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Food for Thought: How Will the Nutrition Labeling of Quick Service Restaurant Menu Items Influence Consumers' Product Evaluations, Purchase Intentions, and Choices?

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Abstract

Within the context of quick service restaurant meals, three studies (a consumer diary study, web-based experiment, and longitudinal experiment) examine how accurately consumers estimate calorie, fat, and sodium content and explore how objective nutrition information may influence product evaluations, perceptions, and purchase intentions. The results indicate that many consumers have little understanding of the calorie, fat, and sodium levels of many typical quick service meals, and this is especially true for less healthful meals. Consistent with rationale drawn from the expectancy-disconfirmation paradigm, results demonstrate that menu-based nutrition information provision negatively influences consumers' responses when that information is less favorable than expected. Findings suggest that the relationship between actual and expected nutrition levels drives responses, rather than the disclosure of information *per se*. Since these relationships can vary both within and between restaurants, results suggest that the effects of mandated nutrition information disclosure may not be uniform across the industry.
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Many quick service and table service restaurant retailers now face potentially significant market changes. Legislation that would mandate the provision of calorie and nutrient information on restaurant menus and menu boards has been proposed at federal, state, and local levels. The impetus for this proposed legislation is the rising prevalence of overweight and obesity, which is associated with a number of chronic diseases including heart disease, stroke, and type 2 diabetes (Centers for Disease Control (CDC) 2008). With over $500 billion spent annually on food from quick and table service restaurants (accounting for almost one-half of American's food expenditures), changes within this retailing environment potentially may have significant implications for many consumers, specific restaurant chains, and the retail restaurant industry in general (National Restaurant Association 2008; United States Department of Agriculture 2008).

The positive relationship between rising obesity rates and increases in consumer spending at restaurants has not gone unnoticed by a number of public policy makers and public interest groups. This increase in away-from-home food consumption and the rise in obesity rates have raised questions regarding both the healthfulness of food prepared by restaurant retailers and consumers' awareness of the influence away-from-home food consumption may have on the outcome of their weight maintenance and weight-loss attempts. Quick service restaurants have often been specifically targeted for their potential role in contributing to the national obesity problem by selling foods high in calories and negative nutrients in overly large portions.

Legislation mandating the disclosure of calorie and nutrient information on menus and menu boards has been signed into law in California and introduced in over 20 other states and municipalities. The Menu Education and Labeling Act and the Labeling Education and Nutrition Act have been under consideration by the United States Congress. Yum Brands, the parent company of KFC, Taco Bell, and Pizza Hut, announced in October, 2008, that it will (voluntarily) present product calorie information on menu boards in its company-owned U.S. restaurants by January, 2011, the same date on which the California legislation goes into full effect (Horovitz 2008).

These initiatives are likely to affect many of the product offerings of firms within this $500 billion dollar retail industry. The goal of our research is to provide insight regarding how the pro-

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vision of calorie and nutrient information on restaurant menus and menu boards may influence consumers' product evaluations, perceptions of diet-related disease risks, purchase intentions, and item choices. An improved understanding of how consumers may respond to the provision of calorie and nutrient information in the context of away-from-home food consumption will better inform retailers' decision making processes as they assess this dynamic business environment. Specifically, we address the following research questions:

1. How accurately do consumers estimate the calorie, fat, and sodium content of their actual fast food meal purchases?
2. How do the disclosure of nutrition information and initial calorie expectations interact to influence meal evaluations, purchase intentions, and choice? Are these effects similar across different quick service retail restaurants?

Study 1

Background and predictions

In most restaurant environments, product attributes such as calories, protein, fat, and sodium, can generally be viewed as credence attributes since most consumers cannot accurately assess or verify their levels even after product consumption (Caswell and Mojduszka 1996; Darby and Karni 1973). For example, it is impossible to determine the fat and calorie content of a large Starbucks muffin simply through purchase and consumption. However, this has not been the case with consumer packaged foods since passage of the National Labeling and Education Act (NLEA); nutrient and calorie content, and percent daily values are available on a per serving basis in the Nutrition Facts panel. Thus, inherently credence attributes have been transformed into search attributes that consumers can easily assess prior to consumption with minimal search costs.

While calorie and nutrient attributes may be considered search attributes for most packaged foods (Caswell and Mojduszka 1996), foods purchased from restaurants are exempt from NLEA disclosure requirements. Cues obtained through product experience (i.e., product taste) and prior market knowledge enable consumers to make relative comparisons of the nutritional content of foods prepared at quick service restaurants. For example, we suspect that although most consumers can correctly infer that a Burger King Whopper has more calories and fat than a 6 in. Subway turkey sub, they may have little knowledge of absolute calorie differences.

Clearly, relative to packaged food products, consumer search costs associated with nutrition-related attribute information are higher for foods prepared outside the home. For many consumers, these search costs probably exceed the perceived benefits of that information. The absolute, *quantitative* values of calories and nutrients such as fat and sodium remain credence properties and thus consumer knowledge of these attributes is likely to be very low. This is consistent with findings that demonstrate that for some foods purchased at specific quick service restaurants (e.g., Subway and McDonald's) and for some foods (e.g., Fettuccine Alfredo) typically available at table service restaurants, consumers' absolute and percentage underestimation of calorie levels increase as meal calorie levels increase (e.g., Burton et al. 2006; Wansink and Chandon 2006). Properties of psychophysics may account for this effect; studies show that there is less sensitivity to increases in magnitude as the absolute size of a stimulus increases (Chandon and Wansink 2007b).

Study 1 extends prior research both by considering a greater variety of menu options from a wider set of quick service restaurants and by employing a different type of methodology. Furthermore, nutrients with significant health-related implications, as well as calories, are considered. Although "calories" is often the most salient attribute during the choice process of many consumers because of its weight-related implications, fat and sodium content are also often highly salient because of their association with diseases and health conditions such as coronary heart disease, cancer, and hypertension. Thus, an initial objective of Study 1 is to partially replicate prior findings related to estimated calorie consumption and extend this prior research to additional nutrients, retailers, and consumer segments (cf. Burton et al. 2006; Chandon and Wansink 2007a; Wansink and Chandon 2006). Specifically, we examine how accurately consumers estimate the calorie, sodium, and fat content of their restaurant food purchases. In addition, how the estimates and the accuracy of these estimates differ across quick service restaurants and gender is considered.

The primary objective of Study 1 involves the interaction between meal calorie level and exposure to objective nutrition information. How the provision of objective calorie and nutrient information may influence consumers' evaluations and purchase behaviors is important for both public policy makers and those in the restaurant industry to understand. Drawing from expectancy disconfirmation theory (van Raaij 1991), we suggest that consumers form initial expectations about specific nutrition attributes which vary with respect to objective levels. According to expectancy disconfirmation theory, attribute dissatisfaction occurs when objective attribute information does not meet expectations. When this occurs, attitudes toward the product should be more negative and repurchase intentions should be lower (Grunert 2005; van Raaij 1991). However, more favorable attitudes and higher repurchase intentions result if actual attribute levels meet or exceed expectations (e.g., calorie levels are below or consistent with expected levels). If calorie and nutrient content of restaurant foods are credence attributes, then confirmation/disconfirmation processes cannot occur which, in turn, suggests that consumers' product evaluations should not be affected. However, consumers will have an objective basis for the confirmation or disconfirmation of their expectations when these values are transformed into search attributes through the provision of highly accessible nutrition information.

Thus, when consumers choose lower calorie (and healthier) meals from fast food restaurants, exposure to the objective nutrition information for these meals is more likely to confirm (favorable) initial expectations. Using a mock menu for a fictitious table-service restaurant, Burton et al. (2006) reported an interaction between nutrition information disclosure and menu item; menu items had either relatively low (e.g., a turkey sandwich) or high calorie (e.g., a large hamburger with fries) levels

and nutrition information was either presented or not presented. Information disclosure had a stronger negative impact on the higher calorie meals which suggests that calorie level moderates the effects of nutrition information provision. In contrast to this mock choice situation, we focus on previously purchased fast food meals. In this context of actual product consumption, repurchase intentions are likely to be influenced by both the provision of nutrition information and by a variety of other marketing and nonmarketing variables (e.g., taste, price, food preference) as well. When consumers purchase *higher* calorie meals, calorie expectations are more likely to be disconfirmed. Therefore, evaluations and meal repurchase intentions should decrease. However, meal evaluations and repurchase intentions should increase or remain stable after exposure to the nutrition information when *lower* calorie meals are purchased (i.e., when calorie expectations are more likely to be confirmed). We predict:

H1. For meals purchased from quick service restaurants, the objective calorie level of the meals will moderate the effect of exposure to nutrition information on perceived (a) calorie level attractiveness, (b) weight gain likelihood, (c) heart disease likelihood, (d) meal healthfulness, and (e) repurchase intentions.

