Are Some Comparative Nutrition Claims Misleading? The Role of Nutrition Knowledge, Ad Claim Type and Disclosure Conditions

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Are Some Comparative Nutrition Claims Misleading? The Role of Nutrition Knowledge, Ad Claim Type and Disclosure Conditions

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Abstract  
As the regulator of all national food advertising, the Federal Trade Commission (FTC) has expressed concern that consumers may be misled by certain comparative nutrient content claims in advertising. To help examine this issue, primary food shoppers were recruited and interviewed in three U.S. markets according to generally accepted procedures for advertising copy tests. The study employs a 2 (ad claim type) x 2 (nutrition knowledge) x 4 (disclosure type) between-subjects design using manipulated print advertisements. Misleading
generalizations for absolute levels of sodium content beyond that of control ads are found for both specific and
genral nutrient content claims from experimentally manipulated soup advertisements. Effects of certain ad
disclosure types are found to be dependent on ad claim type and on nutrition knowledge levels. Conclusions
from the study and implications for advertising practice and public policy are offered.

Following passage of the Nutritional Labeling Education Act (NLEA 1990), the Food and Drug Administration
(FDA) specified the approved use and terminology for a limited number of nutrient content claims on all food
packaging (Federal Register 1993; FDA Consumer 1993). Nutrient content claims such as "low fat," "reduced
sodium," "high in fiber" have become quite prevalent in advertising (Center for Science in the Public Interest
1994; Reece Sheffet and Rifon 1997; Resnick 1997) and often extend to synonyms for such terms (e.g, "without
all the fat," "a lot less sodium," "loaded with fiber"; see Colford 1994).

However, as the regulator of all national food advertising, the Federal Trade Commission (FTC) has expressed
concern that consumers may sometimes draw misleading conclusions from such claims (FTC 1994). For example,
former FTC Commissioner Starek requested research evidence as to exactly how consumers might interpret
favorable nutrient content claims for foods that contain high levels of other negative nutrients (e.g., fat,
saturated fat, cholesterol, sodium; Starek 1993). If broader (and erroneous) generalizations were likely, then
some type of disclosure about the related negative nutrient would be needed. Similarly, the FTC (1994)
expressed concern with the use of comparative nutrient content claims (i.e., "1/3 less salt," "healthier"),
especially when the basis for comparison is not clear. In such instances, the claim may be unqualified
("healthier" than?), the benefit overstated, or the absolute level of the negative nutrient still high. On this latter
point, the Commission (FTC 1994, p. 11) indicates that:

... a claim such as "20 % less fat in our frozen entree compared to Brand X," regarding a product that
nevertheless contains a significant amount of fat, may need to identify the quantitative amount of fat in
the advertised food and the reference food (e.g., "20% less fat than Brand X-Brand X has 25g. fat, ours
has 20 g. fat"), particularly in situations where consumers are not likely to be aware that the item is
genearly high in fat.

Research studies to date on such misleading omissions in nutrient content advertising concern
overgeneralizations of absolute nutrient claims (such as "Low Cholesterol") to other related attributes (Andrews,
Netemeyer and Burton 1998; FTC 1998) and misperceptions of substitution claims (FTC 1998). "Halo effects" to
other related nutrient attributes also are found in the study of health claims in Roe, Levy and Derby (1999). Our
present study seeks to extend these contributions by examining comparative nutrient content claims in
advertising for a product viewed by most consumers as relatively nutritious (soup), yet whose reduced value
levels for an unfavorable nutrient remain high. (These reduced values were 500 mg. of sodium and 21% of the
Daily Reference Value [DRV] compared to its regular version at 746 mg. of sodium and 31% DRV; see FTC 1994,
p. 11). Based on nutrition research, the FDA has linked high levels of sodium to high blood pressure and
coronary heart disease (Federal Register 1993, pp. 2836-7; Liebman 1995).

Research focusing on the effects and remedies for potentially misleading comparative nutrition claims in ads
also can contribute to the comparative ad literature in general (Muehling 1987; Putrevu and Lord 1994; Shimp
1978). Further, such research is of direct interest to

food advertisers and is likely to enhance overall consumer welfare (FTC 1979). Given the FTC's case-by-case
approach in regulating ad claims, food advertisers seek greater guidance as to what specific ad claims and
messages may lead to gross misinterpretations by consumers (Colford 1994; Petruccelli 1996).

Thus, our study seeks to address four primary research questions. First, will consumers draw inappropriate
conclusions from favorable, comparative nutrient content claims in advertising, given nondisclosure of the
absolute level of the advertised negative nutrient? Such conclusions will be addressed primarily by assessing
effects on consumer perceptions of absolute levels of nutrient content and disease risk. Second, will ad
disclosures have an effect on consumers' tendencies to generalize from such nutrient content claims, and, will
these effects vary across different disclosure types? Third, will conclusions drawn by consumers differ across
general and specific ad claim types? Fourth, will consumers' level of nutrition knowledge affect such conclusions
and/or moderate effects of different claims and disclosures?

Research Background and Hypotheses
Advertising Conclusions and Generalizations
Conclusions and generalizations drawn by consumers beyond specific attribute information provided by an ad
are quite common (Harris, Dubitsky and Bruno 1983; Shimp 1983) and may lead to ad-based beliefs that are
misleading or deceptive (Johar 1995; Pechmann 1996; Shimp 1978). For example, Shimp (1978) demonstrated
the misleading nature of incomplete comparatives in advertising (such as "Brand X is Better") because of their
susceptibility to multiple interpretations, some of which are false.

From a legal perspective, the Federal Trade Commission (1983, pp. 4, 15) has indicated that they will find
evidence of deception "... if there is a representation, omission, or practice that is likely to mislead the consumer
acting reasonably" and "the representation, omission, or practice is material." For instance, the FTC has found
that consumers form erroneous inferences from the omission of negative information, such as a food's high
sodium level. This negative information is needed to prevent positive ad claims, such as express and implied
heart-healthy claims, from being deceptive (Campbell Soup Co. 1992).

