Perceived healthiness of food: If it’s healthy, you can eat more!

Véronique Provencher, Janet Polivy, & C. Peter Herman

Department of Psychology, University of Toronto, Canada

Corresponding Author (and requests for reprints):
Véronique Provencher, RD, Ph.D.
Department of Psychology, University of Toronto at Mississauga
3359 Mississauga Rd N., Mississauga, ON L5L 1C6
Phone: (905) 828-3957; Fax: (905) 569-4326
E-mail: veronique.provencher@utoronto.ca

This research was supported by a grant from the Canadian Institute for Health Research to the first author and from the Social Sciences & Humanities Research Council to the second and third author.
Abstract

The main aim of this study was to investigate the effects of food-related beliefs about the healthiness of foods, restrained eating, and weight salience on actual food intake during an *ad libitum* snack. In a 2 (healthy vs. unhealthy) by 2 (restrained vs. unrestrained eaters) by 2 (weight salient vs. not salient) factorial design, 99 female undergraduate students were invited to taste and rate oatmeal-raisin cookies. Dietary restraint and weight salience did not influence snack intake, but participants ate about 35% more when the snack was regarded as healthy than when it was seen as unhealthy. Ratings of the snack food’s “healthiness,” “capacity to affect weight” and “appropriateness in a healthy menu” also indicated that the “healthy” manipulation was effective. In addition, the “weight salience” manipulation appears to influence perceptions about food differently in restrained versus unrestrained eaters, in that restrained eaters rated the snack food more negatively than unrestrained eaters did when they received weight feedback before eating. Beliefs about the healthiness of foods may thus be of great relevance to both food intake and weight gain.

**Key words:** Food perceptions, food intake, restrained eating, weight, eating behavior.
Introduction

Calorie-restricted diets are the weight-loss strategy of choice for overweight and obese individuals; unfortunately these diets do not appear to be successful on a long-term basis (Miller, 1999; Polivy & Herman, 2002). Consequences of caloric restriction, such as hunger and disinhibited eating, have been related to weight regain (Elfhag & Rossner, 2005). Restrictive diets may also increase appetite (Doucet et al., 2000) and the frequency of obsessive thoughts about food and eating (Hart & Chiovari, 1998). Polivy, Coleman, and Herman (2005) reported a significant effect of deprivation on craving and overeating, mainly in restrained eaters, suggesting that eliminating “forbidden” foods may be counterproductive as a strategy for better managing food intake. Nevertheless, energy intake is obviously a core component in weight management, as is encouraging individuals to make healthier food choices. We still do not fully understand which factors determine, individually or in combination, healthy eating patterns.

Perceptions of healthy eating could be considered as one of the many determinants of eating patterns (Paquette, 2005). Previous studies have shown that foods can be (and often are) categorized as healthy or unhealthy (Oakes & Slotterback, 2001; Carels, Harper, & Konrad, 2006; Carels, Konrad, & Harper, 2007). Various factors may influence the healthy/unhealthy categorization of foods, such as their perceived fat content (Carels et al., 2006) as well as some stereotypical beliefs related to their names (Oakes, 2006).

Furthermore, it has been demonstrated that perceptions about healthiness or “fatteningness” of foods may bias estimations of caloric content of foods (Carels et al., 2006; Carels et al., 2007). More specifically, when compared to the actual caloric content of the foods, “healthy” food choices were perceived as having a lower caloric content (underestimation)
whereas “unhealthy” food choices were considered as having a higher caloric content (overestimation) (Carels et al., 2006; Carels et al., 2007). Moreover, restaurants claiming to serve “healthy” foods may lead consumers to underestimate the caloric density of the foods they offer (Chandon & Wansink, 2007). The “health halo” effect refers to the fact that individuals are more likely to underestimate the caloric content of main dishes and to choose high-caloric side dishes in restaurants claiming to offer “healthy” food choices (e.g., Subway) than in restaurants that do not make that claim (e.g., McDonalds) (Chandon & Wansink, 2007). Low-fat nutrition claims could also contribute to overeating by increasing consumer’s serving-size estimate and reducing guilt associated with eating (Wansink & Chandon, 2006). These results suggest that food intake may be influenced by beliefs about the healthiness of foods. The present study is thus designed to test the associations between such food beliefs and actual food intake.

