

Broken halos and shattered horns: overcoming the biasing effects of prior expectations through objective information disclosure

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Abstract In three studies the authors seek to extend prior research by examining the simultaneous effects of positive (halos) and negative (horns) health-related inferences. How the provision of objective point-of-purchase nutrition information moderates the effects of these pre-existing health halo and health horn effects on food evaluations and choices is considered. In Study 1 predictions addressing the interaction between a recently mandated objective nutrition disclosure and initial product category healthfulness perceptions are proposed and supported. Study 2 extends findings from this initial online experiment to a more realistic retail environment, and Study 3 addresses how different presentation exposure contexts (on a package compared to a nutrition poster) affects evaluations and how evaluations related to the information disclosure are linked. Since the USDA recently required retailers to provide nutrition information at the point-of-purchase for beef and poultry products, these results have important implications for consumers, producers, retailers, and policy makers.

Keywords Health halos · Consumer expectations · Heuristic-systematic processing · Retail food choices · Retail product labeling · Consumer inferences · Product disclosure

American consumers have never been more concerned about their personal health, and consequently demand for healthier foods continues to increase (Trivedi 2011). However, it is often difficult for consumers to consistently make healthy decisions, even when they feel confident in their ability to do so (Cole and Gaeth 1990; Kidwell et al. 2008). There are a variety of processing and contextual issues that may affect consumers' perception of product healthfulness. For example, recent research has examined the influence of "health halos," consumers' erroneous beliefs that a food item or category is healthy when objectively it is not (Roe et al. 1999; Chandon and Wansink 2007).

Halo effects, a term coined by Edward Thorndike (1920), have been studied in a variety of contexts throughout the decades. Health halos occur when consumers form biased impressions of a product (e.g., healthy) from limited information that may not always be objectively correct. These biased inferences made at the point of purchase have important implications for both marketers and consumers because they may inhibit more objective evaluation processes. Halo effects arising from claims and symbols presented on packaging, shelf tags, and posters (e.g., no cholesterol, certified organic, no *trans* fat) may also have significant implications for other stakeholders. Specifically, manufacturer, producer, or retailer sponsored nutrition-related promotional initiatives may be unintentionally misleading if consumers overgeneralize product healthfulness by extending favorable perceptions of one attribute to other unrelated attributes (Andrews et al. 1998). That is, the positive inferences stemming from a health halo may bias consumers' perceptions of product healthfulness. For example, Chandon and Wansink (2007) demonstrate

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how the positive health-related associations with fast food restaurant brands that claim to be healthy (e.g., Subway) can lead consumers to underestimate the calorie content of menu items. Certain product categories, such as salads, can also generally benefit from a health halo. However, if prepared with generous amounts of cheese, meat, and a creamy dressing (e.g., ranch), a salad is likely to contain high levels of saturated fat and calories. Fortunately, objective nutrition information presented on food packaging may help reduce inappropriate halo effects by providing unbiased quantitative data that contradicts prior expectations.

The relationship between health halos and potential increases in unhealthy food consumption has received considerable attention from consumer health and welfare researchers. We suggest the inverse effect also deserves broader consideration. We label this understudied contrasting bias the “health horn” effect, an erroneous negative inference that occurs when a product is mistakenly perceived to be *unhealthy*. Of course, from a conceptual and practical perspective, health halos and health horns can be potentially beneficial to consumers because they reduce information processing demands, particularly when decisions need to be made quickly. That is, when inferences based on product category perceptions are consistent with more objective information, processing and search efforts can be minimized (c.f. Putrevu and Ratchford 1997). However, it is unclear what occurs when additional objective nutrient and calorie information that contradicts *or* supports both prior favorable *and* unfavorable expectations is provided at the point-of-purchase (POP), and this warrants further examination.

Thus, the overall purpose of this research is to examine health halo and health horn effects across two product categories that can serve as substitutes for one another (i.e., beef and chicken) by varying the consistency of the products’ objective nutrition levels with prior expectations of category healthfulness. The specific goal is to use our findings to provide marketers with additional insight regarding how the provision of previously unavailable calorie and nutrient information at the POP interacts with consumers’ prior expectations to influence their product evaluations and choices. Three studies integrate and extend two theoretical frameworks, expectations theory (Anderson 1983) and the heuristic-systematic model of processing (Chaiken 1980; Chaiken et al. 1989). We add to the growing body of literature that examines how added nutrition attribute information at the POP may influence consumers’ evaluative and choice processes (e.g., Balasubramanian and Cole 2002; Howlett et al. 2008). In addition, based on our theoretical foundation we propose and test hypotheses regarding effects of the interaction between prior horn and halo expectations and information that may or may not support preexisting expectations for product substitutes.