In a study of nutritional claims, Roe, Levy and Derby (1999) have identified at least three types of possible biased
inferences when consumers are exposed to nutritional claims. These potential biases include (1) a positivity bias,
in which consumers provide better product ratings merely based on the presence of the claim, (2) a halo effect,
in which consumers rate the product higher on other attributes not mentioned in the claim, and (3) a "magic
bullet" effect, in which consumers attribute inappropriate health benefits to the product. There is empirical
evidence consistent with these proposed biases (cf. Andrews, Netemeyer and Burton 1998; FTC 1998). For
example, in Andrews et al. (1998), misleading halo effects occurred from nutrient content claims ("No
Cholesterol," "Healthy") to evaluations of fat levels and overall healthiness for a product (margarine) viewed by
consumers as relatively non-nutritious. Inclusion of qualifying disclosures had effects that were independent of
ad claim type and nutrition knowledge levels.

In general, activation theory provides a useful conceptual framework for how ad-based beliefs and conclusions
might be formed (Collins and Loftus 1975). Activation theory argues that links between concepts (e.g., nutrients,
diet-disease relationships) in a memory network are a function of the strength or salience of the links between
concept "nodes." When a concept in the memory network is primed by a claim such as "1/3 Less Salt," activation
occurs via tracing an expanding set of links between concepts (e.g., beliefs that the promoted brand is "low in
sodium," "healthy," and "will not lead to high blood pressure and heart disease"). However, as noted by Coffins
and Loftus, this activation process weakens the further it travels outward in the network. Therefore, beliefs
about general healthiness and related, yet non-disclosed nutrient levels may be more likely than more
ambiguous associations between the use of a product and risk level for certain diseases, such as the belief that
reduced salt products lead to lower risk of heart disease. Based on the previous research, we predict that:

H1: Exposure to favorable, comparative nutrient content claims ("1/3 Less Salt," "Healthier") will lead to
more favorable evaluations of absolute nutrient levels (absolute levels of sodium, overall nutritional
content) and disease risk (risk of high blood pressure, coronary heart disease) than exposure to
control ads not promoting nutrition.
Advertising Disclosures

In general, disclosure statements or qualifications in ads are designed to provide additional information to consumers to help them from being misled or deceived by the primary claims or messages in the ad. If disclosures are clearly and prominently displayed, they can be effective in mitigating the formation of potentially misleading beliefs, attitudes, and intentions (cf. Foxman, Muehling and Moore 1988; Hoy and Stankey 1993; Muehling and Kolbe 1998). As found in Andrews, Netemeyer and Burton (1998) and FTC (1998), disclosure effectiveness also can depend on the type of qualification shown to consumers. Language helping to expand the consumer's cognitive frame of reference by linking diseases to nutrient information tends to have stronger effects than information that is more limiting in nature (e.g., disclosure of absolute levels of nutrients) or that which might be rationalized by consumers (e.g., relative levels compared to larger daily levels). Such language tends to be effective because consumers view it as important diagnostic information that should be considered in ad-based evaluations and brand perceptions (Feldman and Lynch 1988).

Also, in the case of nutrient content claim disclosures, the FTC has stated that:

"When the context of an ad as a whole conveys to consumers the net impression that the food only makes positive contributions to a diet, or does not contain any nutrients that raise the risk of diet-related disease, the failure to disclose the presence of risk-increasing nutrients is likely to be deceptive." Further, "even where nutrient differences are substantial in an absolute sense, careful qualification may be necessary for products that despite such absolute reductions, still contain appreciable amounts of a nutrient, to ensure that consumers are not misled regarding the absolute level of the nutrient" (FTC 1994, pp. 11, 15).

Absolute Disclosure.

Three specific footnoted nutrition disclosures are examined in this study in addition to a control condition in which no disclosure is presented. The first disclosure type examined is an "absolute information only" condition that presents information on the absolute quantitative level of a nutrient ("Contains 500 milligrams of sodium per serving") when the nutrient level is not emphasized in the ad headline or copy. This disclosure type follows packaging regulations that require that omitted information about fat, saturated fat, cholesterol, or sodium must be disclosed when any favorable nutrient claims are made on the package, if that omitted information occurs at a level that increases the risk of diet-related disease (Federal Register 1993). This absolute condition also is consistent with the Federal Trade Commission's position on advocating qualifying information to prevent misleading inferences and beliefs about an advertised product (FTC 1994, p. 15).

Relative Disclosure.

The second disclosure type is a "relative" disclosure that includes not only disclosure of the nutrient level, but adds information on the recommended daily value level and percentage of daily value of the nutrient. This latter information is consistent with that required on current nutrition labels (Levy, Fein and Schucker 1996), and thus is intended to serve as an aid to consumers in interpreting ad copy and disclosure information.

Evaluvative Disclosure.

The third disclosure type examined is evaluative in nature in that it specifies that the per serving level of the disclosed nutrient is "high" based on FDA standards. Consistent with the model health statements in the food labeling regulations, this evaluative disclosure links low levels of consumption of the nutrient to a reduced risk of some health-related disease (e.g., high blood pressure). Providing this linkage offers information that some consumers might not have available or accessible in the absence of an explicit memory cue (Andrews, Netemeyer and Burton 1998; FTC 1998). Thus, this disclosure type should change the cognitive frame accessed and used in constructing ad-related brand beliefs and nutrition and health evaluations.
Based on the above rationale, it is predicted that inclusion of a disclosure will affect ad-based nutrition and health-related perceptions, compared to ads with no disclosure. We also predict that the evaluative disclosure will result in the least favorable nutrition and health-related brand evaluations.

H2a: Exposure to ads with nutrition disclosures will lead to less favorable evaluations of non-featured nutrient levels (absolute levels of sodium, overall nutrition content) and disease risk (risk of developing high blood pressure, heart disease) than exposure to ads without disclosures.

H2b: Exposure to an evaluative disclosure will lead to less favorable evaluations of non-featured nutrient levels and disease risk than exposure to absolute or relative disclosure statements.

