The impact of health claims and food deprivation levels on health risk perceptions of fast-food restaurants

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Abstract: We examined the effect of health claims and food deprivation levels on the health risk perceptions of fast-food restaurants. Consistent with previous research, we used a within-subjects experimental design to manipulate the health claims of fast-food restaurants using real brands: Subway, expressing strong health claims *vs*. McDonald's, expressing weak health claims. Participants who did not have access to nutrition information were asked to estimate the health risk associated with food items that were slightly more caloric for Subway than McDonald's (640 kcal vs. 600 kcal). We collected data through a web survey with a sample consisting of 414 American adults. Based on the USDA Food Insufficiency Indicator, participants were classified into two categorical food deprivation levels: food sufficiency and food insufficiency. We find that risk perceptions for obesity, diabetes and cardiac illnesses are lower (higher) for the restaurant with stronger (lower) health claims, i.e. Subway (McDonald's). Moreover, we also find that food deprivation levels moderate this effect, such that health risk underestimation is aggravated for individuals who suffer from food insufficiency. More precisely, we find that food insufficient individuals are more responsive to health claims, such that they perceive less health risk than food sufficient individuals for the restaurant with stronger health claims (Subway). Exploring the underlying mechanism of the latter effect, we found that dietary involvement mediates the relationship between food deprivation levels and health risk perceptions for the restaurant with stronger health claims (Subway). These results provide an interdisciplinary contribution in consumer psychology and public health.

Key words: health claims, food deprivation; food insufficiency; health involvement; health risk.

1. Introduction

In recent years, a growing number of marketers have used nutrition claims (e.g., "low fat" and "rich in omega 3") as well as health claims (e.g., "healthy" and "supports immunity"). The previous literature in consumer psychology has shown that these claims may create perception biases or "health halos", as they rely on an individual's natural tendency to categorize food as intrinsically healthy or unhealthy (for a literature review, see Chandon and Wansink 2012). For instance, Chandon and Wansink (2007) showed that people are more likely to underestimate the caloric content for restaurants with strong health claims (e.g., Subway) compared to restaurants with weak health claims (e.g., McDonald's). Moreover, these results have been replicated with other foods and restaurant brands (Tangari et al. 2010).

Although this prior literature is valuable and insightful, it also has some limitations. First, the existing research in consumer psychology focuses more on the impact of health claims in terms of calorie estimation and food consumption rather than health risk perceptions. Yet, the concept of risk perception, defined as a subjective judgment, is an "outgrowth of our society's great concern about coping with the dangers of modern life" (Slovic 2000, p.1). The literature in risk communication and public health has investigated various internal (e.g., values and gender) and external (e.g., familiarity with risk sources and irreversibility of the damage) antecedents of health risk perceptions (Bennett 2010). However, no studies have assessed the impact of marketing health claims on risk perceptions from a public health perspective.

Second, little attention has been given to consumption deprivation in the consumer psychology literature (Chakravarti 2006). Yet, food deprivation is a problem of considerable magnitude. Previous research has used various terms to label food deprivation and scarcity. According to Scott and Wheler (1998), food insecurity is defined as the limited or uncertain availability of food, while food insufficiency refers to restricted household food stores or

insufficient food intake. For a detailed discussion on the similarities and conceptual differences between these terms, refer to Heflin et al. (2005, p.1972). According to the most recent government estimates, nearly 15% of American households are food insecure, or approximately 18 million households (Coleman-Jensen et al. 2013). Because of the poor dietary practices that people adopt in the face of economic insecurity, food deprivation has been associated with obesity among adults - especially women - in the USA (Martin and Lippert 2012, Ma et al. 2003), as well as in middle-income countries that have transitioned to the so-called Western diet (Velasquez-Melendez et al. 2011). Most research on food deprivation focuses on behavioral phenomena; however, little is known about the perceptual differences between food insufficient and sufficient individuals.

Hence, the purpose of this short report is to examine the impact of health claims and food deprivation levels on health risk perceptions. By doing so, we bring together two streams of literature, consumer psychology and public health, to develop an interdisciplinary contribution. In particular, the context of fast-food was chosen because it has been linked to obesity (Jeffery et al. 2006). Our findings are the first to suggest that food insufficiency may make individuals more susceptible to at least some types of food marketing communications. These results will pave the way towards more effective initiatives to assist vulnerable consumers in making the best possible food choices. In the next paragraphs, we develop the main hypotheses of the present study.