A key impetus for this research is a U.S. Department of Agriculture (USDA) ruling that recently mandated retailers to provide calorie and nutrient information found in the Nutrition Facts panel (NFP), either on product packaging or through POP materials (e.g., posters), for major cuts of meat and poultry. The joint consideration of health halos (positive expectations) and health horns (negative expectations) simultaneously across two product categories (chicken vs. beef) leads to various potential outcomes. That is, the health halo or health horn effect can be either supported or not supported by additional objective POP information. When a health halo or a health horn is simply confirmed by objective data, there should be little effect of the added attribute information on consumers’ product evaluations and choices. However, when existing expectations are contradicted by the additional objective data, the pattern of results should provide evidence of a disordinal interaction.

In Study 1, we examine the effects of calorie and nutrient information disclosures on product evaluations and choices in an online experiment. Study 2 then examines these effects in a behavioral research lab designed to simulate a retail store with a wide range of products (e.g., food, cleaning supplies, analgesics) and arrangements (e.g., end caps, aisles). Lastly, Study 3 extends findings by contrasting consumers’ reactions to the additional calorie and nutrient information when it is presented on a product package versus a poster at the POP. Study 3 also more directly examines the processes underlying these effects by considering *why* changes in purchase decisions may occur. All three studies specifically consider how the favorable health halo associated with chicken and the unfavorable health horn associated with beef may interact with the newly mandated information disclosures to affect consumers’ product evaluations.

Retail product information disclosures: potential effects on health halos and horns

Although most *packaged* food products sold by U.S. retailers have been required to display a NFP designed to provide “clear, unambiguous information” to “assist consumers in maintaining healthy dietary practices” (Nutrition Labeling and Education Act (NLEA) 1990, Section 2), single-ingredient, raw meat products (e.g., steaks, chicken, ground beef) have been critical exceptions. This lack of information at the POP has been of concern to many consumer health advocates since certain cuts of meat and poultry are considerably less healthy than others. Given the relationship between an unhealthy diet and numerous chronic health conditions such as cardiovascular disease, many have argued that this lack of objective information has impeded consumers’ abilities to make informed, healthy purchase decisions (Federal Register 2010). However, the USDA recently began requiring retailers

to provide nutrition information for more than 40 major cuts of meat and poultry either on product packaging or through POP materials (e.g., posters) located near the products (Federal Register 2010). If nutrition information for beef and poultry is not offered by the retailer, “the labeling of these products will be false or misleading because it will not provide consumers with sufficient information to evaluate the nutrient content of the major cuts and will not enable consumers to select major cuts that fit into a healthy diet that meets their individual needs” (Federal Register 2010, p. 82149). Given that U.S. consumers consume meat and poultry at a rate more than three times the global average (Daniel et al. 2011), these changes are of substantial importance to consumers, producers, and retailers. For example, in 2012 domestic consumption for beef accounted for \$85 billion in retail sales, while poultry retail sales topped \$78 billion (USDA 2013a, b).

How will the new product information interact with consumers’ preexisting health-related expectations? When consumers were asked in a survey to identify whether beef or chicken was healthier, 70% chose chicken, and 6% chose beef (Husted 2005). This example suggests that chicken is associated with a favorable health halo effect while beef is associated with an unfavorable health horn effect. These assumptions are supported by long-term sales trends indicative of increased chicken consumption and reduced red meat consumption as consumers continue to strive for healthier diets (Leonard 2011). However, the objective information now presented to consumers at the POP reveals substantial differences across specific cuts of beef and chicken. For example, some lean cuts of beef are objectively more healthful than certain cuts of chicken. Consequently, prior expectations are not always consistent with the objective nutrition profiles. We contend that these health halo and health horn effects influence how the newly mandated nutrition information disclosures impact consumers’ evaluations and choices.

