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Research report

Is less always more? The effects of low-fat labeling and caloric information on food intake, calorie estimates, taste preference, and health attributions ☆

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ABSTRACT

The present study examined whether low-fat labeling and caloric information affect food intake, calorie estimates, taste preference, and health perceptions. Participants included 175 female undergraduate students who were randomly assigned to one of four experimental conditions. A 2 × 2 between subjects factorial design was used in which the fat content label and caloric information of chocolate candy was manipulated. The differences in food intake across conditions did not reach statistical significance. However, participants significantly underestimated the calorie content of low-fat-labeled candy. Participants also rated low-fat-labeled candy as significantly better tasting when they had caloric information available. Participants endorsed more positive health attributions for low-fat-labeled candy than for regular-labeled candy, independent of caloric information. The inclusion of eating attitudes and behaviors as covariates did not alter the results. The study findings may be related to the "health halo" associated with low-fat foods and add to the research base by examining the interaction between low-fat and calorie labeling.

Introduction

In a recent survey, almost 70% of American adults were identified as overweight or obese (Flegal, Carroll, Ogden, & Curtin, 2010). Food intake and possibly overconsumption may be influenced by people's perception of food's healthiness and fat content. People tend to categorize foods according to heuristic principles such as healthy vs. unhealthy or good vs. bad foods (e.g. Oakes & Slotterback, 2001a), and one of the primary factors influencing food choices is perceived healthiness (Paquette, 2005). Indeed, 48% of participants in a national sample agreed with the statement that most foods are either good or bad for one's health (Rozin, Ashmore, & Markwith, 1996). People tend to base their judgments about the healthiness of food on factors such as the food's perceived fat content (Carels, Harper, & Konrad, 2006) and its perceived capacity to affect body weight (Carels, Konrad, & Harper, 2007). Roefs and Jansen (2004) demonstrated that people predicted they would consume less of a milkshake when it was labeled as high-fat than when the same milkshake was labeled as low-fat. Similarly, participants served themselves 28% more M&M's when they were labeled as low-fat than when they were labeled as regular-fat (Wansink & Chandon, 2006). More recently, participants consumed an additional 35% when oatmeal cookies were described as having been prepared with "healthy" ingredients (e.g. low in saturated fat) compared to a condition in which the cookies were described as containing "less healthy" ingredients (e.g. butter; Provencher, Polivy, & Herman, 2009). Shide and Rolls (1995) revealed possible overcompensation following consumption of food labeled as low-fat; women who received a yogurt labeled as low-fat consumed more calories during a subsequent lunch than they did after receiving yogurt with identical energy content, but labeled as high-fat. In addition, Chandon and Wansink (2007) introduced the "health halo" effect, referring to the finding that people tend to underestimate the calorie content of foods in restaurants where food choices are advertised as healthy, compared to restaurants that do not advertise a healthy image.

One of the public health efforts that has been undertaken to increase people's awareness of caloric consumption is the introduction of calorie labeling on food menus (Ludwig & Brownell, 2009). Harnack and French (2008) reviewed six studies on the effects of calorie labeling on menu choices, including five studies that supported the hypothesis that having caloric information available

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will enable customers to make more low-calorie choices, while one study reported a non-significant effect of calorie labeling. However, not only do these studies show small effects, they also resulted in some inconsistent findings which have been attributed to methodological problems (Harnack & French, 2008). Furthermore, a laboratory experiment asking participants to choose items from a McDonald's menu failed to show a difference in calorie choices when this information was available (Harnack et al., 2008). On the contrary, a real-world study observing consumers' purchasing behaviors in fast-food chains reported that people who had caloric information available chose menu options that were significantly lower in calories than consumers who did not have access to this information (Bassett et al., 2008). Similarly, when participants were informed of the calorie content of menu options, they ordered food that contained significantly fewer calories than when participants were unaware of the calories (Roberto, Larsen, Agnew, Baik, & Brownell, 2010). A recent study compared data from New York Starbuck's coffee stores before and after the new menu-labeling policies had been implemented and found that the added caloric information caused customers to purchase foods that had 6% fewer calories while the revenue remained the same (Bollinger, Leslie, & Sorensen, 2011). However, it is important to note that this change translated to only a 15 calorie decrease (Bollinger et al., 2011).

In sum, external factors such as low-fat claims and calorie labeling may play an important role in food intake and possibly overconsumption. The main objective of the current study was to examine the effect of low-fat labeling on food intake, calorie estimates, taste preference, and health attributions. Of further interest was whether knowledge of the food's actual calorie content would impact and possibly reduce the "health halo" effect caused by low-fat claims. We predicted that after learning about a single supposedly healthy attribute of a food product (i.e., low-fat), participants would apply a "health halo" to other attributes of the food as well (e.g., calories), which may in turn lead to increased consumption, greater perception of healthiness, and lower calorie estimates. Further, we hypothesized that this effect would be attenuated when participants have caloric information available. Finally, it has been suggested that chronic dieters (restrained eaters) may respond differently to food than unrestrained eaters, particularly when it is perceived as a diet food (Scott, Nowlis, Mandel, & Morales, 2008). Therefore, restrained eating and eating disorder pathology were assessed to account for potential differences between experimental groups.