Some limited previous research has suggested that individual differences could have an impact on food-related beliefs and accordingly may influence caloric estimation (Carels et al., 2007). For example, even though both dieters and non-dieters were inaccurate in estimating the caloric content of foods, current dieters were less inaccurate, showing a smaller discrepancy between their caloric estimations of foods and the actual caloric content of these foods than did non-dieters (Carels et al., 2007). However, some differences in the behaviors of chronic dieters (restrained eaters) and current dieters (people who simply report being on a diet at this moment) have been reported, with chronic dieters often being more likely to overeat in response to situational provocations (e.g., Polivy, 1996). In addition, restrained eaters are usually engaged in a long-term struggle to achieve (or at least maintain) a body shape that conforms to society’s thin-ideal female physique
(e.g., Polivy & Herman, 2007) whereas the restrictive eating behaviors of current dieters might reflect a relatively short-term restriction (e.g., until they reach a limited weight-loss target). Restrained eating or chronic dieting, then, may differ from current dieting in how it influences the relations between food-related beliefs about healthiness of foods and actual food intake.

Food intake in restrained eaters also appears to be strongly affected by weight feedback. Restrained eaters who were led to believe that they were heavier than they previously thought ate significantly more during a subsequent “taste test” than did restrained eaters who did not receive such weight feedback; they also ate more than did unrestrained eaters (regardless of whether or not they received false weight feedback) (McFarlane, Polivy, & Herman, 1998). This finding suggests that simply being weighed (i.e., having one’s weight made salient) could alter the effects of food-related beliefs on actual food intake in restrained eaters.

The main objective of the current study was to investigate the effects of food-related beliefs about the healthiness of foods on actual food intake during an *ad libitum* snack. In addition, we were interested in examining the extent to which restrained eating and having one’s weight made salient might moderate the effects of food-related beliefs on food intake (during an *ad libitum* snack as well as the day’s total energy intake). As underestimations of caloric content of healthy food have been previously observed (Carels et al., 2006; Carels et al., 2007; Chandon & Wansink, 2007), we hypothesized that food intake would be greater if the *ad lib* snack was described as “healthy” rather than “unhealthy.” Given that perceived caloric content is affected by perceptions of healthiness, we also predicted that the “healthy” snack will be estimated as having lower caloric content that the “unhealthy”
snack. Further, we predicted that food intake during a “healthy” *ad lib* snack would be higher in restrained eaters than in unrestrained eaters, and that the opposite would be observed with the “unhealthy” *ad lib* snack. In fact, chronic dieters might be more susceptible to overeat healthy food because beliefs about the food’s healthiness could authorize them to eat; by the same token, perceiving the food to be unhealthy might have a more powerful inhibitory effect on the intake of restrained eaters. Finally, because restrained eaters were sensitive to weight feedback (McFarlane et al., 1998), and because simply being weighed could remind them that they should restrain their eating, we predicted that the intake of a “healthy” or “unhealthy” *ad lib* snack would be lower in restrained eaters weighed before eating than in restrained eaters who were weighed after eating or in unrestrained eaters (weighed before or after eating).

Methods

Participants and study design

Participants were 99 female undergraduate students (mean age = 19.4 ± 2.8 yrs; mean body mass index [BMI] = 23.2 ± 4.2 kg/m²) recruited online from the introductory psychology course at the University of Toronto at Mississauga. They were invited to participate in a market-research study investigating various dimensions of new snack products. In compensation for their participation in the 2 sessions of the study, participants received experimental course credit or were paid a small fee ($20). The study was approved by the Office of Research Ethics at the University of Toronto, and all participants provided informed consent.
Participant were randomly assigned to one of the experimental conditions in a 2 (healthy vs. unhealthy) by 2 (restrained vs. unrestrained eater) by 2 (weight salient or not) factorial design. Each participant was tested on an individual basis twice, in separate 45-minute experimental sessions (between 11:00 a.m. and 5:00 p.m. for the first session and between 9:00 a.m. and noon for the second session).