Ad Claims
Use of a general or specific ad claim type also may affect generalizations from nutrition information in ads. Based on the study of factual versus evaluative ad content, evaluative claims, such as "Brand X is Better," have been viewed as believable because of the multiple implications that may be drawn from such claims by consumers (Shimp 1978, 1983). However, some frequently used nutrient content terms, such as "oat bran" and "healthy," have led to skepticism from consumers ("Shopping for Health" 1995, p.7). Such discounting of ambiguous claims by consumers can occur in the form of "schemer schemas," or consumers' intuitive theories about persuasive tactics in the marketplace (Wright 1986). For example, focus group participants suggested that nutrient content claims are placed on food packages to encourage sales rather than to accurately disclose the food's nutrient content (Lewis and Yetley 1992).

Based on economics of information research (Ford, Smith and Swasy 1990; Nelson 1974; Smith 1990), consumers will tend to be more skeptical of experience-good claims (where the product cannot be inspected prior to purchase) and subjective claims (e.g., "Healthy") than they will be for search-good and objective claims (e.g., "No Cholesterol"). Similarly, Hoch and Ha (1986) found that when consumers are confronted with ambiguous evidence, such as a "Healthy" claim, further information from advertising or other sources is needed to more accurately evaluate the claim. This, in turn, can have dramatic effects on perceptions of product quality. Therefore, it is expected that:

H3: Exposure to a specific ad claim type ("1/3 Less Salt") will lead to more favorable (and erroneous) evaluations of non-featured nutrient levels (absolute levels of sodium, overall nutrition content) and disease risk (risk of developing high blood pressure, heart disease) than will exposure to a general ad claim type ("Healthier").

Consumer Nutrition Knowledge
Prior research indicates that while consumers report they are interested in nutrition information, they lack the requisite knowledge and skills to effectively make use of this information (Burton, Biswas and Netemeyer 1994; Jacoby, Chestnut and Silberman 1977; Levy, Fein and Stephenson 1993; Petty and Cacioppo 1986). However, the conceptualization of memory as a network of concepts that are sequentially activated (Collins and Loftus 1975) indicates that nutritional knowledge levels may play an important role in how consumers process nutrition claims. For example, Brucks, Mitchell and Staelin (1984) determined that more knowledgeable subjects tend to encode and utilize information in terms of specific nutrient content, as opposed to more abstract concepts of "overall nutritiousness."

In general, Alba and Hutchinson (1987, pp. 423 and 428) argue that novices are more likely to overgeneralize new product-related information than experts. Also, prior knowledge will help consumers from accepting erroneous pragmatic implications of ad claims (see Shimp 1983). If product-related information is simplified by the consumer, prior knowledge is said to increase the accuracy of this simplification (Alba and Hutchinson 1987,
Moreover, product experience/knowledge has been shown to be an important factor in assessing the credibility of advertising claims, especially when ambiguous evidence is provided (Hoch and Ha 1986). Therefore, we expect that:

H4a: Higher levels of nutrition knowledge will lead to less favorable evaluations of the non-featured nutrient levels (absolute levels of sodium, overall nutrient content) and disease risk (risk of developing high blood pressure, heart disease) than will lower levels of nutrition knowledge.

Based on inferencing research, novices are more likely than experts to rely upon non-analytic inferences and make holistic classifications (Alba and Hutchinson 1987, p. 423). In addition, nutrition research has determined that consumers, in general, have experienced many problems in processing and understanding numerical information in nutrition (Daly 1976; Jacoby, Chestnut and Silberman 1977; Levy, Fein and Stephenson 1993). Providing consumers with detailed nutrition information tied to disease risks (i.e., evaluative information) is likely to aid their understanding and utilization of the information (Andrews, Netemeyer and Burton 1998; FTC 1998) and be more readily used in evaluations by consumers with higher nutrition knowledge. The reason is that consumers with greater knowledge structures and networks can better utilize expanded amounts of information than those with lesser knowledge (Alba and Hutchinson 1987; Collins and Loftus 1975). Therefore, we predict that:

H4b: The level of nutrition knowledge moderates the effect of disclosures on nutrient content and disease risk evaluations. Exposure to disclosures with evaluative information will lead to less favorable evaluations of non-featured nutrient levels (absolute levels of sodium and overall nutrient content) and disease risk (risk of developing high blood pressure, heart disease) for consumers with higher levels of nutrition knowledge than for those with lower knowledge levels.

Methodology

Description of Pretests

Prior to the main study, three pretests were conducted. The purpose of the first pretest was to select a product category that is commonly perceived as nutritious. Data were collected from 54 primary food shoppers who were 18 years of age or older. Nutritiousness ratings often commonly-purchased grocery items were evaluated by the subjects on a scale from "1" (not very nutritious) to "7" (very nutritious). (A "don't know" option was also provided.) Statistical tests were performed to determine if the standardized scores for each category were significantly different from the overall standardized mean of zero. Soup was selected as the product category for use in the main study based on pretest results, significant use of print ads with nutrition claims, and previous public policy interest in the product category.

Our second pretest examined possible ad claim language on key manipulation-check measures of ad claim specificity (general vs. specific), as well as evaluations of the disclosed nutrient after exposure to several types of ad disclosures. All ads contained between 61 to 67 words for the headline and copy, and were identical in executional layout. Targeted (specific or general) claims were repeated 3-4 times in the ad copy. The specific ad claim copy condition was "Now with 1/3 Less Salt," while the general ad claim copy condition used a "Now Healthier Than Ever" theme. In addition, three ad disclosure types and a control (no disclosure) condition were tested across both general and specific ad conditions discussed above. "Absolute," "relative," and "evaluative" disclosure conditions were constructed based on actual campaign material and information from the food labeling regulations. A sample of 200 primary food shoppers was exposed to one of the eight print ad conditions in a 2 (levels of ad claim type) x 4 (disclosure conditions) design. Findings indicated that the ad claim conditions were perceived as desired with the specific ad copy viewed as significantly more specific, detailed, and clearer
than the general ad copy. In addition, there were effects associated with all disclosures relative to the control (no disclosure) condition. Thus, all three disclosures were retained for the main study.

