Changes in Food Attitudes as a Function of Hunger

D. I. LOZANO, S. L. CRITES and S. N. AIKMAN
Department of Psychology, University of Texas at El Paso

This experiment investigated whether hunger selectively influences attitudes toward common food items. Participants completed a take-home questionnaire on which they rated their attitudes toward food and non-food items when they were either hungry (45 participants) or not hungry (45 participants); after returning the questionnaire, participants completed a second take-home questionnaire in the opposite hunger condition. Results of both between-subject and within-subject analyses revealed that participants rated foods more positively when hungry compared to not hungry and that there was no difference in the ratings of non-foods when hungry vs. not hungry. Moreover, attitudes toward high-fat foods changed more as a function of hunger than attitudes toward low-calorie foods. As attitudes are important for guiding behavior, these results suggest that food attitudes influence daily eating patterns and consumer decisions regarding food purchases. The findings may also have important health implications because hunger exerts a greater influence on attitudes toward high-fat foods.

INTRODUCTION

Attitudes, which are relatively permanent and stable evaluative summaries about an item, are an important psychological construct because they have been found to influence and predict many behaviors (e.g. Kraus, 1995). Relatively little is known, however, about the relation between food attitudes and eating, even though proper food selection is essential for health and survival. Recent research has started to examine how food preferences, or food attitudes, develop and affect long-term eating habits (e.g. see Birch, 1987; Galef, 1988; Rozin, 1988). Considerably less is known, however, about whether and how food attitudes are influenced by hunger.

Although there is little research examining the relation between hunger and food attitudes, there is considerable research demonstrating that hunger influences taste evaluations (for reviews see Cabanac, 1979; Fantino, 1984; Scott, 1990). Cabanac and Duclaux (1970), for instance, had participants taste and evaluate sucrose solutions following 12 h of food deprivation and following ingestion of glucose; participants rated the taste of these solutions as less positive following glucose ingestion. Studies with non-humans also reveal that motivational factors influence affective or evaluative...
taste reactions to foods (for reviews see Berridge, 1996; Grill & Berridge, 1985). Research demonstrating that hunger alters taste evaluations, however, does not necessarily imply that hunger will similarly affect food attitudes because there are two important distinctions between taste evaluations and attitudes. First, taste evaluations reflect a single type of evaluative judgment about an item whereas attitudes are evaluative summaries that can include various types of evaluative judgments (e.g. Crites et al., 1994). In fact, the attitude concept may provide a theoretical framework for integrating various factors that are important for determining food preferences and guiding food selection. That is, research has demonstrated that numerous factors such as sensory qualities, consequences of ingestion, social influences and cognitive beliefs are important for determining food preferences (e.g. see Birch, 1987; Galef, 1988, 1996; Hill & Blundell, 1982/3; Rozin & Fallon, 1980; Rozin & Schulkin, 1990; Sclafani, 1989). Thus, hunger might influence an individual's taste evaluation, but not significantly affect an individual's attitude if, for example, the attitude was based on social factors or health beliefs. Second, taste evaluations are online judgments that can easily change from one instance to the next whereas attitudes are relatively stable memory constructs that are not easily changed (e.g. Olson & Zanna, 1993). For example, an individual's positive attitude toward lasagna that is based on years of experience is unlikely to change because of a single instance in which the individual eats lasagna that does not taste good (i.e. individual has a single negative taste evaluation).

Though research on taste evaluations does not necessarily imply that hunger affects food attitudes, there is some indirect evidence that hunger may influence food attitudes. A handful of studies have had participants dichotomously rate food items as acceptable or unacceptable and examined whether the number of items that are endorsed as acceptable varies with hunger (e.g. Blundell & Rogers, 1980; Hill et al., 1984; Rolls et al., 1988). These food checklist measures, however, may assess behavioral intentions or willingness to eat foods and not attitudes toward food. A long history of research demonstrates that attitudes and behavioral intentions are different constructs, and, although behavioral intentions are hypothesised to mediate the relation between attitudes and behaviors, factors can directly influence behavioral intentions and subsequent behavior without affecting attitudes (Ajzen, 1987; Ajzen & Fishbein, 1977). Thus, when people are hungry, they may change their behavioral intentions toward eating foods and endorse more food items as acceptable on a food checklist without changing their attitudes. That is, a person who is hungry may still dislike a food but be willing to eat it. A second potential shortcoming of food checklist measures is that the dichotomous format of the judgment (i.e. indicating whether a food is acceptable or unacceptable) gives them only limited sensitivity. Dichotomous measures can detect category changes (i.e. negative to positive) but not intensity changes that occur within a category (i.e. very negative to slightly negative).