Study 1 method

In Study 1, diary data of fast food purchases were merged with survey data of participants' product perceptions and repurchase intentions. There were four primary stages of data collection. In the initial stage, participants kept a seven-day diary of their visits to fast food outlets; the specific food and drinks consumed (and condiments used), the restaurants where the purchases occurred, meal prices, and ratings of meal satisfaction were recorded. During the data collection period, participants were reminded to record their fast food visits. There was no mention of meal-related calorie or nutrient levels during this initial data collection stage.

After the seven-day diaries were finished, participants estimated the calorie, fat, and sodium levels for each restaurant meal recorded in their diary.[1] During this second stage of the data collection process, for each specific meal purchased, ratings of meal healthfulness, calorie level attractiveness, likelihood of gaining weight and developing heart disease if the meal was included as a regular component of their weekly diet, and likelihood of meal repurchase were obtained. In the third stage, participants visited restaurant websites to obtain the objective calorie and nutrient levels of each meal. A few days after obtaining this objective information, participants reevaluated their meal purchases on the five measures noted above, without access to any of their prior responses. Thus, these product evaluation and repurchase intention measures were assessed at two points in time, once several days before and once several days after obtaining objective nutrition information.

A total of 155 junior and senior undergraduate students participated in the study; 96 percent of the participants reported eating at a fast food restaurant during the seven-day period. More than 500 total fast food experiences were recorded; the average number of fast food meals consumed was 3.8 ($SD = 2.2$). For each fast food meal purchased, single item measures employing a nine-point response scale were used to assess the calorie level perceptions, meal healthfulness, and likelihood of meal repurchase. As noted above, these measures were assessed both before and after objective nutrition information was acquired, separated by a one-week period. Endpoints for the calorie and meal healthfulness evaluations were "very unfavorable" (1) to "very favorable" (9). For the likelihood of gaining weight and developing heart disease measures, subjects were asked if they ate the meal regularly as part of their diet, did they think that the product would (decrease/increase) the likelihood of gaining weight or developing heart disease (Kozup, Creyer, and Burton 2003) with endpoints of "would decrease the likelihood" (1) to "would increase the likelihood" (9).

Study 1 results

Initial findings concerning calorie and nutrient estimates

The first column of Table 1 shows (1) consumers' *estimated* calorie and nutrient levels, (2) *actual* calorie and nutrient levels obtained from corporate websites, and (3) *accuracy* measures, that is, differences between the estimated and actual levels, across all fast food meals. Consistent with prior research addressing calorie estimates, meal calories (−243), fat (−9.6 g), and sodium (−1,011 mg) levels were all underestimated. A series of t tests assessed whether the accuracy measures were significantly different from zero; t values ranged from −21.5 to −8.9 ($df = 503$; $p < .001$ for all), indicating significance across all meals. Consistent with prior findings showing that as calorie levels increase, underestimation increases (Wansink and Chandon 2006), the Pearson correlations between objective calorie and nutrient levels (obtained from the websites) and the accuracy measures are all negative and significant (r's range between −.58 for calories to −.77 for sodium; $p < .001$ for calories, fat, and sodium).[2]

Table 1 also highlights differences between retail chains. In a series of MANOVAs, consumers' estimates, actual calorie and nutrient levels, and accuracy measures for calories, fat, and sodium served as the dependent measures while restaurant chain served as the independent variable. Generally, not only do estimated calorie and nutrient levels of the purchased food items differ across retailers, actual levels and accuracy measures differ as well. Also, given that the F values are greater for actual nutrition levels than for the estimated values, these between-retailer differences appear larger than participants realize. In other words, consumers do not seem to fully realize the degree

[1] Respondents were provided "daily value levels" consistent with those found in the bottom portion of the Nutrition Facts panel. In pilot tests, we found that when daily values are not provided for nutrients such as sodium, most consumers lack the knowledge to make reasonable estimates.

[2] Further examination of the diary data indicate that as meals became larger (e.g., more than 1000 calories), underestimation increases. In addition, we examined the relationship between actual and estimated calories and found a significant nonlinear component that slightly improved fit. However, the nonlinear component in similar analyses for fat and sodium did not reach significance.

Table 1
Study 1: Fast food meal estimates, actual meal values, and accuracy measures for calories, fat, and sodium.

	Total ($n = 504$)	Burger King	McDonald's	Wendy's	Sonic	Arby's	Taco Bell	Chick-fil-A	Subway	F values[a,b]
Calories										
Estimated	662	773	749	670	583	739	624	635	518	1.80^{*}
Actual	905	$1{,}134^{4}$	$977^{3,4}$	$941^{2,3,4}$	$916^{1,2,3}$	$1{,}040^{3,4}$	$863^{1,2,3}$	$743^{1,2}$	$728^{1,2}$	5.83^{***}
Accuracy[c]	−243	−361	−228	−271	−333	−301	−239	−110	−210	1.15
Fat[d]										
Estimated	28.5	40.2^{3}	$37.4^{2,3}$	28.8^{2}	27.5^{2}	25.8^{2}	28.4^{2}	29.4^{2}	11.0^{1}	8.11^{***}
Actual	37.9	54.3^{4}	42.5^{3}	39.2^{3}	44.5^{3}	46.4^{3}	40.2^{3}	28.4^{2}	20.7^{1}	13.0^{***}
Accuracy	−9.6	$-14.1^{1,2}$	$-5.1^{2,3}$	$-10.4^{1,2,3}$	$-17.0^{1,2}$	-20.6^{1}	$-11.8^{1,2}$	$+1.0^{3}$	$-9.7^{1,2,3}$	4.7^{***}
Sodium[d]										
Estimated	820	$1{,}272^{2}$	$924^{1,2}$	747^{1}	$915^{1,2}$	$943^{1,2}$	805^{1}	685^{1}	550^{1}	3.08^{***}
Actual	1,831	$1{,}810^{1,2}$	$1{,}543^{1}$	$1{,}830^{1,2}$	$1{,}888^{1,2}$	$2{,}523^{3}$	$2{,}065^{2}$	$1{,}532^{1}$	$1{,}982^{1,2}$	6.96^{***}
Accuracy	−1,011	-537^{3}	-619^{3}	$-1{,}083^{2,3}$	$-972^{2,3}$	$-1{,}580^{1}$	$-1{,}260^{1,2}$	$-847^{2,3}$	$-1{,}432^{1,2}$	6.02^{***}

$^{*}p < .10$; $^{***}p < .01$.

[a] Different numerical superscripts in the table indicate a significant difference ($p < .05$) between means based on SNK contrasts. For example, for Burger King (superscript of 4), the actual meal calories differ from Sonic, Taco Bell, Chic-fil-A, and Subway (none with superscripts of 4), but it is not significantly different from Wendy's, McDonald's, and Arby's (all with superscripts of 4). Sample sizes range from 29 to 76 meals across the eight restaurants.

[b] Degrees of freedom for all univariate F tests range between (7,345) and (7,356).

[c] The accuracy measure score represents the estimated number of calories for the meal minus the actual calorie level calculated from the restaurant's website. Negative numbers indicate that the number of calories in the meal is underestimated by the consumer; positive numbers indicate the number of calories is overestimated.

[d] Numbers shown for fat are in grams; sodium levels are in milligrams.

Table 2
Study 1: Effects of nutrition information exposure and meal calorie level on consumers' evaluations and repurchase intentions.

Independent variables	Multivariate results		Univariate results				
	Wilks' lambda	*F* values	Calorie attractiveness[c]	Weight gain likelihood[c]	Heart disease likelihood[c]	Meal healthfulness[c]	Repurchase intentions[c]
Meal calorie level (MC)[a]	.81	15.1**	63.16**	63.7**	52.9**	62.7**	3.5
Nutrition information exposure (NIE)[b]	.88	9.2**	6.4*	.0	4.5*	8.1**	40.8**
MC × NIE	.87	9.9**	46.7**	8.3**	.5	19.1**	4.3*

*$p < .05$; **$p < .01$.
[a] Calorie level is a between subjects factor for lower versus higher calorie meals based on fast food restaurant website information. Lower calorie meals are fast food meals with less than 720 calories and high calorie meals exceed 1,030 calories.
[b] Nutrition exposure is a repeated measure variable for which the initial dependent measure was assessed prior to exposure to the objective fast food meal nutrition information. The second assessment of the measure was taken subsequent to exposure to the objective information.
[c] Numbers shown in the table are univariate *F* values; degrees of freedom for all univariate tests = (1,333).

to which calorie and nutrient levels of "fast food" meals vary across restaurants. Consequently, consumer accuracy measures differ across the retail chains, as well. For example, the accuracy measure for fat ranges from −20.6 to +1.0 (for Arby's and Chic-fil-A, respectively), and from −361 to −110 for calories (for Burger King and Chic-fil-A, respectively).

