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Does Green Mean Healthy? Nutrition Label Color Affects Perceptions of Healthfulness

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The food industry has recently implemented numerous front-of-package nutrition labels to readily convey key aspects of a food product’s nutritional profile to consumers (e.g., calories and fat content). Although seemingly well-intentioned, such labels might lead consumers to perceive relatively poor nutrition foods in a healthier light. The present research explores whether one underresearched aspect of nutrition labels—namely, their color—might influence perceptions of a product’s healthfulness. In Study 1, participants perceived a candy bar as healthier when it bore a green rather than a red calorie label, despite the fact that the labels conveyed the same calorie content. Study 2 examined the perceived healthfulness of a candy bar bearing a green versus white calorie label and assessed individual differences in the importance of healthy eating. Overall, results suggest that green labels increase perceived healthfulness, especially among consumers who place high importance on healthy eating. Discussion focuses on implications for health-related judgment and nutrition labeling.

In early 2011, two leading food-industry trade organizations, the Grocery Manufacturers of America (GMA) and the Food Marketing Institute, unveiled a new and voluntary nutritional labeling system known as “Facts Up Front” (formerly “Nutrition Keys”) (GMA, 2010). The program was purportedly developed to help consumers make healthier choices, answering a call by First Lady Michelle Obama’s “Let’s Move” campaign to work toward reducing childhood obesity. The Facts Up Front label features four basic nutrient categories, namely, calories, saturated fat (g and percent daily value [%DV]), sodium (mg and %DV), and sugar (g), and up to two “nutrients to encourage,” a category including protein, fiber, potassium, and certain vitamins that are claimed to be underconsumed by many members of the public.

Though seemingly well-intentioned, Facts Up Front has come under criticism by leading scientists and public health professionals both for the content of its label and for the political process by which it came into being. For instance, critics charge that the inclusion of “nutrients to encourage” may lead consumers to perceive nutritionally poor foods as healthier than they otherwise would (Brownell & Koplan, 2011), a point supported by research demonstrating that relative nutrition labels (e.g., “no cholesterol,” “low fat”) can lead consumers to misperceive foods as being healthy in other, unclaimed ways (e.g., as low calorie) (Andrews, Netemeyer, & Burton 1998; Wansink & Chandon, 2006). Grocery Manufacturers of America and the Food Marketing Institute have also been criticized for moving ahead with Facts Up Front unilaterally, despite having been in discussions with other interested parties (including the White House and the Food and Drug Administration) as well as the commissioning by the Centers for Disease Control and Prevention of an independent body—the Institute of Medicine—to develop a uniform labeling system for the U.S. marketplace, actions that have further raised questions regarding whether industry-driven labeling systems are in the best interest of the consumer public (Brownell & Koplan, 2011).

Although Facts Up Front refocused attention on front-of-package labels in the United States and the need for a uniform labeling system, similar systems were previously in place. In 2008 Kellogg unveiled its “Nutrition at a Glance” label that appeared in the upper right corner of cereal packaging and conveyed the amount of calories, total fat (g and %DV), sodium (mg and %DV), and sugar (g) in a
single serving, as well as the amount of select micronutrients (e.g., Vitamin A) (%DV) (Narayan, 2010). Shortly thereafter, Kellogg partnered with other major food companies (including Kraft and Unilever) to develop the Smart Choices label. With its simpler design that featured a green checkmark, the label was used briefly 2009 on foods meeting specified nutritional criteria; however, it was quickly suspended amid criticism for its appearance on high-calorie, high-sugar breakfast cereals marketed to children (Neuman, 2009; Roberto, Shivaram, Martinez, Boles, Harris, & Brownell, 2012). Adding to consumer confusion, front-of-package labels are also administered by independent organizations, such as the American Heart Association (AHA) “Heart-Check Mark,” which indicates that a food meets the organization’s standards for cardiovascular health (AHA, 2012). In addition to these formal labeling initiatives, “healthy” nutrient claims (e.g., “0 g trans fat,” “a cholesterol-free food”) have become commonplace on the front of food packages (Brandt, Moss, Ellwood, Ferguson, & Asefa, 2010). Considering the myriad front-of-package labels currently in use, scholars have argued for developing a uniform labeling system with tighter, evidence-based standards, to help decrease consumer confusion and promote truly healthier choices (Brownell & Koplan, 2011; Nestlé & Ludwig, 2010). This need is perhaps most apparent in the case of front-of-package labeling on relatively poor nutrition snack foods, such as candy bars.