1.1 The effects of health claims on health risk perceptions

Chandon and Wansink (2007) found that health claims might influence calorie estimation through inferential mechanisms. We believe that a similar theoretical argument may be developed in the case of health risk perceptions. When estimating the health risks associated with food consumption, individuals may make inferences based on internal and

external cues. Drawing on the literature of inferential mechanisms (Kardes et al. 2004), we posit that individuals may make inferences about health risks for a particular food from the health positioning of a restaurant's brand, that is:

- **H1**: Health risk perceptions will be lower for a fast-food restaurant with strong health claims (e.g., Subway) compared to a restaurant with weak health claims (e.g., McDonald's).

1.2 The moderating impact of food deprivation levels

We believe that the amplitude of health risk underestimation (McDonald's – Subway) may depend on food deprivation levels. First, public health and nutrition research has found that food insufficient individuals may develop poor dietary practices in terms of the consumption of high-calorie but nutritionally poor products (Dixon et al. 2001), meal irregularity (Ma et al. 2003) and the low consumption of healthy products, such as milk, fruit and vegetables (Tarasuk et al. 2007). Second, previous research in consumer psychology has found that the amplitude of calorie estimation biases decreases with nutrition involvement (Chandon and Wansink 2007). Hence, we develop our theoretical argument drawing on the concept of dietary involvement, which may be defined as the degree of interest that an individual displays for both nutritional information (e.g., nutrition facts) and dietary healthiness (e.g., eating healthy products, such as fruits and vegetables). In short, because food insufficient individuals have a lower dietary involvement, they may be more responsive to health claims such that they underestimate the health risks associated with a restaurant that claims to be healthy.

- **H2**: The health risk underestimation (McDonald's – Subway) is aggravated for food insufficient individuals compared to food sufficient individuals.

- **H3**: In the presence of strong health claims (Subway), dietary involvement mediates the negative relationship between food deprivation levels and health risk perceptions.

2. Methods

2.1 Independent variables, design and stimuli

Consistent with Chandon and Wansink (2007), this study uses a within-subjects design in which we manipulated health claims using two real brands: Subway, expressing strong health claims *vs*. McDonald's, expressing weak health claims. In a manipulation check study, we asked 111 American respondents to rate the two restaurants on several variables scored using a 9-point Likert format. Results from repeated-measures ANOVAs showed that the restaurants did not differ on familiarity ("I am familiar with [Restaurant]", p=.802) or affordability ("[Restaurant] is affordable", p=.378). However, there was a significant difference regarding perceived health claims ("[Restaurant] advertises about its healthy products", $M_{McDonald's}$=5.57 vs. M_{Subway}=7.46, $F(1;110)$=77.94, p<.001). Next, we selected two popular sandwiches with a similar number of calories: the Bacon & Cheese Quarter Pounder for McDonald's (600 kcal) and the 12-inch Club for Subway (640 kcal). The participants were shown names and pictures of the sandwiches as well as brand logos, before moving to the latter part of the questionnaire (available in the online appendix).

The second main independent variable of this study is food deprivation levels. The existing literature provides different measures for food deprivation. First, food insecurity is generally measured with 18 questions from the United States Department of Agriculture's Food Security Scale (Bickel et al. 2000). Using this scale, previous research has estimated that the level of food insecurity was 11.2% in 2003 (Gundersen and Ribar 2011) and 14.5% in 2012 (Coleman-Jensen et al. 2013). Second, food insufficiency is measured with the USDA Food Sufficiency Indicator (USDA FSI), using a single question with three options: A- "You

always have enough to eat and the kinds of food you want" B- "You have enough to eat but not always the kinds of food you want" and C- "Sometimes or frequently, you don't have enough to eat", in which answers B and C are combined to measure food insufficiency (Radimer, 2002). In 2003, the prevalence of answer B was 17.8% and answer C was 3.5%, yielding a food insufficiency level of 21.3% (Gundersen and Ribar 2011).

Given that questionnaire length may lower response quality for web surveys (Galesic & Bosnjak 2009), we measured food deprivation levels using the USDA FSI. In fact, compared to the alternative option including 18 questions, combining answers B and C in the USDA FSI has the advantage of a single-question measure that gives rather good estimates of food insecurity (Radimer 2002). In our sample, the prevalence of food insufficiency is 52.1% (177 respondents who answered B, that is 42.7%; and 40 respondents who answered C, that is 9.4%). Because we did not ask the market research institute for a representative sample using socio-demographic specifications, every panel member could participate in the study. Our sample is biased such that food insufficient individuals are over-represented. This may be because the consumers in the panel are below the national average in terms of income and food insufficiency. We do not believe that the sampling bias constitutes a fundamental issue, as we do not aim to estimate the prevalence of food deprivation levels; rather we seek to compare perceptions between these groups. Several institutions, such as the National Health and Nutrition Examination Survey, deliberately over-sample minority populations to gain sufficient precision for estimates within these groups (e.g., Crespo et al. 2000). Hence, including more food insufficient individuals in the sample allows for more reliable statistical comparisons between groups.