Many promotional activities conducted by quick service restaurants suggest that gender is an important segmentation variable in this retail industry (Nayga 2000). Thus, potential differences between calorie and nutrient accuracy measures for males versus females are also considered. A MANOVA was performed with accuracy of the calorie, fat, and sodium estimates as dependent variables. Females' estimates of calories ($M = -107$ vs. $M = -324$, $F(1,465) = 24.2$), fat ($M = -4.2$ g. vs. $M = -14.7$ g, $F(1,465) = 23.4$), and sodium ($M = -777$ mg. vs. $M = -1,320$, $F(1,465) = 34.1$) were more accurate than males. However, males consumed substantially larger meals than females ($M = 1,020$ vs. $M = 757$ calories, $F(1,465) = 57.0$; $p < .001$). This suggests a possible mediating role of objective calorie and nutrient levels. To test this possibility, hierarchical regressions were run with calories, fat and sodium accuracy as dependent measures. When gender was the sole predictor, there was a significant effect ($p < .001$) for all accuracy measures (consistent with the above mean differences). However, when meal calorie and nutrient levels were also included as predictors in the second stage of the analysis, the effect of gender on accuracy for calorie, fat, and sodium all were nonsignificant, supporting the mediating role of meal nutrition level.[3]

Effects of meal calorie level and exposure to objective nutrition information

Given consumers' underestimation of calories and negative nutrients, we next examined how objective information on meal calorie and nutrient levels impacted consumer evaluations. H1 predicted a moderating influence of the objective meal calorie level on the effects of exposure to objective nutrition information. To test this prediction, a repeated measures MANOVA was performed. Meal calorie level was a between subjects factor with two levels, lower calorie meals (calories less than 720; $n = 167$) and higher calorie meals (calories greater than 1,030; $n = 168$), determined by a tercile split (Richins and Dawson 1992). The repeated measure factor consisted of evaluations both *before* and *after* exposure to the objective meal nutrition information for the five dependent measures (perceived calorie attractiveness, weight gain likelihood, heart disease likelihood, meal healthfulness, and repurchase intentions).

As shown in Table 2, the multivariate interaction is significant ($F = 9.9$; $p < .001$), and significant univariate interactions extend to four of the dependent measures. For meals *lower* in calories, there is a significant increase ($t = 2.51$; $p < .01$) in attractiveness after exposure to nutrition information, while there is a substantial (and somewhat stronger) decrease in attractiveness for the *higher* calorie meals ($t = -7.18$; $p < .001$). A conceptually similar pattern was observed for the perceived likelihood of weight gain. As shown in Fig. 1, information provision does not influence the likelihood of weight gain for the *lower* calorie meals ($t = -1.47$; $p > .05$), but it does so for the *higher* calorie meals ($t = 2.42$; $p < .01$).

Plots for perceived meal healthfulness and repurchase intentions are shown in Fig. 2. After exposure to information, the increase in perceived meal healthfulness is nonsignificant ($t = 1.01$; $p > .20$) for the lower calorie meals, but the decrease in healthfulness is significant for the higher calorie meals ($t = -5.54$; $p < .001$). Repurchase intentions decrease after information exposure, regardless of whether the meal calorie level is high or low ($p < .01$ for each). However, the difference is clearly greater for higher calorie meals ($p < .05$). Thus, H1 is broadly supported.

Confirmation/disconfirmation of expectations for lower and higher calorie meals

The previous analyses do not directly address the role of confirmation/disconfirmation of expectations on the dependent measures. To explore this question, additional analyses were performed. For consumers who purchased *higher* calorie meals

[3] Mediation also requires (1) the independent variable to affect the mediator (i.e., meal nutrition level) and (2) the mediator to affect the focal dependent variable (Baron and Kenny 1986). Results support both conditions. Similar to the pattern of results reported by Wansink and Chandon (2006) for overweight consumers, the calorie and nutrient levels of fast food meals purchased by males (higher in calories, fat and sodium) were larger than by females, and these larger meal sizes that substantially exceeded consumer expectations were associated with reduced accuracy.

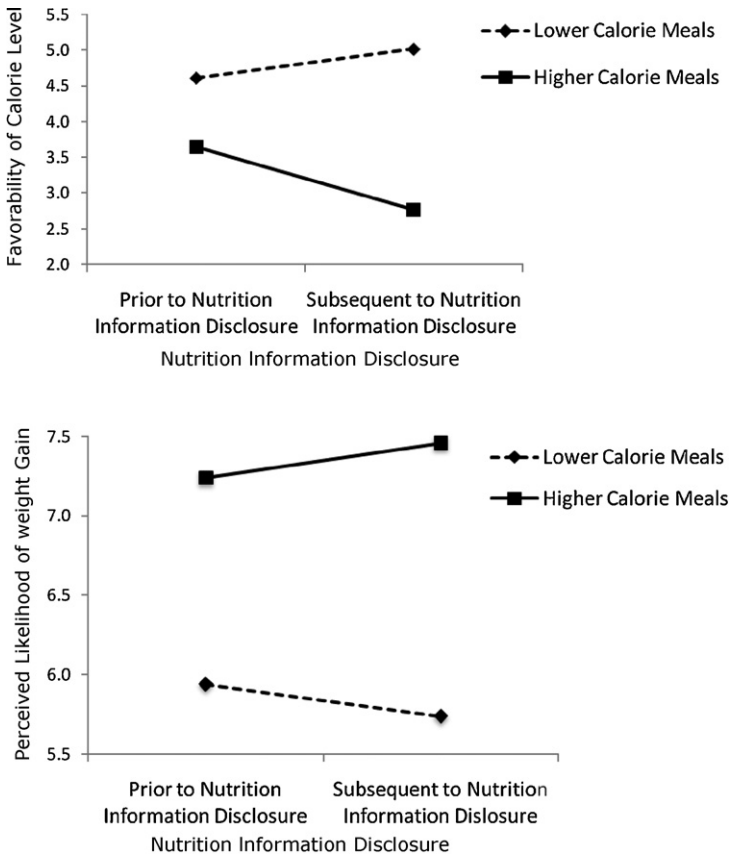

Fig. 1. Study 1: Interactive effects of nutrition information disclosure and calorie level on perceived calorie attractiveness and weight gain likelihood. *Note*: Higher (lower) values for calorie levels indicate more favorable (unfavorable) evaluations; higher (lower) values for the perceived likelihood of weight gain indicate an increased (decreased) likelihood.

(based on a median split, $M = 1{,}222$), we created groups that (1) underestimated actual calories by 200 calories or more (initial expectations disconfirmed) and (2) estimated calories to be equal or greater than actual levels (initial expectations confirmed). Similarly, consumers who purchased *lower* calorie meals (based on a median split, $M = 591$ calories), were placed into one of two groups. One group underestimated calories by 200 calories or more (expectations disconfirmed) and the other group estimated calories to be equal or greater than the actual levels (expectations confirmed).

We then performed a 2 (confirmation or disconfirmation of calorie expectations) × 2 (nutrition information disclosed or not disclosed) × 2 (higher or lower calorie level) mixed MANOVA to assess how the interaction between expectations and nutrition information disclosure affects the dependent measures. If the effects of this interaction are consistent across the two meal calorie levels (i.e., two- and three-way interactions involving meal calorie level are nonsignificant), this suggests that expectations work similarly across both higher and lower calorie meals.

Results show that the three-way multivariate interaction is nonsignificant ($F = 1.77$; $p > .10$) and the expectations by meal calorie level two-way interaction is also nonsignificant ($F = 1.68$; $p > .10$). However, the two-way multivariate interaction for nutrition information disclosure by expectations ($F = 4.90$; $p < .01$) and for nutrition disclosure by calorie level ($F = 6.38$; $p < .01$) are significant as well as the main effect for information disclosure ($F = 7.87$; $p < .01$). The univariate two-way interaction between nutrition information disclosure and expectations is significant for perceived calorie attractiveness ($F(1,422) = 14.95$; $p < .01$), product healthfulness ($F(1,422) = 17.67$; $p < .01$), heart disease likelihood ($F(1,422) = 5.97$; $p < .01$), and weight gain likelihood ($F(1,422) = 8.71$; $p < .01$); results were nonsignificant for repurchase intentions ($p > .20$).