**Measurements and procedure**

*Taste-rating task.* Participant arrived at the laboratory for their first appointment in a pre-meal state (i.e., at least 2 hours without food prior to the experiment). At that time, participants were informed that this market-research study involved a taste-rating task in which they would taste and rate a new snack food. More specifically, a pre-weighed plate of approximately 500g of freshly baked bite-sized English Bay oatmeal-and-raisin cookies was presented to the participant, with a taste-rating form and a glass of water. On average, one bite-size cookie is about 9g, which represents approximately 40 kcal per cookie.

Oatmeal-raisin cookies were then described by the experimenter, but the description given to the participant differed according to the condition to which she was randomly assigned (“healthy snack” vs. “unhealthy snack”). In the “healthy snack” condition, the cookies were described by the experimenter as follows: “The snack product that you have to taste today is a new high-fibre oatmeal snack made with healthy ingredients. You have certainly heard that whole oatmeal is good for your health because it contains soluble fibres. So, this new oatmeal snack is high in soluble fibres, as well as low in saturated fat and free from trans fat.” These are all characteristics of healthy food choices so this description was designed to make the cookies appear to be a healthy snack. In the “unhealthy snack” condition, the cookies were described as “new gourmet cookies made with fresh butter and
old-fashioned brown sugar. So, these new cookies are a great treat with a pleasant, sweet
taste.” The experimenter asked the participant to taste and rate the snack food on the
dimensions listed on the taste-rating form during a subsequent 10-minute period. With
visual analogue scales (VAS) (150mm), the taste-rating form measured the perceived
palatability of the snack tested (i.e., salty, sweet, crunchy, bitter, sour, and good-tasting).
Participants were instructed to eat as many cookies as were needed to achieve accurate
ratings and to feel free to help themselves to cookies after they completed the taste-rating
task, as long as they did not change their initial ratings. After participants completed the
ratings, the plate of cookies was removed and weighed to measure grams of cookies eaten
by each participant.

Weight, height and BMI. Described as normative data collection, weight and height
were measured in all participants, and BMI was then calculated (kg/m²). According to
weight-salience condition randomization (i.e., weight salient or not), measurements were
performed for half of the participants before the taste-rating task whereas the remaining
participants were weighed immediately after the taste-rating task but before the completion
of the questionnaires. The participants were made aware of their weight by being told
directly what their weight was on the scale.

Questionnaires. After the taste-rating task, participants were asked to complete
some questionnaires. The Restraint Scale (Herman & Polivy, 1980) was used to assess
whether participants exhibit behavioral and attitudinal concerns about dieting and weight
control. Participants were categorized as restrained eaters (scores of 15 or higher) or
unrestrained eaters (scores below 15), as performed previously (Goldman, Herman &
Polivy, 1991). The validity of the Restraint Scale has been previously reported (Allison,
Dietary intake. After having completed the first experimental session, participants were told to return to the laboratory the following day to taste and rate a second new snack food. Participants therefore arrived the next morning believing that they would have to taste and rate another snack, but the purpose of the second session was actually to assess food consumption during the previous day (i.e., the day of the experiment). Food intake was assessed by 24-h recall, administrated by the experimenter following standardized procedures. Note that participants were also asked to report the amount of snack they ate during the experiment (self-reported amount of snack intake eaten). A dietician reviewed the food-recall report and calculated nutrient intakes using the Food Processor SQL software (ESHA Research, 2008). At the end of the second session, the participant was informed that there was no additional taste-rating test. The experimenter then explained to her the true purpose of the study and asked her not to discuss any of the details of the study with other people who might participate in the study.
Statistical analyses