The third pretest included several small studies whose purpose was to develop and evaluate an objective measure of general nutrition knowledge. This began by generating a pool of 64 items used in prior nutrition research and practice (cf. Burton, Biswas and Netemeyer 1994; Levy, Fein and Stephenson 1993; Moorman 1990; and available nutrition quizzes and tests). Based on a series of tests with general and expert samples, and by assessing known group validity, the final scale consisted of 15 multiple-choice items (see Andrews, Netemeyer and Burton 1998).

Experimental Design
Hypotheses were tested in a between subjects experiment involving three factors: ad claim type, disclosure type and nutrition knowledge. Ad claim type consisted of two levels, general and specific, and, as noted above, was developed and tested prior to the main study in a pretest. The general comparative claim used was "Now Healthier Than Ever" and the specific comparative claim was "Now with 1/3 Less Salt." For each claim, respondents were exposed to one of four disclosure conditions in the study, including a no disclosure control, an absolute disclosure, a relative disclosure, and an evaluative disclosure, as described prior to hypotheses H2a and H2b. The three disclosure conditions were consistent with remedies applied in FTC orders (cf. Campbell Soup Co. 1992; Conopco, Inc. 1997), and, as described in the previous section, each was pretested prior to inclusion in the main study. Nutrition knowledge was a measured variable that consisted of two levels (high and low) for use in tests of hypotheses. The high and low knowledge levels were based on a median split of the number of correct responses to the 15-item Nutrition Information Survey developed previously (Andrews, Netemeyer and Burton 1998). The mean for the high nutrition knowledge group was 8.80 ($\bar{x} = 1.65$), and for the low nutrition knowledge group it was 4.55 ($\bar{x} = 1.37$; $t =: 26.83; p < .01$).

The study also included an additional (trailer) control ad that did not contain any nutrient content claims or disclosure information. This nonnutritional ad claim condition was used to help determine the incremental effect predicted in H1 for the specific and general nutrition claims relative to this control ad that did not contain any nutrition-related information. The claim used in this nonnutrition control condition was "Now More Delicious Than Ever." If the specific and general nutrition claims are shown to have a misleading effect relative to this nonnutritional control condition, effects of various disclosures can be examined to determine if they help mitigate inappropriate beliefs of consumers.

The basic design used to examine predictions in hypotheses H2 to H4b was 2 (ad claim) x 2 (knowledge level) x 4 (disclosure), with at least 20 subjects per cell. In total, there were 326 subjects for this basic design, all of whom were primary food shoppers for their households. An additional 40 subjects were exposed to the trailer control ad that used the nonnutritional claim.

Sample Characteristics, Ad Stimuli, and Study Procedure
All participants in the main study were at least 18 years of age and voluntarily participated in a mall intercept study. The study included a total of 366 primary food shoppers recruited and interviewed in three geographically dispersed mall locations across the U.S. (Boston [$n = 127$], Chicago [$n = 119$], and Los Angeles [$n = 120$]), using generally accepted procedures for advertising copy tests (cf. Andrews and Maronick 1995; Maronick 1991). Quota sampling on age was used such that 26% of the participants were between 18 and 29 years, 25% were between 30 and 40 years, 26% were from 41 to 56 years, and 24% were 57 years or older. As the sample was restricted to primary food shoppers, 68.5% of the participants were female.
After initial screening, respondents were randomly assigned to one of the possible ad conditions and viewed the target soup ad embedded in two clutter ads (both for two nationally-distributed, consumer packaged good items) in a booklet. All ads were presented in full color.

Dependent Measures
The measures proceeded from general questions on ad meaning to more specific questions on nutrient content, health and attitudes. The four primary absolute nutrient content level and disease-related items measured whether the advertised soup brand was (1) low/high in sodium content, (2) healthy/unhealthy for you, and agreement/disagreement that regularly using the advertised brand would contribute to the risk of developing (3) high blood pressure and (4) coronary heart disease. Specifically, the question for sodium asked, "Based on the Campbell's ad that you just read, do you consider the advertised Campbell's soup to be ..." with responses ranging from "low in sodium" (scored as "1") to "high in sodium" (scored as "7") on a seven-point scale. Similarly, the healthiness question contained the same preface as the sodium question, with responses ranging from "healthy for you" ("1") to "unhealthy for you" ("7") on a seven-point scale. The two questions on disease-risk began as follows, "Regularly using the advertised Campbell's soup may contribute to the risk of developing ..." coronary heart disease for one question and high blood pressure for the other question. Both disease-risk items were Likert-type measures with responses ranging from "strongly agree" ("1") to "strongly disagree" ("7"). These latter two diet-disease links are specified in the model health statement of the food labeling regulations (Federal Register, 1993, p. 2836) and discussed by nutritionists elsewhere (Liebman 1995). Also, the four measures were consistent with those frequently used in consumer research on nutrition labeling and claims (cf., Ford, Smith and Swasy 1996; FTC 1998; Keller et al. 1997; Levy, Fein and Schucker 1996; Mitra et al. 1999; Roe, Levy and Derby 1999).

Claim believability was a summated scale (alpha = .89) comprised of three, 7-point items measuring whether the information in the ad was believable-unbelievable, trustworthy-untrustworthy, and credible-not credible. Attitude-toward-the-ad also was a summated scale (alpha = .93) of three, 7-point items assessing whether reaction to the ad was favorable-unfavorable, good-bad, and positive-negative. Brand attitudes were the summation (alpha = .96) of three items measuring whether attitude toward the advertised brand was favorable-unfavorable, good-bad, and positive-negative.

Based on prior work of Moorman (1990, p. 367), two 7-point items are summed (correlation = .63) to measure motivation to process nutrition information for use as a potential covariate with the believability and attitude measures. These Likert-type items measure agreement with the following statements: "I usually am interested in looking for nutrition information in soup ads," and "I would like to see additional nutrition information in soup ads." The second covariate, brand familiarity, was measured on a 7-point scale from "not very familiar" to "very familiar" in response to the question, "Before the study today, how familiar were you with the advertised soup brand?"