Two plots are shown in Fig. 3 for the confirmation/disconfirmation by disclosure interaction. Generally, and as expected, disconfirmation (actual calorie level exceeds expectations) has a negative impact on perceived meal healthfulness ($F(1,268) = 34.73$; $p < .01$) while confirmation has a somewhat smaller positive impact ($F(1,156) = 4.62$; $p < .05$). In addition, disconfirmation increases the perceived likelihood of heart disease ($F(1,268) = 13.27$; $p < .01$) while confirmation has no effect ($F(1,156) < 1$). The pattern of results suggests that the effects of confirmation or disconfirmation of expectations appears consistent with theory and work similarly for both lower and higher calorie meals.[4]

[4] We performed this analysis using different splits on calories and disconfirmation/confirmation levels and results follow the same general pattern. We also ran two separate analyses where we split the sample into two groups, one with lower calorie meals and one with higher calorie meals, and results are consistent with the analyses showing the nonsignificant interactions for meal size reported in the text.

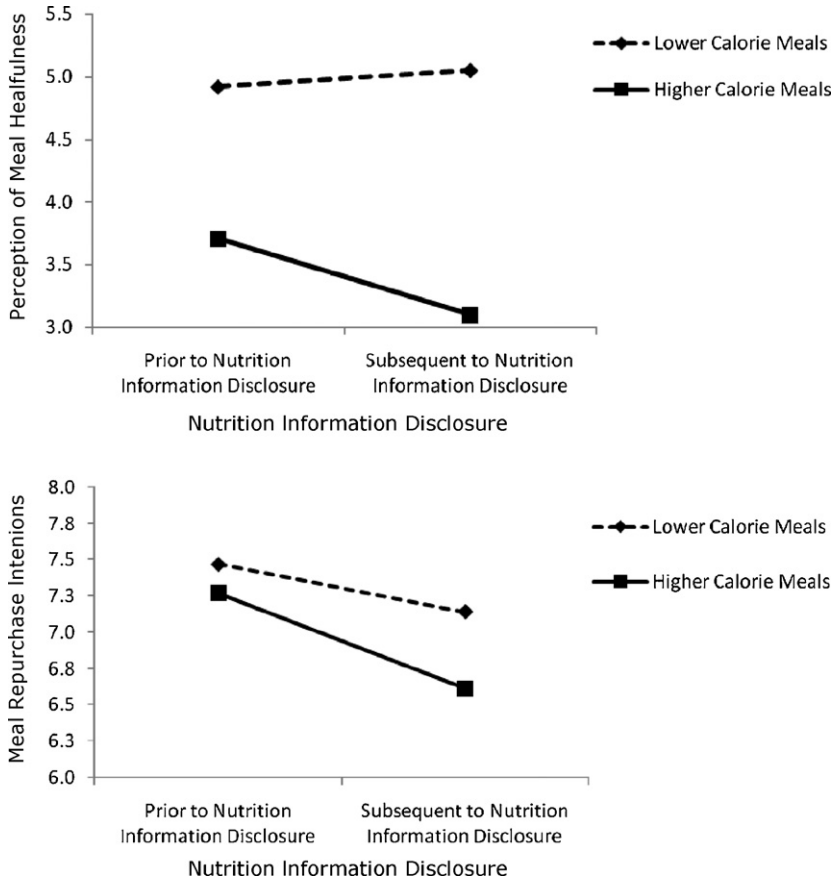

Fig. 2. Study 1: The interaction of nutrition information disclosure and calorie level on perceived meal healthfulness and repurchase intentions.

Study 1 discussion

Findings from Study 1 illustrate that consumers have a poor understanding of the calorie, fat, and sodium levels of many meals purchased at popular quick service restaurant chains (cf. Wansink and Chandon 2006). Also, while small sample sizes and self-selection issues should be considered, the differences between retail restaurant chains suggest that some chains would be in a better position to respond to mandated nutrition information disclosures.

Results also indicate that exposure to the objective nutrition information tends to decrease overall product evaluations. The general pattern of findings supports the contention that while *qualitative* differences between fast food purchases are recognized by consumers, they have a limited understanding of their *quantitative* differences. Without awareness of these actual quantitative calorie, fat and sodium levels, the potential effect that quick service restaurant purchases may have on consumers' weight maintenance or weight loss efforts (which in turn may influence their long term health) appear difficult to assess.

However, when consumers become aware of meal calorie and nutrient levels, their product evaluations are influenced in a predictable manner. When objective calorie levels are relatively low, estimates, on average, are very close to actual levels. Therefore, nutrition information provision has little influence on consumers' evaluations (as shown in Figs. 1 and 2). In contrast, when expectations are disconfirmed by information disclosure (i.e., when there is a significant level of calorie underestimation), product evaluations decrease. These findings suggest that restaurant chains which serve foods with calorie and nutrient levels that substantially exceed consumers' expectations may have cause for concern as nutrition information disclosures on menus and menus boards become more widely mandated.

The diary methodology offers potentially useful findings for consumers, policy makers, and restaurant retailers, but the exposure context (obtaining meal information online) is atypical of how nutrition information would be presented if required through legislation. Also, there is no explicit control group, a limitation of the quasi-experimental design used. To narrow this contextual gap, enhance internal validity, and extend tests of the disconfirmation framework, Studies 2 and 3 employ menu-based experiments to assess potential effects of calorie disclosure.

Study 2

The primary purpose of Study 2 was to determine, using a controlled experiment, how the provision of objective calorie information for actual quick service restaurant items influences consumers' choices and purchase intentions. In Study 1 consumer purchases were not controlled (i.e., they were actual consumer purchases), and there was no explicit control group. In addition, the purchased meals generally had calorie levels that

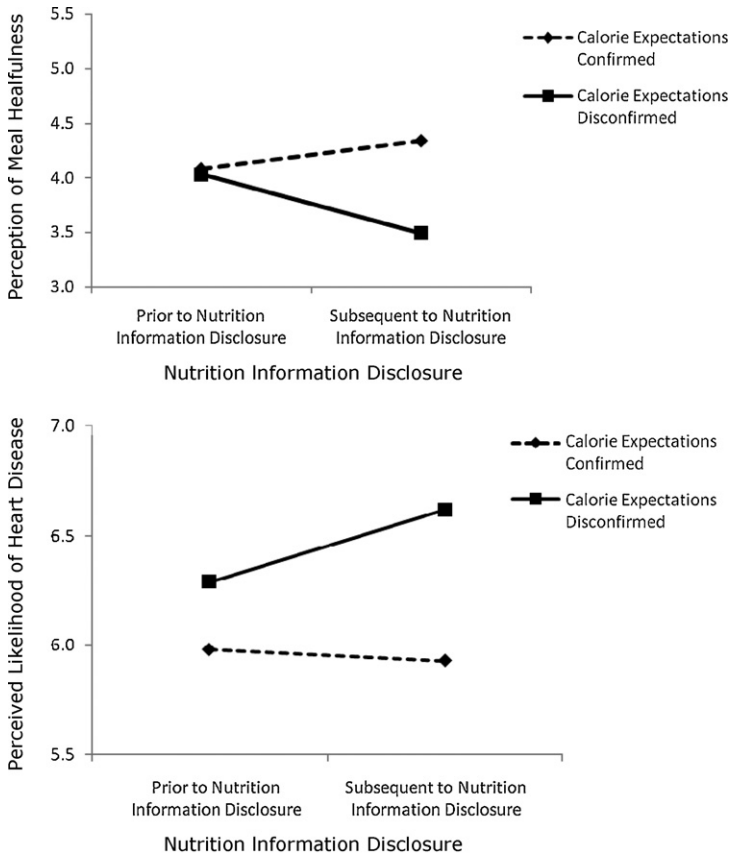

Fig. 3. Study 1: The interaction of the nutrition information disclosure and expectations. *Note*: Higher (lower) values for meal healthiness indicate more favorable (unfavorable) evaluations; higher (lower) values for the perceived likelihood of heart disease risk indicate an increased (decreased) likelihood.

were either above expectations or closely matched expectations. Thus, under such circumstances negative disconfirmation and confirmation, respectively, are likely to occur. However, many retail chains offer a few very low calorie items on their menus. For these items, nutrition information provision should result in *positive* disconfirmation (cf. Woodruff and Gardial 1996). That is, if consumers *overestimate* actual calorie levels, then objective information should have a positive effect on purchase intention and choice.