A 2 (healthy vs. unhealthy) by 2 (restrained vs. unrestrained eater) by 2 (weight salient or not) analysis of variance (ANOVA) was conducted to assess the effects of these three variables on actual food intake during an *ad libitum* snack as well as on total energy intake during the day of the experiment. Opinions about the new snack food (i.e., “healthy,” “weight-gain” and “appropriateness” ratings, and perceived caloric content) were also analyzed using a 3-way ANOVA. Pearson correlation coefficients were also calculated to assess associations between actual and estimated amounts of snack food eaten, as well as between participants’ ratings of the snack food’s “healthiness,” “capacity to affect weight” and “appropriateness in a healthy menu.” The probability level for significance used for the interpretation of all statistical analyses was set at an alpha level of $p<0.05$, and all data were analyzed using SPSS statistical software (version 15.0 for Windows).

Results

Table 1 presents descriptive characteristics of the sample in each experimental condition. No significant differences were observed between experimental groups for age and BMI, while as expected, a difference in restraint scores was observed between restrained and unrestrained eaters, $F(7,91) = 38.48; p<0.0001$. 
Food consumption

A 3-way ANOVA revealed only a main effect of beliefs about healthiness of food on food intake during the taste test, F(1,91) = 4.92; p<0.05. Participants ate more (14.4g or about 56 kcal or 35% more) when the food was described as a healthy snack (M=56.0, SD=34.6 g; healthy condition) than when it was presented as cookies (M=41.6, SD=27.8 g; unhealthy condition). No differences were found as a function of restraint status or weight salience. When the magnitude of the significant difference observed was assessed using Cohen’s $d$ effect-size (ES) estimates ($d =$ standardized difference, i.e. difference between means divided by their pooled standard deviation [strength of ES defined as small ($d$=0.20 to 0.49), moderate ($d$=0.50 to 0.79) and large ($d \geq 0.80$)] (Cohen, 1992), we obtained an ES of 0.46, which is considered to be a small ES of perceived healthiness of food on intake.

There was a marginal main effect of beliefs about healthiness of food on the amount of snack intake reported in the 24-h food recall, F(1,91) = 3.46; p<0.08. Self-reported amount of snack eaten (in kcal) tended to be higher in the healthy condition (M=195.2, SD=112.9 kcal) than in the unhealthy condition (M=155.8, SD=100.9 kcal). No significant effects were observed for the difference between the actual versus self-reported snack intakes, and the amounts of snack food eaten and reported were significantly correlated, r=0.77; p<0.0001.

Dietary intake during the entire day of the experiment was also assessed by a 24-h food recall and a 3-way ANOVA was performed on total energy intake. While no main effects of beliefs about healthiness of food and weight salience were observed, a main effect of restraint status was noted on total energy intake, F(1,91) = 5.96; p<0.05.
Restrained eaters consumed about 16% (271) fewer kcal during the day of the experiment than did unrestrained eaters.

Opinions about the new snack food

Participant’s ratings of the snack food’s “healthiness,” “capacity to affect weight” and “appropriateness in a healthy menu” were all separately analyzed with 3-way ANOVAs. For the “healthy” rating, there was a main effect of beliefs about healthiness of food, F(1,91) = 32.08; p<0.0001. The snack food tested was perceived as healthier in the healthy condition (M=5.7, SD=1.3) than in the unhealthy condition (M=4.2, SD=1.4), which confirmed the effectiveness of the “healthy” manipulation. Furthermore, a significant interaction between restraint status and weight salience was observed, F(1,91) = 4.02; p<0.05. Making weight salient in restrained eaters decrease their “healthy” rating of the snack when compared to unrestrained eaters, whereas no differences between the two groups were noted when weight was not made salient (see Figure 1).