Theory and hypotheses

We draw from expectations theory (Anderson 1983; Howlett et al. 2009) and the heuristic-systematic model of processing (Chaiken 1980; Chaiken et al. 1989) to provide conceptual rationale for the influence of health halo and health horn effects. We also use these frameworks to construct hypotheses regarding how, and why, the added objective nutrition information is expected to interact with these halos and horns. Customer expectations have been conceptualized as “individual belief elements in a consumer’s cognitive structure regarding the product” (Olson and Dover 1976, p. 170). Numerous sources of information can lead to the formation of expectations including publicity, word of mouth, and marketing communications (Zeithaml et al. 1993). Expectations influence product evaluations and initial purchase decisions, as well as subsequent purchase behavior (e.g., Kopalle and Lehmann

1995, 2001; Darke et al. 2010). Expectations are confirmed when there is no discrepancy between an outcome and prior expectations (Churchill and Surprenant 1982); however, if an outcome deviates from expectations, assimilation-contrast theory suggests that consumers will magnify the disparity and react either favorably or unfavorably as a result (Sherif and Hovland 1961). Thus, within the context of this research, we propose that health-related expectations can be confirmed (i.e., a product is objectively as healthful as expected), positively disconfirmed (i.e., a product is objectively *more* healthful than expected based on category expectations), or negatively disconfirmed (i.e., a product is objectively *less* healthful than expected based on category expectations) by the provision of POP nutrition information. As explained in greater detail below, we expect the disconfirmation effects of a health halo or health horn to have a more substantial impact on consumers’ evaluations, intentions, and choices.

The heuristic-systematic processing model (HSPM) (Chaiken 1980; Chaiken et al. 1989) provides further insight into the proposed interactive effects between category healthfulness expectations and objective POP nutrition information. According to this HSPM framework, systematic processing occurs when consumers consciously attempt to process and interpret information using thorough analytical thinking, a task that involves considerable cognitive effort. Heuristic processing, by contrast, occurs when consumers rely on more easily processed and accessible information such as prior beliefs. Thus, systematic processing is characterized by a more detailed processing of available information, whereas heuristic processing is characterized by a greater emphasis on simple rules and cognitive “shortcuts” (Chaiken 1980; Maheswaran et al. 1992).

Because the HSPM assumes that consumers are guided by a principle of least effort, information about the *likely* characteristics of an object often serves as a heuristic. Within the context of health and nutrition, consumers may assume (often incorrectly) that certain products are healthy or unhealthy simply based on their association with a given food category. That is, judgments of healthfulness are made using a simple heuristic based on category membership. For example, a consumer may assume a product is healthy simply because it is labeled as “organic.” It is these category-level perceptions that lead to health horn or halo inferences (e.g., the assumption that a specific product is healthy or unhealthy given its category membership). This heuristic processing can be favorable (the heuristic is not misleading) or unfavorable (the heuristic is misleading). This suggests that judgments are often based on a cognitive shortcut associated with the overall perception of a product rather than on specific attributes.

However, the HSPM also assumes that heuristic and systematic processing can co-occur. The influence of a heuristic on evaluative and choice processes may be attenuated if consumers subsequently systematically process additional information that disconfirms expectations (Chaiken 1980;

Maheswaran and Chaiken 1991). For example, if consensus information suggests that most people like a given product, but subsequent detailed processing of attribute information invalidates this expectation, the effects of the heuristic are significantly discounted (Maheswaran and Chaiken 1991). Thus, if a consumer expects a specific cut of beef (e.g., a sirloin steak) to be relatively unhealthy (i.e., a health horn effect), but subsequent systematic processing of objective POP information fails to support this category expectation, the influence of the heuristic (i.e., health horn) should be attenuated. Consumers' product evaluations would then be more strongly influenced by the processing of the objective information (rather than by the category expectation). However, when the expectation that beef is unhealthy is consistent with the POP objective information, consumers should form judgments based on *both* the heuristic (i.e., health horn) and the objective content. Therefore, objective content that simply confirms prior expectations should be assimilated and have less impact on evaluations compared to objective content that disconfirms expectations (Howlett et al. 2008). More formally, we predict:

H1: The effect of preexisting category healthfulness expectations on product attribute evaluations is moderated by the provision of an objective information disclosure. Specifically, when the disclosure disconfirms health halo (horn) expectations, there is a negative (positive) effect on evaluations of (a) calories, (b) saturated fat, and (c) fat level. However, when the disclosure supports category expectations, the effect of the disclosure is reduced.