The primary purpose of this experiment is to assess whether hunger influences attitudes toward foods. In this experiment, we attempt to extend previous research, which has revealed that hunger influences taste evaluations, by demonstrating that hunger influences attitudes toward food but not attitudes toward non-foods. A secondary purpose of this experiment is to investigate whether hunger differentially influences attitudes toward foods with different macronutrient compositions.
Method
Participants

Data from 90 participants (38 male and 52 female) were included in the analyses after incomplete data from two participants were discarded. Participants were undergraduate students at the University of Texas at El Paso who participated in order to partially fulfill a course requirement.

Materials

The principle dependent measure was an attitude questionnaire that contained 32 attitude items that participants rated on three positive unipolar and three negative unipolar scales. The positive unipolar scales were labeled like, positive and good; the negative unipolar scales were labeled dislike, negative and bad. Participants rated the extent to which each of these six scales described their reaction toward each attitude item on a 4-point scale (not at all, slightly, moderately and very much). The attitude questionnaire was arranged such that participants rated all 32 items on one scale (e.g. like), then on a second scale (e.g. negative), and so on. Unipolar scales were used rather than bipolar scales that are more traditional, because there is some evidence that the positive and negative substrates underlying attitudes may be separable (e.g. Cacioppo & Berntson, 1994; Thompson et al., 1995).

Three different forms of the attitude questionnaire were used. Each form contained the same set of eight animal, eight activity and eight color attitude items, but each form contained a different set of two high-fat, two high-protein, two high-carbohydrate and two low-calorie foods (see Table 1). Using three different forms allowed more items from each of the four macronutrient categories to be included and thus helped reduce idiosyncratic effects that might be associated with any one food item.

The experimental materials also included: (1) a biographical information form to assess gender, age, height and weight; (2) the revised restraint scale (Herman & Polivy, 1980) to assess dietary restraint; (3) a physiological-state questionnaire to assess hunger, thirst and tiredness; and (4) the PANAS (Watson et al., 1988) to assess mood. Analyses examining gender, body mass (computed using height and weight) and revised restraint showed no significant effects; therefore, these variables will not be discussed further.

Procedure

When participants arrived for the first session, the experimenter explained that the purpose of the experiment was to examine whether physiological states influence reactions toward objects, characteristics and activities. Although the experiment examined only two states (hungry and not hungry), we led participants to believe that six states (hungry, not hungry, thirsty, not thirsty, tired, not tired, emotionally agitated and emotionally calm) were being examined to help mask the true purpose of the experiment. The experimenter then explained that the experimental procedures required participants to: (1) take home a questionnaire and complete it when experiencing one of the six states; (2) return the questionnaire; (3) take home a second questionnaire and complete it when experiencing a different physiological state; and (4) return the second questionnaire.
Table 1

<table>
<thead>
<tr>
<th>Category</th>
<th>Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animals</td>
<td>Lion, Flamingo, Snake, Panda Bear, Rat, Chimpanzee, Tarantula, Wolf</td>
</tr>
<tr>
<td>Activities</td>
<td>Mowing, Studying, Listening to Music, Swimming, Going to the Movies,</td>
</tr>
<tr>
<td></td>
<td>Cleaning, Dancing, Playing Tennis</td>
</tr>
<tr>
<td>Colors</td>
<td>Red, Yellow, Blue, Green, Purple, Gray, Brown, Pink</td>
</tr>
<tr>
<td>Carbohydrates</td>
<td>Yogurt, Chile con carne, Oatmeal, Macaroni and cheese, Blueberry muffins,</td>
</tr>
<tr>
<td></td>
<td>Spaghetti</td>
</tr>
<tr>
<td>Fats</td>
<td>Scrambled eggs, Cream cheese, Bologna, Bacon, French fries</td>
</tr>
<tr>
<td>Proteins</td>
<td>Grilled chicken, Roasted turkey, Beans, Tuna salad, Roast-beef</td>
</tr>
<tr>
<td>Low-calorie</td>
<td>Pretzels, Chow mein, Popcorn, Apples, Celery sticks, Rice cakes</td>
</tr>
</tbody>
</table>

In general, one serving of high carbohydrate, fat and protein foods had approximately twice as many grams of the appropriate macronutrient than of any other macronutrient. Due to the difficulty in finding foods that meet this criteria, some less than optimal foods were included (i.e. beans and french fries). One serving of low-calorie foods had less than 100 Kcal.