2.2 Dependent variables

We measured our dependent variables using *ad-hoc* scales scored with a 9-point agree/disagree Likert format. Health risk perceptions were measured with the items "This [McDonald's/Subway] sandwich causes an important risk of [obesity/diabetes/cardiac illnesses]". After verifying the reliability of the scales (McDonald's: α=.90, Subway: α=.89), we constructed a health risk measure composed of the average responses to the three items. Second, we measured dietary involvement with the two items "I pay close attention to nutrition information" and "I regularly eat fruits and vegetables" (α=.75).

2.3 Data collection and sample

We collected data through a web survey from the panel of Toluna, a professional market research institute. The sample consists of 414 American adults. The study was approved by the Ethics Committee of ESSEC Business School, France. Appendix A presents the descriptive statistics and socio-demographic characteristics of the sample. Several Chi-Square tests revealed that food insufficiency was linked to lower income (p<.001) and lower education (p=.026), but was not significantly related to gender, age and number of children.

3. Results

First, we examined the impact of health claims and food deprivation levels on health risk perceptions. We analyzed the data using repeated-measures ANOVAs, with health claims as a within-subjects factor (strong health claims: Subway vs. weak health claims: McDonald's) and food deprivation levels as a between-subject factor (two groups: food sufficiency vs. food insufficiency). The dependent variable was the health risk scale. The results from these analyses are exhibited in Table 1. Health claims had a significant main effect on risk perceptions (F(1,412)=310.78, p<.001). Risk perceptions are lower for the restaurant with stronger health claims (M_{Subway}=4.91 vs. $M_{McDonald's}$=6.82). H1 is validated.

However, food deprivation levels do not directly impact risk perceptions (p=.226). More interestingly, the interaction effect between health claims and food deprivation levels is significant (F(1,412)=12.24, p=.001). This interaction is presented in Figure 1. Planned contrasts (one-way ANOVAs) revealed that for the restaurant with stronger health claims (i.e., Subway), risk perceptions for the food sufficient group were significantly higher than for the food insufficiency group ($M_{sufficiency}$=5.21 vs. $M_{insufficiency}$=4.65, F(1,412)=7.91, p=.005). However, risk perceptions did not differ for the different levels of food deprivation for the restaurant with weaker health claims, i.e., for McDonald's ($M_{sufficiency}$=6.72 vs. $M_{insufficiency}$=6.90, F(1,412)=1.91, p=.287). H2 is validated.

[Insert Table 1 about here]

[Insert Figure 1 about here]

Second, the food deprivation measure may capture the covariation between income (or education) and food deprivation related to health risk perceptions. Hence, we ran a similar analysis controlling for income (1=college or above, 0=other), education (1= above 50k, 0=other), age (in years), number of children and gender (see Table 1, M2 and M3). We find that both the main effect of health claims and the interaction effect of health claims and food deprivation levels still hold.

Third, we tested whether dietary involvement mediates the relationship between food deprivation levels (1=food sufficiency, 0=food insufficiency) and health risk perceptions for the restaurant with strong health claims (Subway). We followed Baron and Kenny's (1986) approach, as well as Hayes' (2013) bootstrapping method for estimating the indirect mediating effect. We also included binary variables for education and income as control variables. The effect of food deprivation levels on dietary involvement was significant (β=.42, t=2.31, p=.021). Compared to food sufficiency (M=6.61), dietary involvement is lower for food insufficiency (M=6.13). The effect of dietary involvement on health risk perceptions for

Subway was significant (β=.24, t=4.62, p<.001), while the total effect of food deprivation levels was not significant (p=.144). Moreover, the indirect path of the effect of food deprivation levels on health risk perceptions through dietary involvement was significant, with the 95% confidence interval excluding zero (.0195 to .2257). H3 is validated.

4. Discussion

4.1 Contributions

First, these findings contribute to our understanding of the health halo effect more generally because they reveal that the bias applies to subjective judgments about risk and not merely to calorie estimation. This is significant, as subjective judgments about risk may be more important to the average decision-maker than calorie estimation. In fact, even when consumers know the list of ingredients included in a meal, they have difficulty estimating the portion size in terms of calories (Nestle 2003). Moreover, previous research has found that calorie information has a weak impact on food choices for low-income individuals (Elbel et al. 2009).