H2. The effects of a menu-based calorie information disclosure will be moderated by the extent to which consumers' expectations deviate from actual levels. Specifically:

H2a. When actual disclosed information on the menu is more unfavorable than consumers' expectations (negative disconfirmation), information provision will decrease purchase intentions and choice.

H2b. When the information is more favorable than consumers' expectations (positive disconfirmation), information provision will increase purchase intentions and choice.

H2c. When the information on the menu is consistent with expectations (confirmation), there will be no effect on purchase intentions and choice.

Study 2 method

Predictions were examined using a 2 (menu calorie disclosure: none (control) vs. calories present) × 3 (consumer expectations: confirmation, negative disconfirmation, positive disconfirmation based on the actual calorie levels of three menu options) × 2 (retail chain: Burger King vs. Subway) mixed design. Information disclosure was a between subjects factor, while the actual fast food items pilot tested and selected as exemplars of the confirmation/disconfirmation of consumer expectations and the retail chain were within subjects factors. The confirmation/disconfirmation of consumer expectations was operationalized through the actual calorie levels (obtained from websites) of three different menu items. Pilot tests (that were confirmed in the main study) were used to determine calorie level expectations for each of the menu items, indicating that exposure to actual calorie levels on a menu would either confirm or disconfirm these initial expectations. Pilot tests suggested that the Burger King (BK) Whopper with cheese and Subway (SW) 12 in. Turkey Sub Sandwich with cheese value meals had calorie levels that substantially exceeded expectations (negative disconfirmation) while the BK Tendergrill Garden Salad with medium diet drink and the SW Club Salad with medium diet drink had calorie levels that were below consumer expectations (positive disconfirmation). The BK Whopper Jr. value meal and the SW 6 in. Turkey Sub Sandwich with cheese meal had

calorie levels that were relatively consistent with expectations (confirmation).

Thus, descriptions of three menu items from two national restaurant chains, Burger King and Subway, served as stimuli. These retailers were selected because of their high nationwide level of familiarity and because of the discrepancy between actual and estimated calorie and nutrient levels found in Study 1. Prior usage and dining frequency were similar for both restaurants. Ninety-seven percent of Study 2 participants had dined at each of the two restaurants in the past, and approximately one-half of the participants reported dining at BK (49 percent) and SW (55 percent) in the past month (all differences are nonsignificant). The Burger King options that served as exemplars of differing meal calorie expectations were as follows: (1) Whopper with cheese, large fries, and large regular drink; (2) Whopper Junior, medium fries, and medium diet drink; and (3) Tendergrill Garden Salad with medium diet drink. The exemplar meals from Subway included: (1) 12 in. Turkey Sub Sandwich with cheese, Classic Lays Potato Chips, and large regular drink; (2) 6 in. Turkey Sub Sandwich with cheese, Baked Lays Potato Crisps, and medium diet drink; and (3) Subway Club Salad with medium diet drink.[5] The menu items were presented in several different orders on the stimuli; analyses revealed that presentation order did not affect any dependent measures. Order of the presentation of the menus and measures for each restaurant also were counterbalanced.

Participants were 363 adult consumers that are part of a web-based consumer panel (53 percent female; median age = 47). Participants were e-mailed a link to an online web survey. The survey contained the mock menu board stimuli and dependent measures. The menu boards presented descriptions of each option based on information obtained from the retailers' corporate websites. For example, the Subway Club salad was described as follows: "sliced turkey breast, roast beef, ham and your choice of vegetables on a bed of lettuce." Each participant was presented one version of the menu (items with descriptions that either did or did not include calorie information). Purchase intention for each of the six menu items was assessed by two, seven-point scales (endpoints of not probable–very probable and not likely–very likely; coefficient alphas for this measure for each of the menu items ranged from .97 to .98). Consumers were also asked to choose one of the items from each menu. To corroborate the confirmation and disconfirmation of expectations, control group participants (i.e., those not presented calorie information) estimated the calorie levels of each item after completing the dependent measures.

[5] The objective calorie levels used for the menu items in the calorie disclosure condition for Burger King were as follows: Whopper with cheese meal = 1550 calories; Whopper Junior meal = 730 calories; and Tendergrill Salad meal = 240 calories. In the calorie disclosure condition for Subway, calorie levels used were: 12 in. Turkey Sub meal = 1080 calories; 6 in. Turkey Sub meal = 430 calories; and Subway Club Salad meal = 150 calories.

Study 2 results

Checks on the items as exemplars of confirmation/disconfirmation of calorie expectations

To support the three levels of confirmation/disconfirmation of expectations, analyses of variance followed by a series of *t* tests compared the differences between estimated and actual calorie levels for participants in the control condition. As desired, the Burger King Whopper with cheese meal and the Subway 12 in. turkey sub with cheese meal resulted in negative disconfirmation. Calories of the Whopper and Subway 12 in. sub meals were *underestimated* by 464 (30 percent underestimation) and 357 (33 percent underestimation) calories, respectively. *t* values assessing differences between expectations and objective values are significant (*t* values = −8.6 and −9.9, $p < .001$). Estimates for items used to confirm expectations were generally accurate (−16 and +8 calories for the Whopper Jr. and 6 in. turkey sub meals) and were not significantly different from 0 (*t* values = −.5 and +.4, respectively, $p > .50$). As expected, calorie levels of both salads were *overestimated* resulting in positive disconfirmation. For the Burger King Tendergrill salad, consumer estimates were 196 calories higher than the objective level ($t(165) = +8.2$, $p < .001$). The estimate for the Subway Club salad exceeded the actual level by 195 calories ($t(164) = +9.1$, $p < .001$). The pattern of results indicates that these food items are appropriate exemplars for tests of H2.

Effects on purchase intentions

A mixed ANOVA was performed to determine how the provision of nutrition information influenced purchase intentions. The interaction between item expectations and calorie disclosure is significant as predicted in H2 ($F(2,722) = 7.90$, $p < .001$). Interactions involving differences between the two chains were nonsignificant (three-way interaction between restaurant, disclosure and expectations ($F = 1.22$, $p > .25$); restaurant by disclosure two-way interaction ($F = 1.32$, $p > .20$)). While the restaurant by disclosure interaction is nonsignificant, for clarity, plots of the means relevant to the predicted H2 interaction are presented separately for each retail chain in Fig. 4. When calories are not presented, purchase intentions for both the Burger King and Subway meals with higher than expected calories (negative disconfirmation) do not significantly differ ($p > .30$) from purchase intentions for meals with lower than expected calories (positive disconfirmation). However, there are significant differences in purchase intentions when calorie information is disclosed. Specifically, when negative disconfirmation occurs, the results of a contrast analysis indicate that purchase intentions are lower (higher) when calories are (are not) disclosed ($F(1,370) = 3.98$, $p < .05$). When expected calories exceed actual calories, resulting in *positive* disconfirmation, purchase intentions are significantly higher (lower) when calories are (are not) disclosed ($F(1,370) = 9.40$, $p < .01$). When calories confirm expectations, the contrast for the differences between the calorie information conditions is nonsignificant ($F < 1$). These results support H2a–H2c.

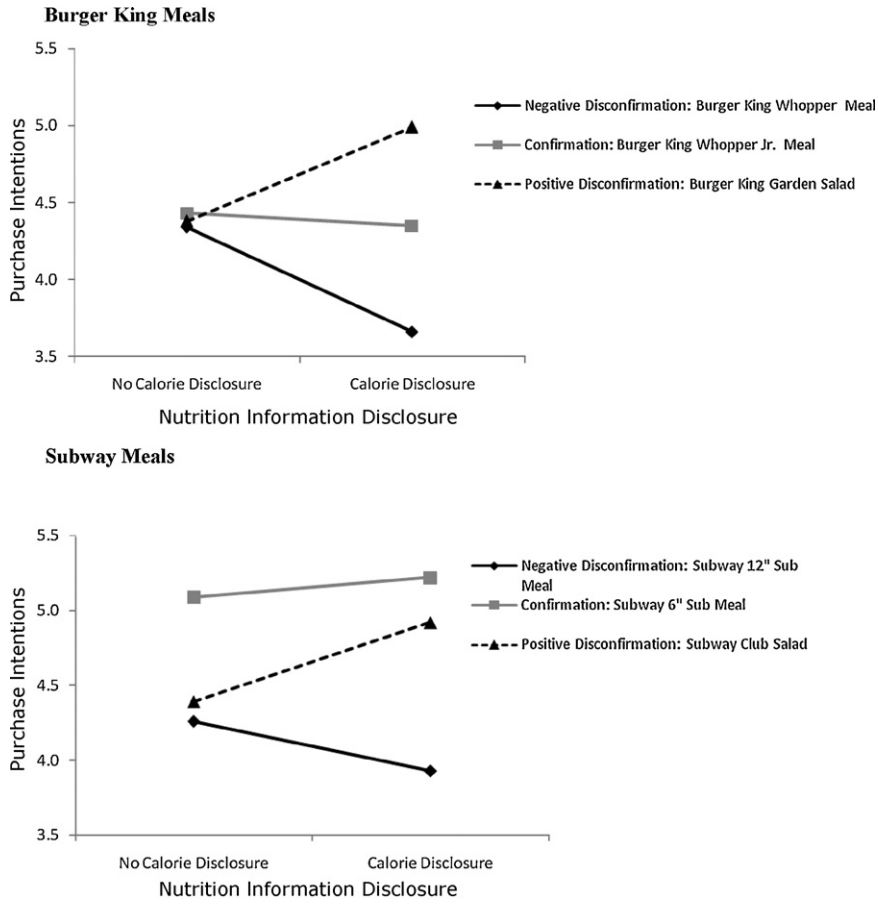

Fig. 4. Study 2: Effects of nutrition information disclosure and confirmation/disconfirmation on purchase intentions for quick service restaurant food items.