We also expect health halo and health horn effects and objective nutrition information disclosure to influence perceptions of diet-related disease risk. Some consumers may be unlikely to make the conceptual link between specific nutrients and calories and the risk of heart disease associated with product consumption because this requires both a certain level of nutrition knowledge and effort during the product evaluation process (e.g., Roe et al. 1999). However, if consumers (1) have knowledge of these product–disease relationships and consider the differences substantial enough to have a long-term effect and (2) expend the cognitive effort to access future consumption-related associations when making an evaluation, there should be a moderating effect of a nutrition disclosure. More formally, we predict:

H2: The effect of preexisting category healthfulness expectations on anticipated consumption-related health outcomes is moderated by the provision of an objective information disclosure. Specifically, (a) when the disclosure disconfirms health halo (horn) expectations, there is a negative (positive) effect on evaluations of the perceived likelihood of developing heart disease.

However, (b) when the disclosure supports category expectations, the effect of the disclosure is reduced.

From a practical standpoint, it is critical to understand how these effects may also impact consumers' product choices. Previous research shows that while nutrition is clearly important, food-related attributes such as perceived taste and price often have a stronger influence on product choice (Glanz et al. 1998). In addition, major cuts of beef and chicken are familiar products that most shoppers have previously consumed (Daniel et al. 2011). However, prior research suggests that consumer choice can be influenced when objective nutrition information disconfirms prior perceptions of the healthfulness of the items (Howlett et al. 2009). Thus, we predict:

H3: The effect of preexisting category healthfulness expectations on choice is moderated by the provision of an objective nutrition information disclosure. Specifically, (a) when the disclosure disconfirms health halo (horn) expectations, there is a negative (positive) effect on choice, but (b) when the disclosure confirms category expectations, the effect of the disclosure is reduced.

Study 1

Method

Experimental design The online study was a 2 (Nutrition Facts Panel [NFP]: absent/present) × 4 (Product Type: health halo or health horn (for chicken and beef) with more or less objective healthfulness) mixed factorial design. The NFP was a between-subjects factor, and product type was a within-subjects factor. Specifically, two types of chicken were presented to participants. One item was healthier and thus consistent with the health halo associated with the category of chicken (boneless, skinless chicken breasts), whereas the other item was less healthful and therefore inconsistent with the halo perception (a full cut-up chicken with skin included). Similarly, there were two beef options. One item (a rib eye steak) was less healthful and thus confirmed the health horn associated with the beef category, whereas the other item (a sirloin steak) was more healthful and therefore inconsistent with prior (health horn) expectations.¹

¹ We base our predictions on both past findings (Husted 2005) and the assumption that consumers perceive chicken to be healthier than beef. We performed a pilot test to confirm this premise in which 79 student participants (mean age=22) rated the healthfulness of both chicken and beef on a seven point scale. Results supported our premise, but we utilize results from the main study for our primary support for the perceived difference. Results from the pilot are available upon request.

Participants were presented all four products. Approximately one half of the participants were exposed to packaging that included the NFP, while the others saw packages with no NFP. Participants were not provided with any instructions that would draw specific attention to nutrition information (i.e., “This survey concerns products similar to what you might find in a local grocery store meat department. Please examine the pictures of packages shown in the next section.”). When the NFP was present, all nutrient levels were consistent with the product’s actual nutrition profile (USDA 2012). For example, the 4-oz serving of the rib eye steak has the most unfavorable calorie (290), fat (23 g), and saturated fat (9 g) levels. The sirloin steak has a substantially more favorable nutrition profile (160 calories, 7 g fat, and 3 g saturated fat). Similarly, compared to the skinless chicken breast, the whole chicken had more unfavorable levels of calories (250 vs. 110), fat (19 g vs. 2.5 g), and saturated fat (6 g vs. 0.5 g). While the chicken breast has a nutrition profile consistent with chicken as a healthful product (a health halo), the whole cut-up chicken does not. While the rib eye has a profile consistent with beef as a product that is less healthful (a health horn), the sirloin is more healthful and is inconsistent with prior expectations. All packages also included a retail price appropriate for each product option.