FRONT-OF-PACKAGE LABELS ON CONFECTIONS

In 2009 a leading confectionary company, Mars Incorporated, implemented its own front-of-package labeling system as part of its “Healthy Living” initiative. Known as Guideline Daily Amounts (GDA), the system is “designed to help consumers quickly and easily locate key nutrition information and make informed choices about their diet, at point of purchase” (Mars Incorporated, 2012). Although similar in appearance to the Facts Front label, the GDA label features some differences. First, only the “calorie label” (also known as a calorie flag) appears on the front of the package, where it indicates the number of calories and percent daily value (%DV) per pack. On the back of the package is the “ingredients label,” which displays the calorie content alongside other nutrients such as total and saturated fat (g and %DV), sugar (g), and sodium (mg and %DV). Second and especially relevant to the present work, GDA labels are green in color. Mars reportedly settled on this particular label design after market research revealed it was “the clear favorite among consumers” (Mars Incorporated, 2012). It is possible, however, that this consumer preference reflects more than purely aesthetic considerations: Green labels may alter how people perceive the nutritional information conveyed by the label, perhaps leading them to perceive candy—likely seen as a “vice” food under normal circumstances (Rozin, Ashmore, & Markwith, 1996)—in a healthier light.

GREEN FOOD LABELS

Although at first glance it would appear to be content-free, color itself carries symbolic meaning with psychological implications (Elliot, Maier, Moller, Friedman, & Meinhardt, 2007). For instance, black symbolizes evil in many cultures whereas white symbolizes goodness and moral purity (Adams & Osgood, 1973; Frank & Gilovich, 1988; Sherman & Clore, 2009), associations that can become activated automatically and shape basic perceptual processes. In one study, participants judging the valence of words as positive or negative made these evaluations more quickly when the word’s valence was congruent with the symbolic meaning of the font color (e.g., when positive words such as gentle appeared in bright-colored fonts; Meier, Robinson, & Clore, 2004). Such effects presumably reflect a metaphor-enriched or “grounded” cognition that enables humans to represent abstract concepts in terms of concrete experiences in the physical world (Lakoff & Johnson, 1980; for a review see Landau, Meier, & Keefer, 2010).

There is reason to expect that chromatic colors, including green, likewise carry associations that are capable of influencing perceptions. In many countries, traffic patterns rely on the shared knowledge that green means “go,” yellow/amber means “slow/prepare to stop,” and red means “stop.” Indeed, some front-of-package labeling systems make explicit use of these associations, most notably the Multiple Traffic Light system developed by the Food Standards Agency in the United Kingdom, which features green, yellow, and red circles to signal relatively healthy, intermediate, and unhealthy nutrient levels, respectively. These meanings may both reflect and underlie color associations that transcend this specific context. For instance, research finds that in achievement contexts (e.g., when students are preparing to take an intelligence test), exposure to red activates avoidance-related perceptions (e.g., localized focus of attention; Maier, Elliot, & Lichtenfeld, 2008) and behaviors (e.g., greater self-distancing from a red versus green exam cover; Elliot, Maier, Binser, Friedman, & Pekrun, 2009). Although green and red may signal “go” and “stop” in goal-relevant contexts such as these, the meaning of colors likely varies markedly with context (Elliot et al., 2009). Just as green represents “go” on traffic lights but pro-environmentalism in the political context, “red” is associated with “stop” but also aggression (Fetterman, Robinson, Gordon, & Elliot, 2011) and romantic attraction (Elliot & Niesta, 2008), to name just a few.