Two to six people participated in the experiment during any given experimental session. After the experimenter obtained informed consent from all participants in an experimental session, participants completed the biological information form. The experimenter then had a participant randomly select one of the six physiological states by drawing a piece of paper from a container. The experimenter instructed each participant in the group to complete the first set of questionnaires when experiencing this physiological state. The drawing was fixed such that the participant selected either hungry or not hungry. Forty-five participants were assigned to the hungry condition, and 45 participants were assigned to the not hungry condition. The experimenter then gave participants the physiological-state questionnaire, PANAS, and attitude questionnaire. Participants in the hungry condition were told to complete the questionnaire at home when they felt very hungry and were about to eat a meal; participants in the not hungry condition were told to complete the questionnaire at home immediately after they had finished eating a meal and felt full. The experimenter gave no other instructions as to when to complete the questionnaire. Next, the experimenter arranged for the participants to return to the lab in approximately 2 days so they could return the completed questionnaire and select a different physiological state for the second part of the experiment.

When participants arrived for the second session, the experimenter collected the first set of questionnaires. Another fixed drawing was conducted, and each group of participants was assigned to the alternative hunger condition (i.e. participants who first participated in the hungry condition were assigned to the not hungry condition and vice versa). The experimenter gave participants a set of questionnaires that was identical to the first set and arranged for the group to return to the lab in approximately 2 days.
When participants arrived for the third session, the experimenter collected the second set of questionnaires and asked them to complete the revised restraint scale. After participants were given credit for the experiment, the experimenter asked participants whether they had completed the two sets of questionnaires when experiencing the appropriate physiological state. All participants reported to have complied with the instructions. The experimenter then solicited participants’ thoughts about the purpose of the experiment. Nearly all participants simply recounted the cover story and reported no suspicion of the actual purpose of the experiment. Finally, the experimenter debriefed the participants and asked them not to discuss the experiment with other students.

**Analyses and Results**

To examine the effect of our manipulations, we analysed responses on the physiological-state and PANAS questionnaires. As expected, when participants completed the questionnaires during the hungry, compared to the not hungry, condition, they were hungrier ($M_s = 4.08$ vs. $1.26$; $SEs = 0.09$ and $0.07$), $F(1,88) = 592.57$, $p<0.001$, and had gone longer without eating a meal ($M_s = 8.8$ vs. $2.3$ h; $SEs = 0.45$ and $0.33$), $F(1,87) = 144.12$, $p<0.001$. These findings suggest that participants were in the appropriate hunger state when they completed the attitude questionnaire. Participants were also thirstier in the hungry, compared to the not hungry, condition ($M_s = 3.17$ vs. $2.08$; $SEs = 0.12$ and $0.12$), $F(1,89) = 48.63$, $p<0.001$, and had gone longer without having something to drink ($M_s = 3.62$ vs. $0.69$ h; $SEs = 0.43$ and $0.10$), $F(1,71) = 44.91$, $p<0.001$. An analysis on mood revealed a Mood Valence × Hunger interaction, $F(1,89) = 8.12$, $p = 0.005$; negative mood was greater in the hungry, compared to the not hungry condition ($M_s = 17.18$ vs. $15.73$; $SEs = 0.68$ and $0.59$) whereas positive mood was lower in the hungry, compared to the not hungry condition ($M_s = 24.22$ vs. $26.44$; $SEs = 0.79$ and $0.92$). Finally, there was no significant difference in how tired participants were in the two hunger conditions or in the amount of sleep that they had gotten the night before completing the questionnaires.

As alluded to above, we used unipolar scales because the positive and negative substrates underlying attitudes may be separable. Thus, we computed a positive attitude scale by summing the three positive unipolar items (like, positive and good—$\alpha = 0.89$) and a negative attitude scale by summing the three negative unipolar items (dislike, negative and bad—$\alpha = 0.90$) for each of the 32 attitude items within each hunger condition. Initial analyses on the positive and negative scales revealed that hunger had comparable effects on both scales and did not differentially or selectively influence the positive or negative scale. For didactic reasons, therefore, we computed overall attitude by combining the positive and negative attitude scales (negative items were reverse scored and all six items were summed—$\alpha = 0.87$) and present analyses on the overall attitude. Finally, because we were interested in attitude types (e.g. foods, activities) and not specific attitudes (e.g. yogurt, dancing), we computed a single attitude score for each of the four attitude categories (animals, activities, colors and foods) by averaging the eight items within each category.