Second, our findings contribute to the public health literature on food deprivation. To our knowledge, our study is the first to link food deprivation levels to perceptual differences. This focus allows us to examine the underlying mechanism between food insufficiency and obesity. We propose that food insufficient individuals suffer from lower dietary involvement, defined as the degree of interest that an individual displays for nutritional information and dietary healthiness. In turn, lower dietary involvement may lead to food insufficient individuals being more responsive to health claims. Our findings suggest that further research on dietary involvement in food insufficient individuals may be warranted, particularly to guide the development of educational materials targeting this population.

4.2 Limitations

This study has several limitations that must be taken into account. First, our manipulation for health claims (Subway vs. McDonald's) may not be effective for other countries than the USA. In fact, McDonald's have run marketing campaigns promoting their healthier menu options in Europe, or even changed their logo from red to green. Similarly, we focused on a single product category (fast food restaurants) because of the strong link with obesity. However, we consider that the interplay of health claims and food deprivation levels may very well occur for different product categories, with different brands, in different countries. While we believe that results can be generalized to an extent, it would be important to replicate the findings in other situations.

Second, several factors may be confounded with food insufficiency. Consistent with previous literature, we found that found insufficiency is linked to lower income and lower education. Hence, we included the potential confounders as covariates in our data analyses. While our results still hold with the inclusion of these covariates, we agree that this procedure may not completely rule out the possibility of a spurious effect. Future research may involve a specific design (e.g. randomized control trial) to actively exclude or control confounding variables.

Third, individuals experiencing food insufficiency are over-sampled. However, as we argued in the Methods section, we believe that this issue is not critical. It is indeed consistent with current practices for over-sampling minorities in health research.

Despite these limitations, this paper should encourage further research into how individuals experiencing different forms of financial deprivation respond differentially to private (e.g., marketing claims), interpersonal (e.g., online nutritional recommendations) or even public communications.

4.3 Conclusions

Our findings are obviously concerning, as they suggest that greater susceptibility to some forms of marketing may be a means by which food deprivation contributes to excess weight gain. Government-sponsored initiatives must take into account the fact that food insufficient individuals are more responsive than other consumers to different types of information and communication. The findings also imply that it is worthwhile to encourage greater dietary involvement among food insufficient individuals. Hence, the findings lend support to the idea that federal benefits (e.g., SNAP and WIC) must be associated with educational initiatives targeting food insufficient individuals. One example of an initiative already in place is the USDA's suggested healthy, thrifty meal plans (CNPP 2000).

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Appendix A
Demographic characteristics of the sample

		Food sufficiency n=197	**Food insufficiency** n=217	**All sample** n=414
Gender	Women	59.4%	69.6%	63.7%
	Men	40.6%	30.4%	35.3%
Age	18 – 29	16.2%	19.8%	18.1%
	30 – 39	26.4%	26.7%	26.6%
	40 – 49	21.3%	19.8%	20.5%
	50 – 59	18.8%	19.4%	19.1%
	60 and over	17.3%	14.3%	15.7%
Education	High School	18.8%	27.2%	23.4%
	College	69.9%	58.5%	59.8%
	Graduate school	5.1%	5.5%	5.4%
	Postgraduate	15.2%	5.5%	10.2%
	Other	1%	3.2%	1.2%
Income	Under $20k	14.2%	20.3%	17.4%
	Between $20k – $50k	24.4%	34.6%	29.7%
	Between $50k – $100k	37.1%	26.7%	31.6%
	Over $100k	19.8%	7.8%	13.5%
	Other	4.6%	10.6%	7.7%
Children	0	48.7%	47.5%	48.1%
	1	23.9%	25.8%	24.9%
	2	16.8%	17.1%	16.9%
	3	7.6%	6.9%	7.2%
	More than 3	3.0%	2.8%	2.9%

Table 1
Results from repeated-measures ANOVAs

	M1	**M2**	**M3**
Health claims (HC)	310.78*	135.24*	41.70*
	(*p*<.001)	(*p*<.001)	(*p*<.001)
Food deprivation levels (FDL)	1.47	.27	.44
	(*p*=.226)	(*p*=.599)	(*p*=.505)
HC × FDL	12.24*	8.17*	7.21*
	(*p*=.001)	(*p*=.004)	(*p*=.008)
Income		3.29	3.45
		(*p*=.070)	(*p*=.064)
Education		4.10*	4.56*
		(*p*=.044)	(*p*=.033)
Age			2.65
			(*p*=.104)
Gender			1.03
			(*p*=.310)
Number of Children			1.26
			(*p*=.261)

Notes: The variable health claims is a within-subjects factor and food deprivation levels, income levels and education levels are between-subjects factors. The dependent variable is the health risk scale. The table exhibits *F* statistics, *p-values* are between parentheses: * *p*<.05.

Figure 1
Interaction effect between health claims and food deprivation levels