Table 1 Generalizability Effects for Ad Claim Types vs. Control Ad on Nutrient Content and Disease Risk Measures

<table>
<thead>
<tr>
<th>Independent Variable Level</th>
<th>Dependent Measures: Means and (standard deviations)</th>
<th>Sodium Content</th>
<th>Blood Pressure</th>
<th>Heart Disease</th>
<th>Healthy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Ad (&quot;Taste&quot;)²</td>
<td>(a)</td>
<td>40</td>
<td>3.33b,c</td>
<td>2.65</td>
<td>2.38</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(1.72)</td>
<td>(1.93)</td>
<td>(1.76)</td>
</tr>
<tr>
<td>Specific Ad (&quot;1/3 Less Salt&quot;)²</td>
<td>(b)</td>
<td>42</td>
<td>2.21a</td>
<td>2.86</td>
<td>2.33</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(1.32)</td>
<td>(2.02)</td>
<td>(1.48)</td>
</tr>
<tr>
<td>General Ad (&quot;Healthier&quot;)²</td>
<td>(c)</td>
<td>42</td>
<td>2.64a</td>
<td>2.36</td>
<td>2.45</td>
</tr>
</tbody>
</table>

Notes: a, b, c denote significant differences at the .05 level of significance, using Tukey's HSD test.
"Sodium Content" is a 7-point scale ranging from 1 (low in sodium) to 7 (high in sodium) for the advertised soup brand. "Healthy" is a 7-point scale ranging from 1 (healthy for you) to 7 (unhealthy for you) for the advertised soup brand. Agreement with the link between regularly using the advertised soup brand with the risk of high blood pressure, and separately for coronary heart disease, are both scored from 1 (strongly disagree) to 7 (strongly agree).

2a,b,c Superscripts indicate significant univariate comparisons (p < .05) of cell means for the specific ad vs. the control ad, and separately for the general ad vs. the control ad.

Results

A primary question of interest in this study was whether the nutritional claims influence consumer beliefs in a manner that may be potentially misleading. Our first set of analyses examined this question by comparing the two nutrition ad claim types (with no disclosures) to the control ad that used a "delicious taste" message appeal. To assess these differences, a MANOVA was performed on the four primary dependent variables. Given the magnitude of the public health and policy issues involved, significance levels of p < .01, p < .05, and p < .10 are reported.

Results indicate that the multivariate F is significant (Wilks' Lambda = .87; F = 2.15, p < .05) for the effect of the different nutrient content claims versus the control ad on the dependent measures. In particular, consumers who viewed either of the "1/3 Less Salt" or "Healthier" nutrient content claims had a significantly more favorable and misleading evaluation of sodium content (F = 11.19, p < .01) than did those exposed to the "Delicious Taste" control ad. Follow-up tests were next performed to assess the differences in sodium content evaluations between each nutrition claim condition and the control ad. As shown in Table 1, the means for the sodium evaluation measure for the "1/3 Less Salt" specific ad and the "Healthier" general ad claims were 2.21 and 2.64, respectively, and each was significantly lower (p < .05) than the mean for the control ad claim (3.33).

However, results in Table 1 indicate that effects on the healthiness, blood pressure and heart disease measures are nonsignificant. Thus, the overall pattern of results indicates partial support for Hi. Specifically, while the nutrition claims enhance perceptions of sodium content, these perceptions do not extend to potential risks that may be associated with diets with high levels of sodium. Given the level of the means for these variables in Table 1, a "floor effect" may be operating for these variables and product. Specifically, the preconceived belief, "Soup is Good Food," may contribute to these initially low mean values (all means below 2.7 for the control condition; see "Exploitive Misleadingness," Russo, Metcalf and Stephens 1981, p. 125). In sum, while more favorable effects on sodium perceptions are undesirable from a public health perspective, consumers do not appear to be generalizing these effects to enhanced disease risk perceptions.

Results Pertaining to Effects of Disclosures, Ad Claims, and Nutrition Knowledge

Given some influence of the nutrition claims beyond the control ad condition, we extend the analyses to effects of disclosure information, differences between general and specific nutrition claims, and for different levels of nutrition knowledge. Multivariate and univariate results are shown in Table 2 and dependent variable means and standard deviations are in Table 3. It is predicted in H2a that the presence of disclosure information would lead to more negative consumer evaluations. In support of H2a, there are significant univariate effects of the disclosure for the dependent variables of sodium content, blood pressure and healthiness evaluations. Follow-up contrasts between a combination of these three disclosure types (i.e., the absolute, relative and evaluative disclosures) and the control disclosure condition are significant for sodium content (t = 2.63, p <.01), blood pressure (t = 2.53, p < .05), heart disease (t = 2.08, p < .05), and healthiness (t = 2.30, p < .05). In addition, since disclosure type interacts with both ad claim type and with nutrition knowledge, predictions for H2a are examined within each of the levels of these other factors. With the exception of heart disease, the above
disclosure effects versus the no disclosure condition are all significant \( (p < .05) \) for general ad claim type. For specific ad type, however, only heart disease is significant \( (p < .05) \). In the case of high nutrition knowledge consumers, all disclosure results remain at least marginally significant \( (p < .10 \text{ or better}) \), while only healthiness is significant \( (p < .10) \) for low nutrition knowledge consumers. Thus, the disclosures appeared especially effective in conjunction with the general ad claim and for high nutrition knowledge consumers.

Table 2 Multivariate and Univariate Results for the Effects of Independent Variables on Nutrient Content and Disease Risk Measures