The averaged attitude ratings were submitted to a 4 (Attitude Type: animals, activities, colors, or foods) × 2 (Hunger: hungry vs. not hungry) × 2 (Order: hungry then not hungry vs. not hungry then hungry) × 3 (Questionnaire Form) MANOVA
with the first two factors manipulated within-subjects. The main effects of hunger, $F(1,84)=8.92$, $p=0.004$, and attitude type, $F(3,82)=53.08$, $p<0.001$, were qualified by the expected hunger by attitude type interaction, $F(3,82)=6.45$, $p<0.001$. Analyses using the modified Bonferroni procedure (Keppel, 1982) showed that: (1) food attitudes were more positive in the hungry than the not hungry condition; and (2) animal, activity and color attitudes were not significantly different in the hungry and not hungry conditions (see Table 2—top, left portion). The only other significant effect was a Questionnaire Form × Order interaction, $F(2,84)=3.19$, $p=0.046$; because this interaction does not qualify the variables of theoretical interest, it will not be discussed further.

A second analysis was conducted to help provide evidence that the change in food attitudes was due to hunger and not to participants’ a priori expectations. That is, participants may have reported more positive food attitudes during the hungry condition because they believe that food attitudes should be more positive when people are hungry and not because food attitudes actually are more positive. As these “expectation effects” are more likely to occur when participants have knowledge about the experimental conditions (i.e. as in within-subject designs), we analysed data from only the first experimental session and treated hunger as a between-subjects variable (i.e. rather than a within-subjects variable as was done in the previous analysis). That is, we compared attitudes reported during the first experimental session...
by the 45 participants in the hungry condition with attitudes reported during the first experimental session by the 45 participants in the not hungry condition.

The averaged attitude ratings were submitted to a 4 (Attitude Type: animals, activities, colors, or foods) × 2 (Hunger: hungry vs. not hungry) × 3 (Questionnaire Form: 1, 2 or 3) MANOVA with the first factor manipulated within-subjects. As in the previous analysis, this analysis revealed the expected hunger by attitude type interaction, $F(3,82) = 4.04, p = 0.01$. As can be seen in Table 2 (top, right portion), attitudes toward food items were more positive for participants in the hungry than the not hungry condition, whereas attitudes toward all three non-food categories were more negative for participants in the hungry than the not hungry condition. The only other significant effect was an attitude type main effect, $F(3,82) = 49.25, p < 0.001$, which can be seen in Table 2 (top, right portion).

To examine whether hunger differentially influences attitudes toward foods with different macronutrient compositions, we computed a single attitude score for each of the four macronutrient types (carbohydrate, fat, protein and low-calorie) within each hunger condition by averaging the two items within each category. Initial analyses revealed that each of the macronutrient types was significantly more positive during the hungry than the not hungry condition (see Table 2—bottom, left portion). As we were interested in differences in the magnitude of change, we computed difference scores for each of the four macronutrient types by subtracting attitude ratings in the not hungry condition from ratings in the hungry condition. These difference scores were then submitted to a 4 (Macronutrient type: carbohydrate, fat, protein, or low-calorie) × 2 (Order) × 3 (Questionnaire Form) MANOVA with the first factor manipulated within-subjects. Analyses revealed a macronutrient type main effect, $F(3,82) = 2.87, p = 0.041$. Analyses using modified the Bonferroni's procedure showed that attitudes toward foods high in fat changed more than attitudes toward low-calorie foods (see bottom, left portion of Table 2). There were no other significant effects. Finally, we performed a second analysis excluding low-calorie foods because the findings of the previous analysis may reflect the calorie load of foods rather than macronutrients per se. This analysis revealed a marginally significant macronutrient main effect, $F(2,83) = 2.55, p = 0.084$, which provides some evidence that macronutrient contents is important.

**Discussion**

The present experiment demonstrates that food attitudes are more positive when people are hungry than when they are not hungry and that hunger does not affect attitudes toward non-foods. Previous research has tended to examine taste evaluations or use measures that assess more closely behavioral intentions or willingness to eat certain foods. Thus, this experiment extends previous findings by demonstrating that hunger also influences attitudes. Although the present findings have important implications for eating behavior, they may also help inform attitude research and theory. For example, attitudes have been conceptualised as relatively stable memory constructs (e.g. Olson & Zanna, 1993), but the present findings suggest that this conceptualisation may not be entirely accurate—at least for food attitudes.