Methods

Participants and procedure

Study participants

Participants for this study were undergraduate women from the University of Hawaii who received course credit for their participation. In line with previous study samples (Provencher et al., 2009) the current study only included female participants. In addition, it has been shown that, compared to men, women appear to depend more on fat content information than on other factors when evaluating a food's healthiness (Oakes & Slotterback, 2001a,b,c). Participants ($N = 175$) self-identified as Asian (36.6%), mixed ethnic heritage (34.3%), Caucasian (24.0%), Pacific-Islander (3.4%), and Hispanic (1.7%). Participants' mean (*SD*) age was 20.86 (4.32) years and mean BMI was 22.62 (4.28) kg/m^2. The majority (71.8%) of participants was normal weight (BMI 18.5–24.9), 14.4% were overweight (BMI 25–29.9), 6.3% were obese (BMI $\geqslant 30$) and 7.5% were underweight (BMI $\leqslant 18.5$). The study was approved by the University of Hawaii Institutional Review Board, and informed consent was obtained from all participants.

Procedure

The current study was advertised as a market research study involving a taste-rating task for a new type of M&M's. Participants arrived in a pre-meal state (at least 2 h without food prior to the experiment) and were randomly assigned to one of four experimental conditions: (1) low-fat-labeled with caloric information, (2) low-fat-labeled without caloric information, (3) regular-fat-labeled with caloric information, and (4) regular-fat-labeled without caloric information. A pre-weighed glass pitcher containing approximately 2530 g of unusually colored M&M's (teal, silver, and gold) was presented to participants with a taste-rating form and a bottle of water. A 6.5 × 4.5 in. place card was displayed. In the [low-fat/regular]-labeled condition the place card read "New Colors of [Low-Fat/Regular] M&M's". In the two conditions in which participants were informed of the calorie content the place card in the [low-fat/regular]-labeled condition read "New Colors of [Low-Fat/Regular] M&M's – 240 cal per serving; 1.69 oz, ~55 M&M's". Furthermore, a short instruction was read aloud, instructing participants to taste and rate the M&M's and repeating the labeling and caloric information provided. Participants were given 15 min to taste the M&M's and fill out the taste rating form (described below).

After removal of the M&M's and place card, participants were asked to rate how hungry they were prior to the taste-rating task. A manipulation check included two multiple choice questions: "Were you given caloric information for the M&M's that you have tried?" (1 = *Yes*, 2 = *No*, 3 = *Don't know/don't remember*); "What kind of M&M's did you try?" (1 = *Low-Fat*, 2 = *Regular*, 3 = *Don't know/don't remember*). Participants completed the questionnaires described below (presented in counterbalanced order) and were measured for height and weight on a stadiometer and digital scale, respectively. Food intake was assessed by weighing the glass jar of M&M's before and after the taste-rating on a digital scale, to the nearest 0.1 g.

Measures

Taste preference

A six-item taste-rating form measured the perceived palatability of the snack tested as part of the cover-story. Taste preference was assessed by asking "How good did this snack taste to you?" Items were rated on a 5-point Likert scale from 1 = *Not (i.e. good) at all* to 5 = *Very (i.e. good).*

Health attributions

To assess participants' perceptions of the snack food, they answered three health- and weight-related questions (Provencher et al., 2009) on five-point Likert scales. Specifically, they were asked (1) "*How healthy is this snack that you tried for you?*" (1 = *very unhealthy* to 5 = *very healthy*), (2) "*If you were eating this snack regularly, how would it affect your weight?*" (1 = *I would lose a lot of weight* to 5 = *I would gain a lot of weight*), and (3) "*Do you think this snack would belong in a healthy diet?*" (1 = *would belong very well* to 5 = *would not belong at all*). Participants were also asked to estimate the calorie content of a serving size of the chocolate candy they had tasted (*"How many calories do you think are in one serving size (1.69 oz) of the M&M's that you tried? One serving size equals 55 M&M's."*).

Eating Attitudes Test

The Eating Attitudes Test-26 (EAT-26; Garner, Olmsted, Bohr, & Garfinkel, 1982) is a 26-item self-report questionnaire designed to assess problematic eating attitudes and behaviors. Responses are rated on a six-point scale, from 1 = *never* to 6 = *always,* and summed for a total score (sample item: *"I find myself preoccupied*