Effects on choice of items

Consistent with the findings for purchase intentions, results of a logistic regression analysis showed that the information disclosure and restaurant interaction did not influence the choice between low and high calorie items ($p > .30$). However, as predicted in H2, the effect of the disclosure on choice differed for items that deviated positively and negatively from expectations. Across the two restaurants, when positive disconfirmation occurred, the percentage of consumers who chose these lower calorie meals increased from 25 percent to 34 percent ($z = 2.70$, $p < .01$). In contrast, when the provision of calorie information resulted in negative disconfirmation, the percentage of consumers who chose the high calorie meals decreased from 36 percent to 25 percent ($z = -3.34$, $p < .01$). Choice was not influenced when expectations were confirmed ($p > .10$). Plots of these choice data for both positive and negative disconfirmation conditions and for each restaurant are shown in Fig. 5. The pattern is significant across both restaurants.[6]

In general, although the methodologies used in this study (a controlled experiment with mock menu) and in Study 1 (a survey and food diary) differed, a similar pattern of moderated effects were found. However, since actual menu items from quick service restaurants were used, calorie levels for each of these specific items remained constant and thus do not offer a strong test of the effect of individual-level expectations. That is, because calorie expectations were not directly manipulated, it is difficult to distinguish the effects of disconfirmation from the effects of the specific item calorie levels. To extend these findings, Study 3 explicitly manipulates calorie expectations in order to further address the influence of confirmation/disconfirmation.

Study 3

Study 3 method

Study 3 employed a longitudinal experiment in which participants first formed expectations regarding calorie levels and then were provided product information that either confirmed or disconfirmed these initial expectations (cf. Naylor et al. 2008). To create calorie expectations, participants were initially presented with a fictitious restaurant review (developed by the researchers) for Johnny's Restaurant. The review described a meal consisting of a hamburger, French fries, and soft drink and created either higher or lower calorie expectations. To create low (high) calorie expectations, the review informed participants that almost

[6] As can be inferred from the pattern of findings in Fig. 5 and consistent with the results for purchase intentions, when the calorie expectations were confirmed for the items with moderate levels of actual calories, the disclosure of calories did not have a significant effect ($z = 0.60$; $p > .30$) on choice for these items.

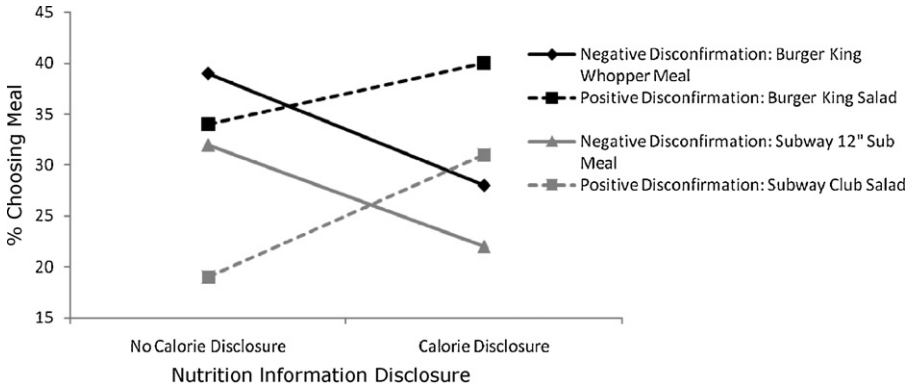

Fig. 5. Study 2: Effects of nutrition information provision and confirmation/disconfirmation on reported choice for quick service restaurant food items. *Note*: Higher (lower) values in plots for calories and purchase intentions indicate more favorable (unfavorable) evaluations; higher (lower) values for heart disease risk indicate an increased (decreased) likelihood.

all menu entrees had less than 700 calories (at least 1,400 calories).

In the second stage of the experiment (conducted on the following day), participants were asked to imagine that they were in a food court at lunch and had been presented a menu that provided calorie information for several different hamburger meals. Menu options included the hamburger meal from Johnny's Restaurant (i.e., the fictitious restaurant described in the review presented on the previous day). Calorie level of the Johnny's meal was either low (700) or high (1,400). This resulted in the following four conditions: (1) confirmation of high calorie expectations (i.e., high calorie meal expectations are confirmed by the high calorie level presented on the menu); (2) confirmation of low calorie expectations (i.e., low calorie expectations are confirmed by low calorie level); (3) positive disconfirmation of high calorie expectations (i.e., high calorie expectations are disconfirmed by low calorie level on the menu); and (4) negative disconfirmation of low calorie expectations (i.e., low calorie expectations created by the review are disconfirmed by the high calorie level on the menu). This scenario was meant to loosely correspond to market conditions in which consumers have initial expectations from prior experience that are either confirmed or disconfirmed by a subsequent exposure to objective calorie information on a menu or menu board. Dependent measures were assessed both after consumers read the review and again after the menu was presented. This created a mixed design with two between subjects factors (high and low calorie expectations either confirmed or disconfirmed) and a within subjects factor (measures assessed before and after calorie disclosure).

A pilot test was initially used to examine the effectiveness of the restaurant review and calorie levels in creating the desired level of meal calorie expectations. All aspects of the review were invariant except for information relating to the creation of calorie expectations. An initial pilot test indicated that the review worked as desired. Manipulation checks in the main study confirmed the effectiveness of the review in creating the desired initial expectations. Specifically, main study participants were asked near the end of the final data collection, "Based only on the restaurant review that I had read, I expected the calorie level of the burger meal (hamburger, order of fries and a medium drink) at Johnny's to be . . .." (seven-point scales with endpoints of 'very low' and 'very high'; 'small' and 'large'; 'much lower than normal' and 'much higher than normal'). Coefficient alpha was .93.

Main study participants were 92 undergraduate students who participated for extra credit. Primary dependent variables included a multi-item calorie evaluation of the Johnny's combination meal (similar to Study 1), likelihood of heart disease if the meal was eaten on a regular basis (single item), and purchase intentions. Reliabilities for calorie evaluation were .97 in both the first and second stages of the study. Purchase intentions also had acceptable reliability ($r = .78$ in both stages). The study also included measures to assess respondents' hypothesis guessing, social desirability (Marlowe-Crowne measure), and socially desirable eating behavior.

Study 3 results

Initial data checks

An ANOVA on the manipulation check variable indicated that the review created a significant difference in the expectations of meal calories (high and low calorie expectations means = 6.0 and 4.2, $F(1,84) = 48.4$, $p < .001$), as desired. The manipulation did not affect the perceived taste of the meal ($p > .10$). Analyses involving the measures used to assess hypothesis guessing, social desirability, and socially desirable eating behavior suggest that hypothesis guessing and social desirability biases are not influencing the results. Regarding hypothesis guessing, only one respondent offered a description that was close to the purpose of the study. For the measures of social desirability, we found that the interaction between the menus (high or low calorie level) and measures of social desirability and social desirable eating were not significant for any of the dependent variables (Fs < 1, ps > .50).