The link between hunger and food attitudes identified in this experiment may help elucidate eating by allowing theory and research on attitudes and behavior, which has primarily used non-foods, to be applied to eating. For instance, recent
research suggests that the positive and negative substrates underlying attitudes may be separable and that attitude ambivalence, the dual activation of positive and negative substrates, can impact the relation between attitudes and behaviors. Although there is considerable discussion about how to examine positive and negative attitude substrates and compute attitude ambivalence (e.g., see Cacioppo et al., 1997; Thompson et al., 1995), we conducted exploratory analyses on attitude ambivalence using the formula reported in Thompson et al. (1995). These analyses offer a few intriguing possibilities about the nature of food attitudes and their relation with hunger. First, when participants were hungry, compared to when they were not hungry, they were less ambivalent toward foods but more ambivalent toward the other attitude categories. As ambivalence reflects conflicting positive/negative reactions or approach/withdrawal tendencies, it tends to inhibit approach, and withdrawal, behaviors. If hunger decreases ambivalence toward foods and increases ambivalence towards other things, this would help engender approach behaviors toward foods. Second, participants were most ambivalent toward high-fat foods followed by low-calorie, high-carbohydrate and high-protein foods. As discussed above, attitudes are evaluative summaries of qualitatively different types of information (e.g., Crites et al., 1994). People may be more ambivalent toward high-fat foods, therefore, because they like the taste of these foods and dislike the fact that the foods are not healthy (and perhaps vice versa for the low-calorie foods). Previous attitude research has revealed that the informational basis of an attitude can affect its ability to influence behavior and its susceptibility to persuasive appeals (e.g., Edwards, 1990; Millar & Millar, 1990; Millar & Tesser, 1989). Thus, food attitudes that have different informational bases may operate differently. For example, hunger may reduce the salience and/or importance of cognitive beliefs about foods (e.g., knowledge that foods are healthy/unhealthy); this would have the greatest impact on food attitudes based on positive taste evaluations and negative cognitive beliefs (e.g., high-fat foods) as these attitudes would become more positive and less ambivalent, which would make people more likely to eat these foods. By demonstrating that hunger influences food attitudes, this experiment offers the possibility that attitudes may be very important in guiding daily eating patterns. More research is needed to examine the mechanisms through which food attitudes influence eating, but a long history of theory and research based primarily on non-food attitudes should provide fertile ground for research.

An alternative explanation for the present findings is that they reflect participants’ expectations about how hunger should influence food attitudes and not actual changes in food attitudes. We anticipated this problem and designed the experiment so as to reduce expectation effects (e.g., using more non-foods than foods, discussing multiple physiological states in the cover story). In addition, we attempted to ascertain whether participants’ expectations may have influenced their responses during post-experimental discussions. Our discussions with participants suggest that it is unlikely that their expectations were responsible for the findings because most participants were not aware of our interest in hunger or food attitudes. A few participants who were suspicious reported that they only became suspicious after they received the second assignment. As none of the participants suspected that we were interested in hunger or food attitudes during the first experimental session, the between-subjects analyses on data from the first experimental condition provide evidence that hunger, and not participants’ expectations, influenced food attitudes.
A second explanation for the present findings is that the food attitude measures are imprecise measures of hunger (i.e. in addition to attitude measures). When people are hungry, food attitude measures are more positive not because hunger changes attitudes but because the measures also reflect hunger. The finding that hunger influences attitudes toward high-fat foods more than attitudes toward low-calorie foods, however, provides some evidence against this explanation. As discussed above, the attitude concept can easily explain why hunger might influence certain attitudes more than others (i.e. because hunger may influence certain types of attitude information but not others). If food attitude measures are imprecise measures of hunger, however, all food attitude measures should be equally affected by hunger (i.e. unless there is some reason to suspect that certain measures assess hunger better than others). Thus, the macronutrient findings suggest that the more parsimonious explanation for the present results is that hunger influences attitudes.