In the food context, green may also evoke approach tendencies and positive impressions that influence how perceivers interpret nutrition labels. As many scholars have noted, the domain of food judgment and choice is one of high goal-relevance. For example, consumers routinely weigh
pleasure and enjoyment goals against health and fitness goals when deciding what to eat (Chernev & Gal, 2010; Fishbach & Dhar, 2005), and people are to some degree hard-wired to approach foods that are rich and delicious (e.g., Birch, 1999; see also Gearhardt et al., 2011). Especially when hungry—a state in which one is naturally motivated to seek out and make decisions about food—the goal-relevant meaning of green as “go” may become activated and shape perceptions in ways that promote a healthier view of poor nutrition foods. Beyond its relevance to goal pursuit, the widespread associations between green and the concept “natural” may further promote healthful impressions. For instance, green is the predominant color on the organic food label administered by the U.S. Department of Agriculture (the USDA Organic seal), and recent findings demonstrate a tendency for consumers to see more natural foods such as organics in a healthier light (e.g., as lower-calorie; Schuld & Schwarz, 2010). Green has also been featured prominently in the design of other “healthy” front-of-package labels (e.g., Smart Choices), raising the possibility of a learned association between green labels and healthy products that may affect health-related judgments.

In light of the appearance of green nutrition labels on the packages of leading candy brands (e.g., M&Ms, Snickers)—including front-of-package calorie flags that are particularly conspicuous to consumers at the point of purchase—the present research examined whether a variable as seemingly content-free with regard to health and nutrition as color can nevertheless influence perceptions of a product’s healthfulness. Study 1 tested whether participants evaluating a candy bar would perceive it as healthier when it bore a green rather than a red calorie label that displayed identical calorie content. Study 2 employed a different color in the comparison condition (white) and examined whether the influence of label color on perceived healthfulness was moderated by individual differences in the importance placed on healthy eating—a possibility suggested by recent reports of greater bias in nutritional judgments among perceivers with strong health goals (Chernev, 2011).

**STUDY 1**

**Method**

As part of a longer laboratory session on “thinking about food,” 93 students (48 males, 45 females) from a large Midwestern university completed this study in exchange for partial course credit. Upon arriving to the lab, participants were seated at individual computer stations. Before beginning the set of computer-administered tasks, the experimenter instructed participants that they would complete a number of tasks related to how people think about food.

**Label condition (green vs. red).** At the beginning of the present task, participants were randomly assigned by computer algorithm to either the green label condition \((n = 47)\) or the red label condition \((n = 46)\). Color was manipulated using Adobe Photoshop software to approximate those currently employed by front-of-package labeling systems. Participants were first presented with the following instructions:

Imagine that you are waiting in line in the checkout lane of a grocery store, and that you are hungry. You see a candy bar, and on the front of the candy bar wrapper is a label that shows the calorie content of the candy bar.

Please look carefully at the calorie label and the candy bar shown below. Then, answer the questions that follow.

Below these instructions was displayed the image of the candy bar and its calorie label. The calorie label indicated that the candy bar contained 260 calories (13% DV) (Figure 1). Depending on condition, the main field of the calorie label was either green or red. Besides this color manipulation, the two conditions were identical in every respect.

**Healthfulness perceptions.** On the same page and directly beneath the candy bar and its calorie label were two questions assessing healthfulness perceptions, a calorie judgment and a healthfulness judgment, that served as the dependent measures: Compared to other candy bars, how many calories do you think this candy bar contains? \((1 = \text{Fewer calories; } 9 = \text{More calories})\) and Compared to other candy bars, how healthy is this candy bar? \((1 = \text{Less healthy; } 9 = \text{More healthy})\). Near the end of the laboratory session, participants reported on personal background items plausibly related to the hypothesized effect, including height and weight (used to compute body mass index, or BMI), age, gender, and current dieting status.