Sample and procedure Participants were 255 adult American consumers obtained using Amazon’s Mechanical Turk (mTurk). Use of mTurk has quickly been adopted by researchers, and recent findings offer support for its strengths and reliability (e.g., Buhrmester et al. 2011). Cell sizes were 129 and 126 for the between-subjects factor. Participants were randomly assigned to one of the nutrition disclosure experimental conditions (either present or absent) and presented with all four package stimuli (two beef and two chicken). We used counterbalancing procedures to control for possible order effects associated with the presentation of the package stimuli. The sample had a median income of \$40,000 to 49,999, 88% had at least some college, and almost one half (46%) had a college degree. The majority of the sample was female (60%), and the mean age of the respondents was 43.

Measures We addressed the following five primary dependent measures: product choice, perceived disease risk associated with consumption of the product, and perceived calorie, total fat, and saturated fat levels. The choice measure preceded specific questions about health and nutrition. The choice measure asked, “If you were choosing one of the products shown below, which one product would you select?” To measure disease risk perceptions, participants were asked, “If you ate this product regularly as part of your diet, do you think this product would increase or decrease the likelihood of you having heart disease?” Responses were assessed with

nine-point scales with endpoints of “would decrease the likelihood” and “would increase the likelihood” (Kozup et al. 2003). We chose heart disease as the focal variable because of its strong relationship with saturated fat and fat consumption. To measure the evaluation of calories, total fat, and saturated fat, respondents were asked, “Please rate how favorable or unfavorable you think the products are for each of the nutrients listed below.” Responses were assessed on nine-point scales with endpoints of “very unfavorable” and “very favorable” (Keller et al. 1997; Mitra et al. 1999).

Results

Manipulation checks We sought to confirm the premise underlying our predictions that chicken is perceived to be more healthful than beef. Near the end of the survey, consumers in the no NFP (control) disclosure condition rated the overall healthfulness of chicken and beef (in general) using a seven point scale. Chicken ($M=5.69$) was considered more healthful than beef ($M=4.17$; $t=15.34$; $df=125$; $p<.001$). Similarly, means for the two chicken items (breasts=5.94; whole chicken=4.74) were greater than the means for the beef items (sirloin=4.14; rib eye=3.43). Further, the least healthy (whole) chicken and the most healthy beef (sirloin) items were statistically different from one another ($t=4.35$, $df=125$, $p<.001$). These results support the health halo and horn expectations associated with chicken and beef, respectively.

We also assessed awareness of the NFP disclosure on the product packaging. Near the end of the survey, participants responded to the following question, “On the packages that you saw in this survey, did you see a Nutrition Facts Panel describing the nutrition level of the product?” When the NFP was disclosed, 97% recalled seeing the information while 94% reported that they did not see the panel when it was not presented ($\chi^2=213.0$, $df=1$, $p<.0001$). This indicates high consumer awareness of the NFP when it was presented on the product packaging. We also tested for possible order effects for the four beef and poultry items. Results revealed no significant main effects or interactions for the effects of presentation order ($p\geq.30$ in all cases).

Tests of hypotheses Hypothesis 1 predicted that when the NFP disconfirms the positive health halo (or negative horn) expectation, there is a negative (positive) effect on evaluations. A weaker effect was expected when the NFP was generally consistent with the halo/horn status of the category. As anticipated, the provision of objective NFP information interacted with prior health halo and horn expectations to influence all dependent measures as shown in Table 1. Plots for calories and total fat are shown in Fig. 1, and saturated fat is shown at the top of Fig. 2.

The primary driver of this interaction is based on effects that occur when either the health halo or health horn

Table 1 Study 1: effects of objective information disclosure and (dis)confirmation of health halo and horn effects on product evaluations and perceived disease risk

Independent variables:	Univariate F values			
	Calorie evaluation	Total fat evaluation	Saturated fat evaluation	Perceived risk of heart disease
Main effects				
Product type (PT)	202.2***	247.5***	211.3***	210.5***
Objective information disclosure (NFP)	0.60	0.0	2.05	0.17
Interaction effects				
PT * NFP	28.6***	25.9***	25.9***	11.9***

Product type represents four options presented on a retail shelf: boneless chicken breasts, full cut up chicken, a rib eye steak, and a sirloin steak. Based on the pilot tests, there is a health halo for chicken options (perceived as a more healthful alternative) and a health horn for beef (perceived as a less healthful alternative). These perceptions are supported by the NFP for one beef and one chicken product option, but not confirmed for the other beef and chicken option