Tests of confirmation/disconfirmation of calorie expectations

To address effects on the perceptions of meal calorie favorability, purchase intentions, and heart disease likelihood, mixed ANOVAs were performed. The key research question focuses on the confirmation/disconfirmation of expectations for meals both lower and higher in calories, indicating an interaction. For perceived calorie favorability, the interaction is significant

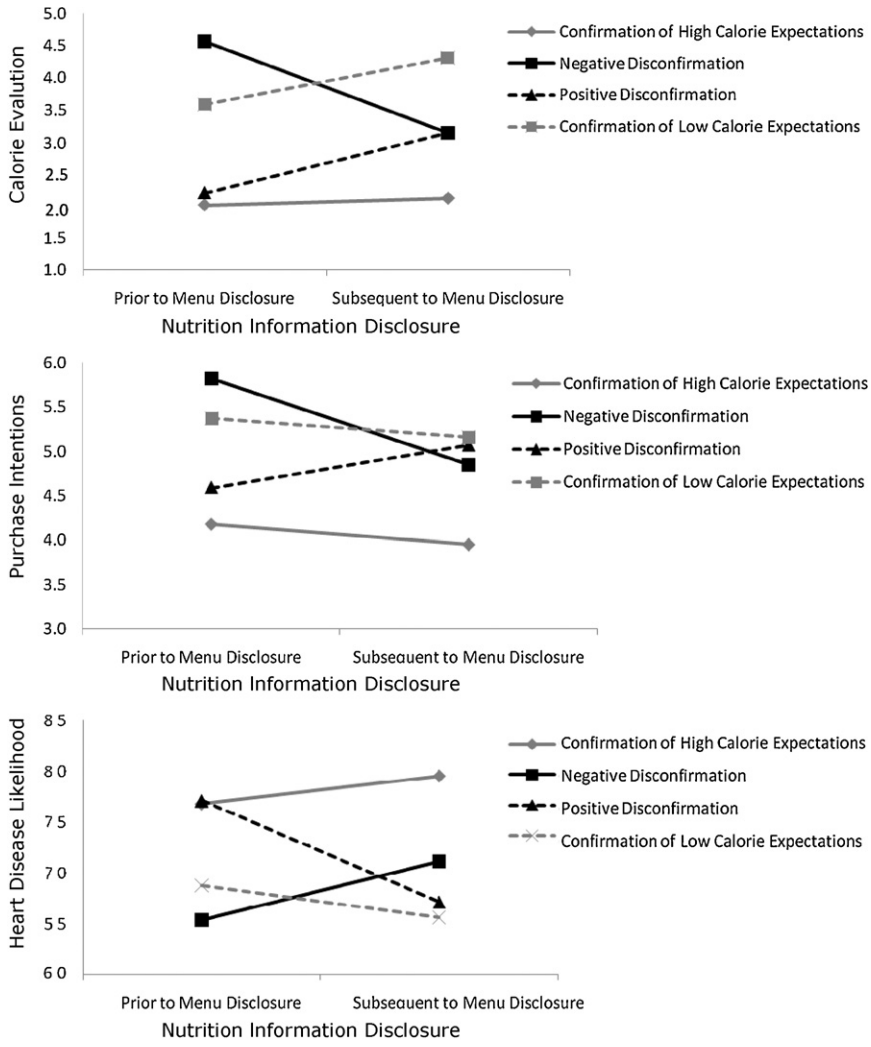

Fig. 6. Study 3: Effects of confirmation/disconfirmation on meal evaluations. *Note*: Higher (lower) values in plots for calories and purchase intentions indicate more favorable (unfavorable) evaluations; higher (lower) values for heart disease risk indicate an increased (decreased) likelihood.

($F(3,88) = 11.07, p < .01$), as shown in the upper portion of Fig. 6. As seen in the plot, after the menu disclosure disconfirms the favorable expectation created by the restaurant review, calorie favorability decreases (Ms = 4.56 vs. 3.14; $F(1,25) = 16.61$, $p < .01$). This is consistent with the disclosure resulting in a negative disconfirmation of expectations. In contrast, when the review created higher calorie expectations which were not confirmed because meal calorie level was low (i.e., positive disconfirmation), there is an increase in perceived calorie favorability (Ms = 2.20 vs. 3.20; $F(1,28) = 11.31$, $p < .01$). When the menu calorie disclosure confirms high calorie expectations created by the review, mean perceptions are unfavorable and remain consistent (Ms = 1.97 vs. 2.13; $F(1,20) = .19, p > .20$). Somewhat surprisingly, for these data, confirmation of low calorie expectations resulted in a significant increase in perceived attractiveness (Ms = 3.49 vs. 4.41; $p < .05$).

The purchase intentions interaction is significant ($F(3,88) = 4.54$, $p < .01$). The plot of means in Fig. 6 shows a pattern similar to that found for calorie favorability perceptions. When the menu disclosure (negatively) disconfirms the low calorie expectation created by the review, purchase intentions decrease (Ms = 5.83 vs. 4.84; $F(1,25) = 13.67$, $p < .01$). When a higher calorie expectation created by the review is disconfirmed by low calories (i.e., positive disconfirmation), the difference between means does not reach significance (Ms = 4.59 vs. 5.07; $F(1,28) = 2.14$, $p = .15$). When expectations are confirmed by the disclosure, the means are consistent and there is no effect on purchase intentions, regardless of the meal calorie level (Fs < 1, $p > .50$).

For the heart disease likelihood measure, the interaction is again significant ($F(3,88) = 4.19$, $p < .01$), and the plot is shown at the bottom of Fig. 6. When a higher calorie expectation created by the review is disconfirmed by a low meal calorie level on the menu (i.e., positive disconfirmation), the perceived likelihood of heart disease is reduced (Ms = 7.71 vs. 6.71; $F(1,28) = 7.13$, $p < .02$). When the menu disclosure (negatively) disconfirms the low calorie expectation created by the review, heart disease is not affected (Ms = 6.54 vs. 7.11; $F(1,25) = 2.20$, $p = .15$). When the expectations created by the review are confirmed by the menu disclosure, there again is no effect on disease likelihood, regardless of whether the hamburger and French fries combo meal calorie level is low or high (Fs < 2.0, $p > .20$).

Within this experimental context, results indicate that when a low calorie disclosure is consistent with expectations, the (low) calorie level disclosed on the menu may lead to changes in meal calorie evaluations but not purchase intentions or perceived disease likelihood. In retrospect, this is not surprising since meal calorie evaluations is the measure most likely to be impacted by objective calorie level. Although results did not reach significance in the positive disconfirmation condition for purchase intentions or in the negative disconfirmation condition for likelihood of heart disease, the results for both were in the expected direction. In sum, as shown in Fig. 6, the overall pattern of results across the three dependent variables was generally consistent with predictions.

General discussion

Using an expectancy disconfirmation theoretical framework, the goal of this research was to provide a better understanding of how consumers' product evaluations and purchase behaviors within the context of quick service restaurants are influenced by both (a) the lack of easily accessible nutrition information and (b) the provision of objective nutrition information. Given the timeliness and importance of this issue (Horovitz 2008; Rabin 2007), we discuss the potential implications of our findings for consumers, retailers, and public policy makers.

Results indicate that consumers generally are poor estimators of the actual fat, sodium, and calorie content of many of their quick service restaurant food purchases. This is particularly true for foods that are relatively high in calories and negative nutrients. Replicating recent findings (e.g., Chandon and Wansink 2007a; Wansink and Chandon 2006), Study 1 results show that the majority of consumers underestimate the calorie levels of their fast food purchases. We extend these recent results to different restaurants and purchase contexts, while also showing that as the levels of fat and sodium increase, underestimation of these nutrient levels increases as well.

Using a diary and surveys in Study 1, exposure to objective calorie and nutrient information, as expected, had a negative (somewhat positive) impact on consumers' perceptions and evaluations of higher (lower) calorie and fat meals. Furthermore, the results of the menu board experiments in Studies 2 and 3 further demonstrate the critical role of deviation from consumer expectations. When objective calorie levels were higher (lower) than expected, purchase intentions were lower (higher). Perhaps more importantly, compared to the no calorie disclosure control condition, the percentage of consumers choosing the less healthful menu items *decreased* when actual calories were disclosed and exceeded expected levels, and the percentage of consumers choosing the more healthful items *increased* when actual calories were disclosed and levels were less than expected.