Similar differences were also observed for the “weight gain” rating of the snack food tested. There was a main effect of beliefs about healthiness of food (F(1,91) = 8.19; p<0.01), with the snack food perceived as having a lower capacity for weight gain in the healthy condition (M=5.2, SD=1.2) than in the unhealthy condition (M=5.8, SD=1.0). A significant interaction between restraint status and weight salience was also observed (F(1,91) = 4.96; p<0.05), indicating that the capacity of the snack to induce weight gain was perceived as higher by restrained eaters than by unrestrained eaters when their weight was made salient (M=5.9, SD= 1.1 vs. M=5.0, SD=1.0, respectively) but not when weight was not made salient (M=5.5, SD= 1.3 vs. M=5.5, SD=1.1, respectively).
Regarding the appropriateness of the snack food in a healthy menu, similar findings were again noted. A main effect of beliefs about healthiness of food was noted (F(1,90) = 18.34; p<0.0001), with the snack being perceived as more appropriate in a healthy menu in the healthy condition (M=5.3, SD=1.2) than in the unhealthy condition (M=4.2, SD=1.4). In addition, a significant interaction between restraint status and weight salience was observed, F(1,90) =11.27; p<0.001. When weight was made salient, restrained eaters rated the “appropriateness” of the snack lower than did unrestrained eaters (M=4.2, SD=1.4 vs. M=5.0, SD=1.0, respectively), whereas when weight was not made salient, restrained eaters rated the snack higher on “appropriateness” than did unrestrained eaters (M=5.4, SD=1.6 vs. M=4.6, SD=1.3, respectively).

A 3-way ANOVA showed no main effect of beliefs about healthiness of food, restraint status or weight salience on the perceived caloric content of a serving of six cookies (healthy condition: M=201.8, SD=234.9 kcal vs. unhealthy condition: M=245.4, SD=423.5 kcal). Pearson correlation analyses showed that a higher “healthy” rating of the snack was associated with (a) a lower “weight-gain” rating (r=-0.32; p<0.002), (b) a higher “appropriateness” rating (r=0.63; p<0.0002) and (c) a higher price for a bag of the snack food tested (r=0.24; p<0.05).

Discussion

The main aim of the present study was to investigate the effects of the perceived healthiness of foods, restrained eating and weight salience on food intake during an *ad libitum* snack. Although restrained eating and weight salience did not influence snack
intake, participants ate about 35% more in the “healthy” condition than in the “unhealthy” condition. The “healthy/unhealthy” manipulation also affected participants’ ratings of the snack food’s “healthiness,” “capacity to affect weight” and “appropriateness in a healthy menu.” Furthermore, the “weight salience” manipulation appears to influence perceptions of food differently in restrained and unrestrained eaters. Restrained eaters had a more negative evaluation of the snack food in general when their weight was made salient before eating, whereas unrestrained eaters had more positive attitudes when their weight was made salient.

As we hypothesized, beliefs about the healthiness of foods significantly affected eating: perceiving a food as healthy increased intake of that food. This finding is in accordance with previous literature; Chandon & Wansink (2007) reported that caloric contents of familiar main dishes from restaurants claiming to offer healthy food choices were estimated by consumers as up to 35% lower in calories than when the dish was from a restaurant not making such health claims. Categorization of foods as healthy, then, may mean that a particular food will be eaten in greater amounts because it is assumed to conduce to health (Ross & Murphy, 1999). Although the difference in perceived caloric content for the healthy versus the unhealthy food in the present study was not significant (due to the extreme variability of the caloric estimates), the healthy food was seen as being not only healthier but more appropriate to eat and less likely to lead to weight gain.