**Results**

First, the calorie judgment measure was reverse-scored and averaged together with the healthfulness judgment \((\alpha = 0.77)\) to create the composite variable, perceived healthfulness. Results revealed a significant effect of label color on perceived healthfulness. As predicted, the candy bar was perceived as healthier in the green label condition \((M = 4.97, SD = 1.29)\) than in the red label condition \((M = 4.37, SD = 1.30)\) \((t(91) = 2.23, p = .03)\), despite the fact that the calorie content information was held constant across conditions (i.e., 260 calories per pack). None of the personal background variables (BMI, age, gender, dieting status) moderated this effect.

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1Similar comparative judgments have been previously employed in research on nutrition judgments (e.g., Schuld & Schwarz, 2010).
FIGURE 1 Candy bar appearing alongside a green versus red calorie label from Study 1. Study 2 employed nearly identical images except that the red-colored field of the calorie label was replaced with white (color figure available online).

Discussion

Results from Study 1 suggest that visual design features of nutrition labels—not simply the nutritional information itself—can influence the perceived healthfulness of food products. Specifically, a candy bar was perceived as healthier when it bore a green front-of-package calorie label than when it bore a red calorie label, despite the labels displaying the same calorie information (260 calories). This finding adds to the literature on the influence of front-of-package labels that has primarily focused on how their presence versus absence influences perceived healthfulness (e.g., Andrews, Burton, & Kees, 2011; Roberto et al., 2012) and carries practical implications given the recent appearance of green nutrition labels on the packages of leading candy brands, which may encourage unwarranted healthy inferences (Brownell & Koplan, 2011).

That the color of the calorie label influenced healthfulness perceptions is consistent with psychological research demonstrating that colors carry meaning (e.g., Elliot & Niesta, 2008; Fetterman et al., 2011). As discussed above, the present finding may reflect generic positive associations carried by green given its “go” symbolism, as well as more domain-specific associations of “natural” that may promote more healthful impressions of food products (Harris Interactive, 2007; Schuldt & Schwarz, 2010). For its part, however, red too may carry associations that contributed to the present effect—for example, generic negative associations given its “stop” symbolism that may promote seeing foods as less healthful. Therefore, it is unclear from Study 1 whether green labels promote healthfulness perceptions or whether they do so only in comparison to red labels.

Study 2 was designed in part to test whether green labels promote healthfulness perceptions in their own right. To this end, the red label condition from Study 1 was replaced with a color-free (white) label condition that served as the control. In addition, in light of recent work linking individuals’ personal health goals to biases in food judgments (Chernev, 2011; Chernev & Gal, 2010), Study 2 assessed the importance that participants placed on healthy eating, which allowed for testing whether this variable moderated the effect of label color on perceived healthfulness.

STUDY 2

Method

Sixty online participants (24 males, 36 females) were recruited via Amazon.com’s crowd-sourcing website, Mechanical Turk, to complete a short (approximately 3-minute) questionnaire on food judgments in exchange for a small fee ($0.10; for a validation of this data source see Paolacci, Chandler, & Ipeirotis, 2010). The experimental procedure was nearly identical to that of Study 1. Participants were again instructed to imagine that they were waiting in line at a grocery store and that they were hungry, and to look at the image of the candy bar and its calorie label (see above). The main difference was that the candy bar’s calorie label appeared in either green (n = 33) or white
(n = 27) (not red as in Study 1), depending on condition. In addition, to assess whether participants were paying adequate attention to the experimental stimuli (especially important in Web-based experiments; see Oppenheimer, Meyvis, & Davidenko, 2009), as a manipulation check, participants reported the color of the calorie label they had just seen on the screen immediately following the food evaluation task. Finally, as part of the personal background questionnaire occurring at the end of the study, participants reported on the importance of healthy eating via the following item (underlining original):

Generally speaking, to what extent is the healthiness of food an important factor in your decisions about which foods to buy and eat? (1 = Not at all important; 7 = Very important).