*** $p < .01$

Fig. 1 Study 1: the moderating effect of information disclosure on (dis)confirmation of health halo and horn effects for calorie and fat evaluations

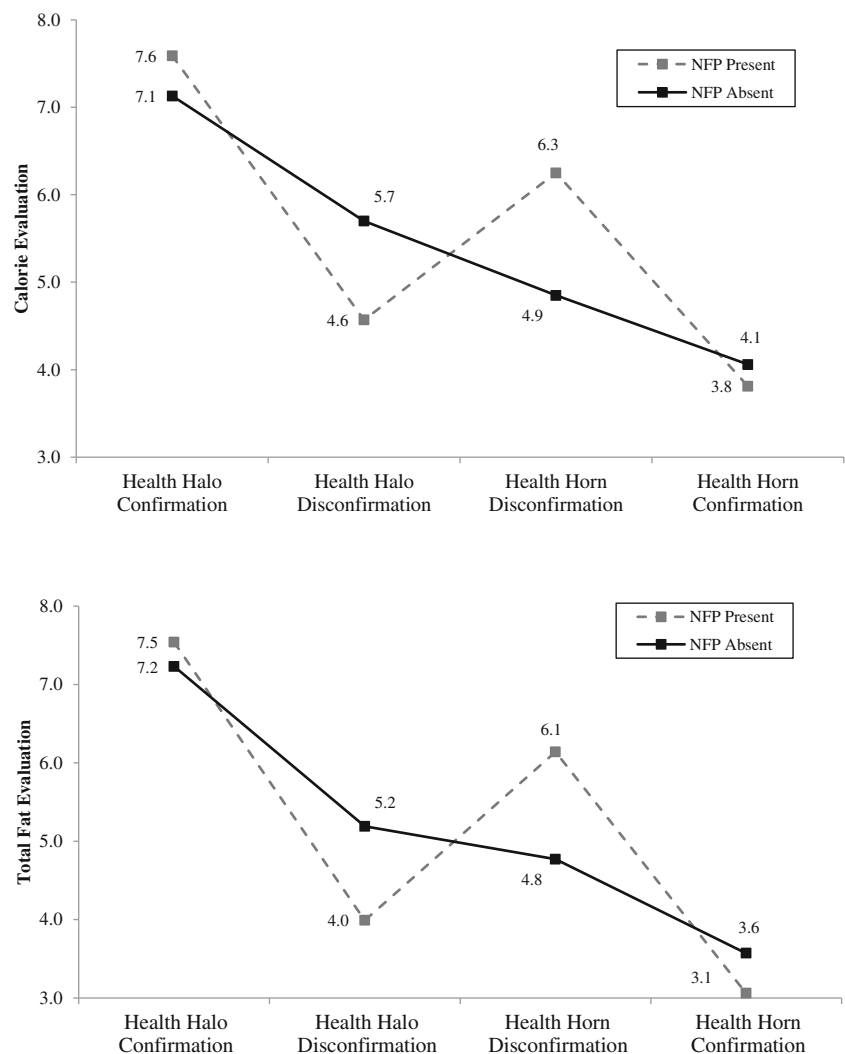
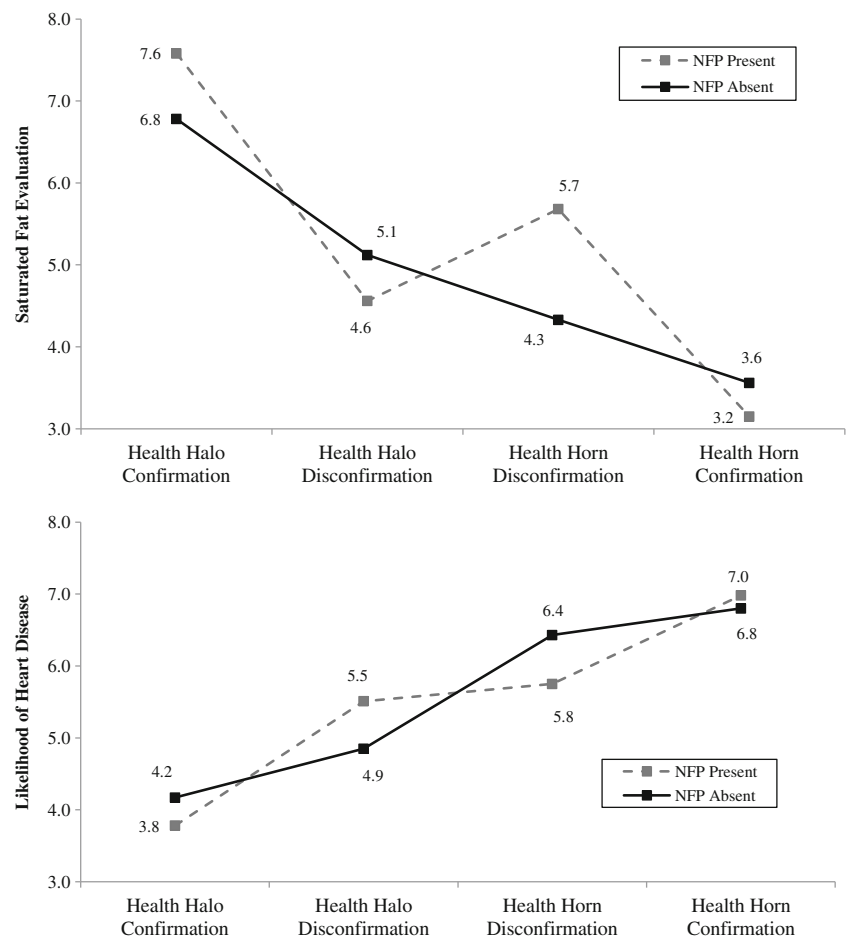