The current study also clearly accords with previous research showing that norms can influence food intake (Herman & Polivy, 2005; Herman & Polivy, 2008). More specifically, beliefs about the healthiness of foods could be described as normative, because such beliefs can serve as an indicator of appropriate intake. Accordingly, our finding that
there was no under-reporting for the amount of snack food eaten (in any condition) suggests that participants generally regarded it as normal to have a higher intake of healthy than of unhealthy foods. Furthermore, believing that cookies were healthy significantly increased food intake among all participants; there was no differential responsiveness between restrained and unrestrained eaters. This finding is in line with Herman and Polivy’s (2008) sensory-normative distinction theory, according to which normative cues affect everyone whereas sensory cues have a more powerful effect in obese and/or restrained individuals. Even if our participants thought they were successfully restricting their food intake, normative beliefs about the healthiness of a given food could lead to overeating (Herman & Polivy, 2007).

While weight salience and restraint status did not influence eating behavior, making weight salient affected restrained and unrestrained eaters’ perceptions of foods differently. Restrained eaters had a more negative evaluation of both healthy and unhealthy snack foods when they received weight feedback before eating, whereas unrestrained eaters gave more positive food evaluations in the feedback-before-eating condition. The strong relation between body dissatisfaction and dietary restraint (van Strien et al., 2007), and the fact that restrained eaters had a higher BMI than did unrestrained eaters (p<0.01), might explain why making weight salient adversely influences food perceptions only in restrained eaters. Because of their greater weight dissatisfaction and greater perceived need for weight control, restrained eaters may feel more negatively about foods in general when their weight is made salient to them. Food-related goals are likely to influence perceptions of food (Carels et al., 2007). Our results also showed that restrained eaters reported consuming about 16% fewer kcal than did unrestrained eaters in the 24-hour recall,
suggesting that they were actually trying to control their weight. Nevertheless, despite the
fact that dieters should be better able to estimate the caloric content of foods (Carels et al.,
2007) and they were less convinced that the snack food was good for them (at least when
weight was made salient), restrained eaters nevertheless ended up eating the same amount
of food in the laboratory as did unrestrained eaters in both the healthy and unhealthy
conditions. Their restrictive attitudes and behaviors clearly did not successfully prevent
them from eating more of the “healthy” snack.

Conclusion

Although this study has some limitations (e.g., female undergraduate students are not
necessarily representative of the general population), these findings contribute to a better
understanding of how perceptions of food may influence food intake. Future studies should
address this issue in males and older adults of both sexes, as well as in overweight/obese
individuals; do beliefs that a given food is healthy make everyone eat more? Beliefs about
the healthiness of foods need to be understood in the context of making healthy eating
recommendations and claiming health benefits for food products in a society facing an
increased prevalence of overeating and obesity.

Acknowledgment

The first author is recipient of fellowships from the Canadian Institutes of Health Research
and Canadian Diabetes Association. The authors would like to express their gratitude to
Mary Grace Lao, Maria Krisselle Galvez and Mickey Kaur for their help in the data
collection.
References


Table 1: Descriptive characteristics of the sample in each experimental condition (Mean ± SD)

<table>
<thead>
<tr>
<th></th>
<th>Healthy snack description</th>
<th>Unhealthy snack description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Restrained eaters</td>
<td>Unrestrained eaters</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>Weight</td>
<td>Weight not</td>
</tr>
<tr>
<td>salient</td>
<td>salient</td>
<td>salient</td>
</tr>
<tr>
<td>(N=12)</td>
<td>(N=12)</td>
<td>(N=12)</td>
</tr>
<tr>
<td><strong>Age (yrs)</strong></td>
<td>19.1±1.6</td>
<td>19.3±1.2</td>
</tr>
<tr>
<td><strong>BMI (kg/m²)</strong></td>
<td>23.5±3.6</td>
<td>25.3±6.7</td>
</tr>
<tr>
<td><strong>Restraint score</strong></td>
<td>17.1±1.7</td>
<td>21.0±3.0</td>
</tr>
</tbody>
</table>
1 **Title for figure**

2

3 **Figure 1**

4 Mean “healthy” rating of the snack food tested (± SD) (unitless scores) for unrestrained and restrained eaters, exposed to the salient weight condition or no salient weight condition.