<table>
<thead>
<tr>
<th>Interaction Effects(^1)</th>
<th>Multivariate Results</th>
<th>Univariate F-Values</th>
<th>Sodium Content</th>
<th>Blood Pressure</th>
<th>Heart</th>
<th>Healthy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disclosure Type X Ad Type</td>
<td>Wilks’ ( \Lambda )</td>
<td>F-Value</td>
<td>df</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>.93</td>
<td>1.82(^{b})</td>
<td>(3,310)</td>
<td>3.47(^{b})</td>
<td>1.60</td>
<td>.74</td>
</tr>
<tr>
<td>Disclosure Type X</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nutrition Knowledge</td>
<td>.94</td>
<td>1.51</td>
<td>(3,310)</td>
<td>3.02(^{b})</td>
<td>2.21(^{c})</td>
<td>.25</td>
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<tr>
<td>Ad Type X Nutrition Knowledge</td>
<td>.99</td>
<td>.86</td>
<td>(1,310)</td>
<td>.95</td>
<td>.04</td>
<td>1.25</td>
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<td>Main Effects</td>
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<tr>
<td>Disclosure Type</td>
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<td>2.73(^{a})</td>
<td>(3,310)</td>
<td>8.75(^{a})</td>
<td>2.76(^{b})</td>
<td>1.91</td>
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<tr>
<td>Ad Type</td>
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<td>2.58(^{b})</td>
<td>(1,310)</td>
<td>8.24(^{a})</td>
<td>.14</td>
<td>.33</td>
</tr>
<tr>
<td>Nutrition Knowledge</td>
<td>.98</td>
<td>1.26</td>
<td>(1,310)</td>
<td>1.43</td>
<td>.26</td>
<td>.78</td>
</tr>
</tbody>
</table>

\(^1\)Three-way interaction was nonsignificant.
\(^{a}\)\( p \leq .01; \)^{b}\( p \leq .05; \)\(^{c}\)\( p \leq .010 \)

H2b predicted that the evaluative disclosure would result in less favorable evaluations of sodium, overall healthiness, heart disease risk, and blood pressure risk than the other disclosure conditions. Partial support is found for this prediction. For example, the results in Tables 2 and 3 indicate that for the heart disease and healthiness measures, the means associated for the evaluative disclosure do not differ from the other disclosure conditions. For the blood pressure measure, the evaluative disclosure resulted in a slightly higher mean for the evaluative disclosure \((M=3.49)\) than the relative disclosure \((M=2.99; \ t=1.57, \ p < .10)\), but the difference between the evaluative and absolute disclosures was not significant \((p>.10)\).

However, for the sodium content measure, there are significant interactions \((p < .05)\) for (1) disclosure by ad type and (2) disclosure by nutrition knowledge. Given these interactions, the predictions for the evaluative disclosure were examined within the general and specific ad type conditions and within the high and low knowledge levels. For the general ad type condition, contrasts showed that the evaluative disclosure resulted in perceptions of higher sodium content \((M=4.28)\) than either the absolute \((M=3.58; \ t=1.70, \ p < .05)\) or the relative disclosures \((M=2.20; \ t=5.31, \ p < .01)\). For the specific ad type condition, contrasts indicated that the evaluative disclosure \((M=3.05)\) resulted in significantly higher perceptions of sodium content than the absolute disclosure \((M=2.38; \ t=1.83, \ p < .05)\), but not for the relative disclosure \((M=2.61; \ t=1.20, \ p > .10)\). In the high knowledge condition, the evaluative disclosure \((M=4.26)\) resulted in a higher sodium content mean than the absolute \((M=2.65; \ t=4.42, \ p < .01)\) or relative \((M=2.51; \ t=4.89, \ p < .01)\) disclosures. For the low knowledge condition, however, the sodium content mean for the evaluative disclosure \((M=3.00)\) was higher than the mean for the relative disclosure \((M=2.29; \ t=1.73, \ p < .05)\), but not for the absolute disclosure \((M=3.30; \ t=-0.74, \ p>.10)\).

H3 predicts that consumers exposed to the specific ad claim would have more favorable evaluations than those exposed to the general ad claim. The multivariate effect is significant \((p < .05)\), and univariate results in Table 2
indicate that this effect is due to differences in sodium evaluations. However, given the ad type’s interaction with disclosure type, the predictions for H3 also are examined within each specific disclosure type condition. For the absolute disclosure, ad type is significant for sodium content \( (p < .01) \) and marginally affected healthiness \( (p < .10) \). In the case of the relative disclosure, ad type only affected healthiness \( (p < .05) \) For the evaluative disclosure, the specific ad type leads to a more favorable evaluation of sodium content \( (p < .01) \) and blood pressure \( (p < .05) \) than the general ad type. Interestingly, in the control disclosure condition, all ad type effects were found to be nonsignificant. Thus, as might be anticipated given the differences in disclosure wording, there are some different effects of claim type on measures across the specific disclosures present in the ad. In general, the differences between general and specific ad claims tend to be more pronounced for the absolute and evaluative disclosures.

<table>
<thead>
<tr>
<th>Table 3 Means and (Standard Deviations) for Dependent Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent Measures</strong></td>
</tr>
<tr>
<td>------------------------</td>
</tr>
<tr>
<td><strong>Control Ad (Taste):</strong></td>
</tr>
<tr>
<td><strong>Disclosure Type</strong></td>
</tr>
<tr>
<td>None (a)</td>
</tr>
<tr>
<td>Absolute (b)</td>
</tr>
<tr>
<td>Relative (c)</td>
</tr>
<tr>
<td>Evaluative (d)</td>
</tr>
<tr>
<td><strong>Ad Type2:</strong></td>
</tr>
<tr>
<td>Specific (a)</td>
</tr>
<tr>
<td>General (b)</td>
</tr>
<tr>
<td><strong>Nutrition Knowledge</strong></td>
</tr>
<tr>
<td>Low (a)</td>
</tr>
<tr>
<td>High (b)</td>
</tr>
</tbody>
</table>

\textsuperscript{1}“Sodium Content” is a 7-point scale ranging from 1 (low in sodium) to 7 (high in sodium) for the advertised soup brand. “Healthy” is a 7-point scale ranging from 1 (healthy for you) to 7 (unhealthy for you) for the advertised soup brand. Agreement with the link between regularly using the advertised soup brand and risk of high blood pressure and separately for coronary heart disease are both scored from 1 (strongly disagree) to 7 (strongly agree).

\textsuperscript{2a,b,c} Superscripts indicate significant differences across cell means according to SNK pairwise comparisons \( (p < .05) \).

H4 predicts that there would be a main (H4a) and moderating (H4b) effect of nutrition knowledge. In partial support for H4a, nutrition knowledge is found to significantly affect healthiness \( (F=4.67; p < .05) \), with respondents having higher nutrition knowledge perceiving the advertised soup as less healthy, as predicted. However, there are no differences in means for the other dependent variables. H4b predicts that knowledge level will moderate the effect of the disclosure such that disclosures with the greatest amount of detail and nutrition information (i.e., the evaluative disclosure) would have stronger effects for consumers with more nutrition knowledge. Partial evidence of this predicted moderating effect of nutrition knowledge is found for sodium content \( (p < .05) \) and blood pressure \( (p < .10) \). Plots of relevant means for the sodium content measure are shown in Figure 1.