Results

Manipulation check. Approximately one-third of participants (i.e., 21) failed to correctly identify the color of the calorie label they had just viewed. These participants were excluded from analysis, leaving n = 39 (16 males, 23 females).3

Healthfulness perceptions. As in Study 1, the calorie judgments were first reverse-coded and then averaged together with the healthfulness judgments (α = 0.82) to create the composite variable, perceived healthfulness. The main analysis took the form of an analysis of variance (ANOVA) in which the hypothesized moderator, importance of healthy eating, was entered as a covariate. Although no main effect of label color on perceived healthfulness emerged (t(35) < 1, ns), the interaction effect of label color and importance of healthy eating was significant (t(35) = 2.39, p = .02) (Figure 2). Regressions examining the nature of this interaction revealed a marginally significant negative association between perceived healthfulness and the importance of healthy eating in the white label condition, \( b = -0.58, t(35) = 1.91, p = .06 \). In other words, when evaluating a color-free calorie label, individuals placing more importance on healthy eating tended to perceive the candy bar as less healthful—a pattern that would appear to validate the importance of healthy eating measure. Notably, when the candy bar bore a green calorie label, this negative trend was eliminated, \( b = 0.28, t(35) = 1.44, p = .16 \). As a consequence, individuals placing high importance on healthy eating (\( M + 1SD \)) perceived the candy bar as more healthful when it bore a green (\( M = 5.39 \)) as compared to a white calorie label (\( M = 4.20 \)) (|t| (35) = 2.34, p = .03), suggesting that consumers who are motivated to choose healthy foods, in particular, may be swayed by green nutrition labels. Finally, none of the other personal background variables (BMI, age, gender, dieting status) moderated the effect.

Discussion

Results from Study 2 extend those from Study 1 in important ways. First, they suggest that green labels can promote healthfulness perceptions relative to a color-free (white) calorie label. In contrast to the white nutritional labels employed in the Facts Up Front labeling system, the Guideline Daily Amounts system used by Mars Incorporated features green nutrition labels on the packages of leading candy brands (e.g., M&Ms, Snickers). Although the choice of green labels over white or any other color may appear to be a purely aesthetic one, the present results suggest that green labels carry a health halo that encourages consumers to see a relatively poor nutrition food (a candy bar) as healthier than they otherwise would. Second, the present results suggest that consumers’ health goals play a key role in this effect, such that those placing high importance on healthy eating may be more likely to perceive green-labeled foods as more healthful. This interaction effect appears to be driven by the tendency for consumers with strong health goals to judge a poor nutrition food as less healthful when the food bears a color-free (white) calorie label—a pattern that is eliminated when the food instead bears a green calorie label.

GENERAL DISCUSSION AND CONCLUSION

Front-of-package nutrition labels have become increasingly common in the food marketplace. Although a number of industry-driven labeling systems have been introduced with the promise of helping consumers make healthier food choices, how these labels influence consumer perceptions is not well understood.

The present work examined the color of nutrition labels and its influence on healthfulness perceptions. Building on research from the psychological literature showing that colors carry symbolic meaning capable of influencing judgment and decision-making (e.g., Elliot & Niesta, 2008; Sherman & Clore, 2009), together with consumer research demonstrating that situational cues can powerfully affect calorie estimates and other health-related judgments (e.g., Andrews et al., 1998; Chernev & Gal, 2010; Wansink & Chandon, 2006), it was hypothesized that green front-of-package calorie labels like those currently appearing on leading candy brands would encourage consumers to see those foods as relatively healthful. Results from two experimental studies supported this hypothesis. In Study 1, a candy bar was perceived as more healthful when it bore a green as compared to

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2This manipulation check appeared as a multiple-choice item and participants were unable to return to the previous webpage. Response options were blue, green, red, and white.