The macronutrient findings also provide some evidence that participants’ expectations are not causing the attitude changes. That is, even if participants’ expectations subtly influenced their responses, it seems improbable that expectations about the effect of hunger on food attitudes would extend to specific macronutrient food categories. In fact, the majority of participants probably had little or no knowledge about the macronutrient content of the foods. Macronutrient content, however, may be confounded with other factors that could influence expectations. One potential confound is the calorie content of the foods. People may expect attitudes toward foods that are more filling (i.e. higher calorie contents) to change more than attitudes toward foods that are less filling (note that changes based on calorie content could reflect real attitude change or simply perceptions about what should occur). Interestingly, low-calorie foods, by definition, had the fewest calories (M = 55 Kcal) followed by high-fat (M = 121 Kcal), high-carbohydrate (M = 199 Kcal) and high-protein (M = 269 Kcal) foods. Thus, the calorie content of the foods does not explain the macronutrient findings.

Another factor that is confounded with macronutrient content and that might explain the present findings is expectations about which foods are more appropriate to eat at certain times. People may expect attitudes toward foods typically eaten during meals to change more when they are hungry compared to attitudes toward non-meal foods (e.g. snacks—popcorn or “food constituents”—peanut butter) because eating a meal is more appropriate when one is hungry (note that changes based on this type of information might also reflect real attitude change or simply perceptions about what should occur). Consistent with this idea, the low-calorie category had the most non-meal foods (five), but the high-fat category had more non-meal foods (three) than either the high-protein (one) or high-carbohydrate (two) categories, suggesting that expectations about meal vs. non-meal foods do not account for the present findings. To further investigate this issue, we examined attitude changes for individual food items. Visual inspection of these data also suggest that the present findings are not due to expectations about the appropriateness of meal vs. non-meal foods because many non-meal foods (e.g. peanut butter, cream cheese, popcorn) changed more than meal foods (e.g. grilled chicken, chile con carne, beans).

The analyses on the individual food items revealed another interesting finding. There were large and consistent changes in attitudes toward high-fat foods when people were hungry compared to not hungry (Range: 0.59–0.84), but there was more variability in the amount of attitude change for carbohydrate (0.32–0.93), protein
Attitudes toward some carbohydrate, protein, and low-calorie foods (spaghetti, roast beef and chow mein, respectively) changed as much, or more, than attitudes toward fat foods whereas others changed very little (oatmeal, cottage cheese, pretzels, respectively). This variability suggests that factors other than macronutrient content moderate the impact of hunger on food attitudes.

This experiment illustrates that take-home questionnaires can be used to examine food attitudes and eating behavior. Most studies that have examined taste preferences and eating behavior have had participants complete questionnaires while they were hungry, then eat at the lab, and complete questionnaires after the meal. Take-home questionnaires may be a useful supplement to laboratory research because each methodology has advantages and disadvantages. For example, laboratory research in which participants complete the experiment in 1 day may be more susceptible to expectation biases because participants are more likely to remember their initial response and can then alter subsequent responses (e.g. to be consistent with their initial response or consistent with their beliefs about what should occur). Take-home questionnaires should be less susceptible to this bias because there is a longer interval between the two experimental conditions (e.g. between 2 and 4 days in the present experiment). On the other hand, take-home questionnaires depend more on the honesty of the participants (e.g. to complete the questionnaire at the appropriate time). In addition, take-home methodologies, compared to laboratory research, do not have as much experimental control and may be more susceptible to extraneous variables that vary with hunger. For instance, participants in the present experiment were thirstier, as well as hungrier, when they completed the questionnaires in the hungry condition. Thus, when using take-home questionnaires, it is important to assess variables that may be related to the variables of interest so their influence can be examined and, if necessary, statistically controlled. Although previous research has demonstrated that take-home questionnaires can be used to study certain constructs (e.g. Diener & Emmons, 1984), research comparing findings from take-home and laboratory methodologies in the area of eating is needed.

Although the finding that macronutrient content moderated the influence of hunger on attitudes should be considered suggestive, it may have important health implications. That is, previous research suggests that: (1) attitudes are important for guiding behavior such as consumer decisions concerning what products to purchase (e.g. see Kraus, 1995); and (2) hunger has some influence on food purchases (e.g. Mela et al., 1996). The results of the present experiment, therefore, suggest that people who shop for groceries when they are hungry may be more likely to purchase high-fat foods and thus eat more high-fat foods. In conclusion, more research is needed to further examine some of the preliminary findings of this experiment and to examine how individual differences such as weight and dietary restraint interact with hunger to influence food attitudes, but the present findings provide strong evidence that examining food attitudes can help elucidate eating behavior.

**References**


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