Consistent with H4b, when exposed to an evaluative disclosure, high nutrition knowledge subjects view the product as higher in sodium \( (F=7.18, p < .01) \) and somewhat more likely to contribute to high blood pressure...
(F=3.83, p<.06) than low knowledge subjects, while these differences in knowledge levels are non-significant for the other disclosure conditions.

Figure 1 Effects of Disclosure Type and Nutrition Knowledge on Sodium Content

The control ad mean points are provided only for reference purposes since the ad disclosures are not relevant for this control ad condition that used a non-nutritional theme.

Effects on Claim Believability and Attitudes toward the Ad and Brand

Our first set of analyses assesses incremental effects of the specific and general nutrition claim conditions (with no disclosures) relative to the control condition that emphasized taste. Because preliminary analyses indicated that brand familiarity is positively related to $A_{AD}$ and $A_{BR}$ ($p < .05$), motivation to process nutrition information is related to claim believability and $A_{AD}$ ($p < .05$), and these variables do not interact with the independent variables, these two measures are included as covariates in analyses. Results indicate that the generalization effect of the claims beyond the control ad is not significant for claim believability, but there is a significant effect on brand attitude ($p < .05$) and a marginally significant effect on $A_{AD}$ ($p < .10$). For $A_{BR}$, follow-up contrasts are significant for the difference between the specific claim mean (18.8) and the control ad mean (17.5; $t=1.70; p < .05$, one-tailed test), but there is not a difference between the general claim and the control condition. Similarly, for $A_{AD}$ contrasts are marginally significant ($p < .10$, one-tailed test) for the difference between the specific claim mean (17.6) and the control ad mean (16.4), but there is not a difference between the general claim and the control condition for $A_{AD}$. These results suggest that questionable comparative nutrient claims may have a positive influence on important consumer evaluations beyond that of control ads using other message appeals.

Table 4 Multivariate and Univariate Results for the Effects of Independent Variables on Attitudinal Measures

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Multivariate Results</th>
<th>Univariate F-Values</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Disclosure Type X Ad Type</td>
<td>.99</td>
<td>.34 (3,307)</td>
<td>.09</td>
</tr>
<tr>
<td>Disclosure Type X Nutrition Knowledge</td>
<td>.95</td>
<td>1.57 (3,307)</td>
<td>1.17</td>
</tr>
<tr>
<td>Ad Type X Nutrition Knowledge</td>
<td>.99</td>
<td>.16 (1,307)</td>
<td>.37</td>
</tr>
</tbody>
</table>

Three-way interaction was nonsignificant.
Results pertaining to the effects of the disclosures, knowledge level, and ad claim type for these attitudinal dependent variables are shown in Table 4 (means and standard deviations for these variables are available upon request). Again, because brand familiarity and motivation to process nutrition information are related to the dependent variables, these two measures are included as covariates in the analyses. Table 4 results show that none of the interactions are significant, and only the multivariate main effect of ad claim type is significant ($F = 3.04; p < .05$). Univariate tests show that ad claim type has a significant effect on claim believability ($p < .02$), $A_{AD} (p < .01)$ and brand attitude ($p < .05$). In particular, for the three dependent variables, specific ad type generated more favorable attitudes and perceptions than that of the general ad type. Interestingly, the disclosure condition did not have any significant effects on $A_{AD}$ or $A_{BR}$, and the disclosure had only a marginal effect on claim believability. These results offer several interesting implications for advertising managers and policy makers as discussed in the following section.

Discussion
Conclusions and Implications
The purpose of our study was to examine whether consumers form potentially misleading generalizations from comparative nutrient content claims in advertising. Given the potential for such generalizations from comparative content (FTC 1994), we also sought to understand how ad claim type, different disclosures, and nutritional knowledge might influence such evaluations. Our targeted measures began with an assessment of important nutrient beliefs and disease risk evaluations, and then extended to measures of claim believability, and brand and ad attitudes.

Generalization effects.
The results indicate partial support for H1 in that consumers provided more favorable (and erroneous) evaluations of absolute nutrient content for comparative nutrient claims ("1/3 Less Salt" and "Healthier") than for control ads without such nutrition claims. These generalizations, however, did not extend to measures of overall healthiness or to specific disease risks of high blood pressure and heart disease. The fact that these results did not spread to measures of healthiness, blood pressure and heart disease is consistent with the tenets of activation theory (Collins and Loftus 1975). Specifically, these measures are likely to represent concepts and linkages that are more distant in a consumer's network of relationships for the soup ad claims. In the case of the healthiness measure, the mean for the control ad displayed a "floor effect," in that it was already at a considerably low (i.e., healthy) level. This finding may result from the frequently advertised message that "Soup is Good Food" and is consistent with prior research showing that consumers discount or ignore sodium information in favor of messages about fat or cholesterol (Keller et al. 1997; Mitra et al. 1999). In general, this result demonstrates the importance of accounting for consumers' preconceived beliefs about the nutritiousness of certain product categories (Brucks, Mitchell and Staelin 1984; Russo, Metcalf and Stephens 1981).

Disclosure types.
Our results offer insight into the effectiveness of disclosures in providing important information about nondisclosed nutrient levels when favorable claims about reduced sodium content or relative health effects are provided. In support of H2a, the disclosures (absolute, relative, evaluative) are significantly more effective than the no disclosure control condition (with "1/3 Less Salt" or "Healthier" claims) in reducing misperceptions of sodium content, blood pressure risk, heart disease risk and overall healthiness. However, given the disclosure type interaction with ad claim type and disclosure type, tests for H2a are necessary within these other conditions. Findings indicate that the disclosures are particularly effective versus the control in reducing
misperceptions when combined with the general ("Healthier") ad claim and high knowledge consumers. This is consistent with research showing that more generally framed or ambiguous claims may be subject to heightened scrutiny (Hoch and Ha 1986; Hurley and Schmidt 1992; Ford, Smith and Swasy 1990) and greater nutrition knowledge maybe necessary to counter misperceptions of foods categorized as "good for you" (Liebman 1995). Under such conditions, the use of prominently displayed disclosures with cogent information is likely to be effective.