3Although the percentage failing the manipulation check might strike the reader as high, the figure is in line with research employing such manipulation checks for the purpose of reducing noise and increasing validity (see Oppenheimer et al., 2009). Indeed, when data from these participants are included in the analyses, the interaction effect of label color and importance of healthy eating falls to nonsignificance, \( r(56) = 1.63, p = .11 \).
a red calorie label, despite the fact that the labels displayed identical calorie content (i.e., 260 calories per package). In Study 2, the same candy bar, when it bore a white calorie label, was perceived as marginally less healthful as perceivers placed more and more importance on healthy eating—a pattern that was eliminated when the candy bar bore a green label. Overall, these findings appear to reflect an association between green and “healthy,” perhaps rooted in generic positive associations carried by green and/or its associations with “natural,” that is capable of influencing health-related judgments independent of the objective nutrition information conveyed by the label.

The results from Study 2, which suggest that green calorie labels buffer relatively poor nutrition foods from appearing less healthful among those especially concerned with healthy eating, are consistent with recent research on biases in nutrition judgments. In their work on “the dieter’s paradox,” Chernev and colleagues (Chernev, 2011; Chernev & Gal, 2010) report that meals containing a relatively unhealthy item and a relatively healthy one receive lower calorie estimates than meals containing the unhealthy item alone. Interestingly, this bias is most pronounced among consumers who are more concerned with managing their weight, that is, those who are presumably highly motivated to make accurate calorie estimates. The researchers surmise that this finding is rooted in a tendency for the highly weight-concerned to categorize foods as “virtue” or “vice,” and to then employ an averaging heuristic that guides (and biases) calorie judgments. Research on the biasing effects of ethical food labels similarly reveals the importance of perceivers’ personal values and goals in shaping perceptions of healthfulness. For instance, cookies labeled “organic” and chocolate labeled “fair trade” are perceived as more healthful among consumers who value the environment and socially ethical food production, respectively (Schuldt, Muller, & Schwarz, 2012; Schuldt & Schwarz, 2010). Likewise, in the present work, individuals who are highly motivated to choose healthy foods may be particularly attuned to and influenced by “healthy” cues, including green nutrition labels. Taken together, these findings suggest that when food targets reflect a valued aspect of one’s identity (e.g., “healthy eater,” “environmentalist”), consumers may be inclined to see those foods in an unrealistically positive light, consistent with the logic of halo effects (e.g., Asch, 1946; Kelley, 1950).

The present work is not without limitations. The two experimental studies reported here utilized relatively small convenience samples of college students and Amazon Mechanical Turk participants, primarily because the meaning of the color green in the health context was expected to be culturally shared. Nevertheless, the use of these populations may limit the generalizability of these results, and future research may fruitfully explore whether these effects are robust among other key populations (e.g., food shoppers). In addition, both experiments used a relatively poor nutrition food, a candy bar, as the target food. Given the attention paid to the negative effects of diets high in added sugar (e.g., obesity and diabetes)—and the consumption of sugar-sweetened beverages such as soda and sugary breakfast cereals in particular (e.g., Harris et al., 2009; Hu & Malik, 2010; Popkin & Nielsen, 2003; Schulze et al., 2004)—research should explore whether similar effects are observed for these foods as well, which Americans may consume more often than candy bars. Finally, the present work focused on the influence of green front-of-package labels on health-related perceptions, leaving open the important question of whether label color has corresponding effects on health-related behaviors (e.g., purchasing and consumption).

These results carry implications for front-of-package nutrition labeling systems that have emerged in Europe and...
the United States in recent years. Although the question of whether green calorie labels affect purchasing behavior and actual consumption awaits future research, the present data suggest that label color can influence the extent to which consumers see foods as a healthful choice. In the United States, green has been featured in the design of other industry-driven front-of-package labeling systems beyond Mars’ Guideline Daily Amounts, including Smart Choices and Nutrition at a Glance. As government organizations including the Food and Drug Administration consider developing a uniform front-of-package labeling system for the U.S. marketplace, these findings suggest that the design and color of the labels may deserve as much attention as the nutritional information they convey.

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