Implications for restaurant retail management

Mandates requiring the provision of calorie information on menus and menu boards are scheduled to go into effect soon in several major U.S. cities, and will be going into effect for the entire state of California on January 1, 2011. Similar regulations appear to be on the horizon in a number of states and cities across the country, and menu labeling requirements are the focus of the LEAN Act, which was introduced in September 2008 in the U.S. Congress. Consequently, our results may help inform the decision making processes of managers within the quick service restaurant industry as they adapt to the changing market environment. As shown in Study 1, consumers generally underestimate calorie and nutrient levels of quick service restaurant purchases, and subsequent exposure to objective information decreases reported repurchase intentions. However, there is substantial variance in both the estimated and actual calorie and nutrient levels across specific restaurants (e.g., Table 1) and across menu items. These data suggest that some restaurants are currently in a more favorable competitive position to mount a market response to mandated nutrition information disclosures. Conversely, quick service restaurants with signature items that are substantially less healthy than consumers' expectations may be in a somewhat less favorable position. Consistent with findings from our studies and arguments from advocates in favor of menu labeling, some restaurants may wish to improve their portfolio of healthy items by either introducing new products or improving the nutrition profile of foods on their current menu by switching to lower calorie ingredients. Similarly, serving sizes of the less healthful menu items could also be reduced while the sizes of more healthful items (e.g., fruit, salads/vegetables with low calorie dressings or sauces) could increase volume without sacrificing satisfaction with meal size. Results indicate that it would also be useful for the chains to understand consumers' current calorie expectations for the full range of menu items that are offered. In addition to introducing healthier items, for some higher calorie items restaurants may want to explore ways to increase consumers' expectations so that they do not experience strong disconfirmation effects when disclosures occur.

Most quick service restaurants offer consumers' some low calorie options (e.g., salads and grilled chicken sandwiches offered by Burger King and McDonald's), and results show that calorie disclosure can result in positive disconfirmation that may lead to an increase in purchases. Although the availability of these more healthful items may help diffuse some customers' negative reactions to the disclosure of objective calorie and nutrient information that is higher than expected, for the segment of consumers most concerned about diet and nutrition, "calorie sticker shock" may be a likely response (Rabin 2007). Such reactions may be amplified by the contrast between very low and very high calorie items (e.g., 240 calories in a Burger King Tender Grill salad and diet drink compared to 1,510 calories for a Double Whopper and large shake). Further research is warranted; of particular interest is how store patronage and food choices are likely to be influenced by the provision of calorie information for an entire menu of a chain (Pan and Zinkhan 2006). For a given chain, if expectations are primarily confirmed, few changes in choices or patronage would be anticipated due to the calorie disclosure.

Mandated nutrition information disclosure also provides an opportunity for more refined market segmentation. Results suggest that restaurants such as Chic-fil-A may be in a position to

more strongly promote the relative healthfulness of their primary fare, compared to consumer expectations. There appears to be a health conscious segment of consumers who state that they will dine out more frequently if easily accessible nutrient and calorie information is available (Rabin 2007). This may be reinforced for items that lead to positive disconfirmation, as suggested in Studies 2 and 3. When selecting a meal, taste is often the most important consideration. However, the importance of taste, relative to product healthfulness, is more important for some segments than for others (e.g., Glanz et al. 1998). One option some restaurant chains may consider is targeting young (male) consumers through use of light-hearted campaigns that flaunt taste while emphasizing the *lack* of meal healthfulness.

Although an environment of nutrition disclosures potentially offers marketing opportunities for some firms with relatively nutritious fare, our findings do raise some concerns for these retailers. The product positioning used in Subway's advertising (i.e., strongly emphasizing their low fat menu items) seems to have created a health halo effect (Chandon and Wansink 2007a). For example, Study 1 findings suggested that, on average, estimated fat levels (11 g) are almost 50 percent lower than the actual fat (20.7 g) levels at Subway. Exposure to values for less healthy options may result in dissatisfaction for some consumer segments. In addition, awareness of the potential effects of health halos might provide consumers with important information that enhances consumers' specialized knowledge regarding fast food marketing communications (Friestad and Wright 1994; Hardesty, Bearden, and Carlson 2007). Note that this halo effect is particularly large for sodium; the promotion may lead consumers to anticipate lower levels of sodium for Subway meals but the processed meat used in many sandwiches leads to sodium levels comparable to the hamburger chains.

Implications for consumers and public policy makers

This series of studies is an example of retailing research that addresses a policy-relevant consumer behavior issue (cf. Grewal and Levy 2007), and findings are likely to be of interest to both consumer researchers and policy makers. The rising prevalence of both childhood and adult obesity is a significant national health problem that, despite widespread media attention and high consumer awareness of the health risks associated with overweight and obesity, shows few signs of abating. Successful weight loss depends on many factors. However, in many cases, the key to losing weight is to consume fewer calories than are expended; consumption of 3,500 more calories than are expended is expected to increase weight by one pound. Results from Study 1 show that, on average, participants were unknowingly consuming 900 *extra* calories in a week from restaurant meals. This degree of underestimation appears capable of causing significant weight gain over the long term. Clearly, there appears to be a potential 'cost of ignorance' (Forster and Just 1989) associated with not making the nutritional values accessible for meals prepared outside the home.

Given the direct role calorie consumption can play in the development of obesity and overweight, health professionals and public policy makers have emphasized the importance of balancing calorie intake with energy output. However, overconsumption of nutrients such as sodium can also have a detrimental effect on health and contribute to the development of cardiovascular (or other) disease. Approximately 77 percent of sodium consumed on a daily basis is obtained from restaurant and processed foods. (Note that in Study 1, consumption of sodium was underestimated by more than 1,000 mg.) Some have suggested that reducing salt consumption by one-half may save more than 150,000 lives each year in the United States (Alonso-Zaldivar 2007). For consumers with health conditions that make sodium an important concern, these results are alarming and suggest the importance of some form of disclosure for consumers at risk for hypertension or heart disease.

Our study findings provide some potential insight into why very frequent restaurant diners may have difficulty maintaining or losing weight—the average consumer has very little knowledge of the total calorie and nutrient content of meals purchased from restaurant chains. Because of this lack of knowledge, consumers are unable to make fully informed food choices. Making calorie and nutrient information easily available to consumers at the retail point of purchase, rather than requiring an active information search which is now the status quo, could potentially help restrained eaters better manage their caloric and negative nutrient intake. For such health conscious consumers, nutrition information disclosures may also strengthen goal activation (e.g., weight loss), which in turn, may encourage more goal directed behaviors (e.g., selection of a diet rather than a regular soft drink). However, nutrition disclosure programs only address one aspect of the problem—the lack of easily accessible, accurate nutrition information. Information provision will not benefit consumers who lack the motivation and desire to utilize that information during their food selection processes (Howlett et al. 2009). A disclosure program in combination with a nutrition education campaign seems to offer the greatest potential consumer benefits.

Limitations and implications for future research

Using methods commonly utilized in retailing research (Brown and Dant 2008), this research combined a diary and survey data assessing consumption behavior with two menu-based experiments; however, limitations remain that may restrict the generalizability of findings. In the experiments, consumers examined nutrition information outside of the context of actual restaurants. When selecting items from a menu in actual restaurants, situational and contextual differences may lead to different responses. It is difficult to obtain behavioral responses to full nutrition disclosure that mimics the actual market, with all of its contextual influences, without the complete cooperation of restaurant management. In addition, Study 1 lacked a control group, and this introduces potential threats to internal validity. All studies focused only on quick service restaurants. However, both pending and passed legislative initiatives also include provi-

sions for table service restaurant chains. Because many of these table service restaurants (e.g., Chili's, TGI Friday's) feature some very large servings of high calorie items, future research may focus on specific restaurants in this category. In addition, mandates passed in California, New York, and Seattle requiring chain restaurants to disclose calories on menus and menu boards will permit the collection of consumers' responses in actual market conditions. Such longitudinal field studies should be particularly useful in overcoming many potential problems related to the generalizability of findings and specific implications for restaurant retailers. In addition, such results will serve to guide future legislation (e.g., the recently proposed LEAN Act) aimed at helping reduce the prevalence of overweight and obesity, at least among some segments of consumers by mandating the provision of calorie and nutrient information for away-from-home foods. Studies of differences in effects based on consumers' current health status and health goals and motivation is warranted.

Consistent with these local and national labeling initiatives, the goal of this research was to address a substantive issue that is timely, relevant, and important. Given this substantive question, we acknowledge that the research generally was more concerned with the application of relevant theory rather than a more direct concern with the development of new theory *per se* (e.g., Mick 2005; Simonson et al. 2001). However, there are a variety of future studies that could address conceptually compelling topics related to this menu labeling issue. For example, research could examine how nutrient estimates are formulated across different restaurants and explore how specific factors (e.g., positioning strategy, target markets, pricing) may affect the accuracy of these estimates across restaurants. In addition, is it possible for mandated nutrition information disclosure to have unintended consequences? For example, will some segments of consumers choose *less healthy* meal options because of psychological reactance or other reasons? In sum, there are many opportunities for additional theoretical and applied research that would involve experimental, longitudinal and qualitative methodologies for this topic that has potentially important implications for academics interested in retailing and consumer behavior issues, as well as for retail restaurant chain marketers.

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