead to an overall increase in calorie intake.

## **Conclusion and future research directions**

This review shows that individuals hold different lay beliefs about food healthiness, which can ultimately impact food consumption decisions, potentially leading to obesity and other health problems. On the positive side, understanding these lay beliefs offers opportunities to develop strategies to nudge individuals toward healthy eating. To encourage healthier food consumption, policymakers have often focused on educating individuals and increasing their awareness of nutritional information [9]. However, this review suggests that instead of relying on objective nutritional information, individuals often rely on their lay beliefs to infer healthiness. Accordingly, policymakers could devise intervention strategies to manipulate various sensory cues (e.g., color, weight) to optimize the perceptions of healthy food and promote healthier consumption. Policymakers should also be cautious of the double-edged nature of classifying food as healthy. Because of the health halo effect, individuals may consume more of the food that they deem healthy [14,29,32].

Given the significant influence of lay beliefs on individuals' food perceptions and consumption, more research is needed to build on the current findings and further our understanding of lay beliefs about food. We suggest some unanswered questions that can be addressed in future research.

*What causes different lay beliefs?* Although the origin of lay theories may differ, prior research has suggested that lay beliefs are generally grounded in personal experiences, knowledge, and environmental cues [10]. As not all individuals share the same experience, lay theories are likely to vary across different individuals and cultures (e.g. the studies by Mai et al., Irmak et al. [13,33]). Research shows that individuals who are health-conscious and know more about health are less likely to believe in the “Unhealthy = Tasty” belief [13]. On a broader level, there are also substantial cultural differences in lay beliefs. For example, while the “Unhealthy = Tasty” belief has been demonstrated in North America, the opposite belief (i.e., “Healthy = Tasty”) holds in some European countries such as France [37,38]. Besides taste, countries may also differ in how they perceive other cues. For example, in Asian cultures, consuming warm food is more likely to be the norm, influencing whether Asians associate warm food with being calorie-rich. Future research can further examine how individuals with different backgrounds and goals (e.g., lower vs. upper social class, dieting vs. non-dieting) adhere to different lay beliefs.

*When do lay beliefs apply?* While this review highlights how often individuals use lay beliefs to evaluate food healthiness, recent research has suggested that lay beliefs are not applied in all situations. For instance, competing intuitions (e.g., “Heavy = More protein”; “Pretty = Artificial modifications” [31,32]) can challenge individuals' original lay beliefs and reduce their biases in judging food healthiness. Other research has examined how different variables, such as goals (e.g., hedonic vs. health goals [17,18]) and subjective nutrition knowledge [26], influence the use of lay beliefs. Future research can examine other strategies that can attenuate the misapplication of lay beliefs.

*How do contradictory sensory and cognitive cues impact individuals' perceptions of food healthiness?* Another question is how lay theories derived from different sensory and

cognitive cues combine, interact and influence each other [39]. What happens when individuals encounter a snack option that uses green packaging (i.e., visual cue) but is physically heavy (haptics cue)? The implications from their respective lay beliefs contradict each other (Green = Healthy, but Heavy = Unhealthy). In this case, it is unclear whether individuals would simply use an additive model to arrive at the overall perception of food healthiness. Alternatively, visual cues often dominate one's judgment implying that the visual cues may also be the more dominant driver in the judgment of food healthiness [40]. Future research can explore these more nuanced perspectives and the interaction between different contextual cues.

*What are the other lay beliefs?* This review focuses on individuals' lay beliefs based only on sensory and cognitive cues. Future research can examine how other cues (e.g., auditory cues) can also be used to derive food-related lay beliefs. For instance, recent research from the sound symbolism literature demonstrates that due to the association between high-frequency sounds and small size, individuals believe that brands using phonemic names with higher frequency (e.g., Sepafi vs. Gupabo) are healthier [41]. Future research can also examine the role of different diets. As individuals are more health-conscious, more diverse diets (e.g., Keto diet, intuitive eating) have been advocated for a healthy lifestyle. These different diets may also influence how individuals perceive what is associated with food healthiness (e.g., protein vs. carbs).

In closing, this review underscores the important role of lay beliefs in guiding individuals' perceptions of food healthiness. These collective findings highlight that researchers, policymakers, and marketers should pay more attention to how contextual cues influence individuals' formation and use of lay beliefs and their perceptions of food healthiness, as they can potentially lead to suboptimal food consumption decisions and consequently hurt one's health.

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