The examination of the effectiveness of different types of disclosures in H2b displays similar patterns. While partial support is found for H2b for the sodium content measure, the effectiveness of the evaluative disclosure compared to the absolute and relative disclosures appears to depend on ad claim type and nutrition knowledge conditions. The evaluative disclosure results in perceptions of higher sodium content than the absolute and relative disclosures, especially in conjunction with the general ad claim type and for high nutrition knowledge consumers. The fact that these results did not occur for measures of blood pressure and heart disease is consistent with the previously cited principles of activation theory (Collins and Loftus 1975).

The effectiveness of the evaluative disclosure versus the absolute and relative disclosures is important information for the development of remedies in deceptive ad orders, such as that found at the Federal Trade Commission. Our results suggest that remedies providing evaluations of nutrient levels and links to diet-related disease (see Conopco Inc. 1997) maybe more effective with consumers than those providing relative or absolute disclosure information (see Campbell Soup Co. 1992). Conversely, the relative or absolute disclosures may appear to be managerially attractive to some advertisers because of their comparative ineffectiveness. Yet, it should be cautioned that the use of similar approaches, such as small print disclosures and ineffective corrective language, has drawn the attention of the FTC in the past (cf. Giant Food Inc. 1962; Novartis 1999; Wilkie, McNeil and Mazis 1984). It should be noted, however, that even the evaluative disclosure was not able to totally remove the sodium misperceptions from the ad claims, as mean values remained below the scale midpoint of "4" indicating low sodium beliefs (see Table 3 means).

Ad Claim Types.
In partial support of predictions in H3, ad claim effects show a discounting by consumers of general "healthier" claims compared to the specific "1/3 Less Salt" claims, as evidenced by differences on the sodium content measure. Effects did not materialize for the other nutrient and disease risk measures. However, given the ad claim type interaction with disclosure type, the sodium content effect should be examined within each disclosure type. Our findings indicate that differences between general and specific claims are heightened for the absolute and evaluative disclosures. One reason is that these disclosures provide clear information with respect to the sodium level of the advertised soup product. If understood, such information is likely to directly contradict the positive claims found in the ad copy, especially in the case of the general claim. However, in the case of the relative disclosure, consumers may view the soup's sodium content as "not that bad" with per serving sodium levels of 500 milligrams compared to an overall recommended daily value of 2400 milligrams of sodium.

Finally, our attitudinal results suggest that advertisers should consider using specific nutrient claims (in a non-misleading manner) rather than more general claims. The general comparative claim of "Healthier" resulted in lower claim believability, brand attitudes, and attitude-toward-the-ad. However, in contrast to the results found for the nutrition belief and health measures, there was no effect of the disclosure conditions on A_{AD} and A_{BR}.
This is an important finding for advertisers because it reveals the limitations of disclosures for having a broader impact on ad perceptions, especially given prior halo effects (e.g., "Soup is Good Food") for this product.
Nutrition Knowledge.

In partial support of H4a, nutrition knowledge is found to significantly affect the healthiness measure, yet does not affect other measures. Similarly, the nutrition knowledge and disclosure interaction offers partial support for H4b, as seen for the sodium content measure in Figure 1. High nutrition knowledge subjects exposed to the evaluative disclosure view the soup product as higher in sodium and (somewhat) more likely to contribute to high blood pressure than their low knowledge counterparts. These findings indicate that nutrition knowledge may be especially helpful given strong prior beliefs and misconceptions about certain advertised products (e.g., "Soup is Good Food"; Liebman 1995) or instances in which advertisers may capitalize on such information ("exploitive misleadingness," Russo, Metcalf, and Stephens 1981). This points to the importance of nutrition knowledge as a moderator, which is likely to be influenced through nutrition education efforts. Thus, continued nutrition education on the part of food manufacturers, educators, consumer groups and/or regulatory agencies is needed (cf. Burros 1994).

Limitations.

There are a few caveats to consider regarding our measures and methodology. First, in measures assessing the risk of high blood pressure and heart disease, the use of the term "regularly" might be viewed differently across respondents. One reviewer felt that these measures and our scale measure assessing beliefs about sodium content (with endpoints of "low in sodium" and "high in sodium") could have been interpreted in multiple ways (e.g., in a relative manner) and might be challenged if introduced as evidence in litigation. However, the wording for our items was absolute in nature and invariant across ad conditions, and given random assignment of treatments to subjects, we feel differences reported across experimental conditions are not likely to be affected. We do believe that if the wording of measures is interpreted somewhat differently across respondents, this is likely to increase error variance and reduce statistical power. Nevertheless, use of this term is consistent with federal agency nutrition research (Levy, Derby and Roe 1997) and copy test standards of the FTC (e.g., Maronick 1991), and smaller effects for these measures are congruent with the tenets of spreading activation. We acknowledge that the generalizability of specific findings may be limited to the print ad media format and the specific headlines, disclosures and the product class used in this experiment. Researchers may wish to consider these measurement and methodological issues in future experimental work with nutrient content and health claims.

In sum, our results show that primary food shoppers may at times overgeneralize from some comparative nutrient content claims. Moreover, the role of disclosures in helping to remedy such misinterpretations is found to depend upon the level of nutrition knowledge and type of ad claim employed. Such dependence may be especially true given potentially misleading claims for a product generally viewed as being nutritious in nature. As nutrition disclosure effects are found to be independent of knowledge and claim type for products viewed as relatively less nutritious (cf. Andrews, Netemeyer and Burton 1998), it appears that different product categories may play an important role in consumer perceptions of nutrition and health-related ad claims (Brucks, Mitchell and Staelin 1984). Given such complexities of effects for disclosures and claim types across product categories, this pattern of findings seems to support the current case-by-case approach of the FTC in regulating claims.

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