Fig. 2 Study 1: the moderating effect of information disclosure on the (dis)confirmation of health halo and horn effects for saturated fat and heart disease risk evaluations



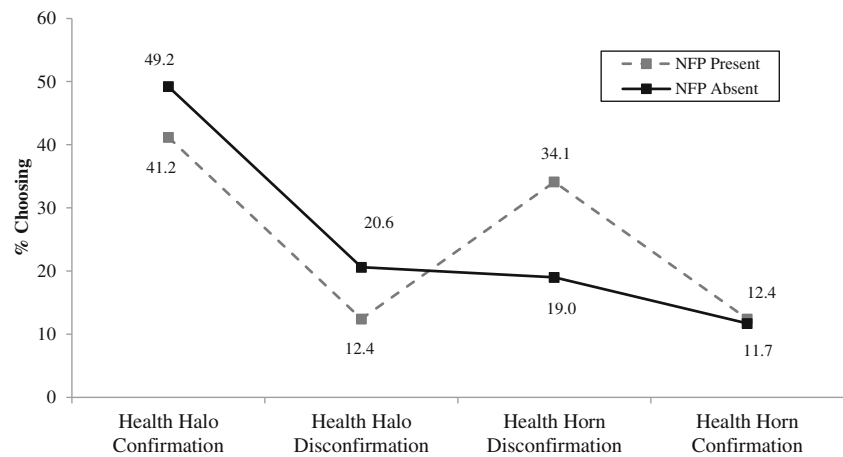
expectation is disconfirmed by the provision of the objective information (the NFP). As shown in the center of the plot for calorie evaluations, when the halo (horn) is disconfirmed, there is a negative (positive) effect of the NFP information. As the plot suggests, the follow-up two-way interaction is significant in these disconfirmation conditions ($F(1, 253) = 67.7; p < .001$). When the health halo (for the whole chicken product) is disconfirmed by NFP information, the mean calorie evaluation decreases to 4.57 compared to 5.70 in the control condition ($F(1, 253) = 21.2; p < .001$, partial eta-squared (η_p^2) = .08). Conversely, when the health horn is disconfirmed (for the sirloin steak), the mean calorie evaluation increases to 6.25 compared to 4.85 in the control condition ($F(1, 253) = 38.1; p < .001$, $\eta_p^2 = .13$). However, as predicted, there is a much weaker effect of the NFP when the initial health perception of the beef or poultry product is confirmed by the NFP. When the negative health horn is confirmed (for the rib eye), the effect of NFP is non-significant (M 's = 4.06 and 3.81; $F(1, 253) = 0.97; p > .20$). There is a favorable effect of the NFP when the health halo (for the skinless chicken breast) is confirmed (M 's = 7.59 and 7.13; $F(1, 253) = 4.98; p < .05$). However, as expected, this effect ($\eta_p^2 = .02$) is smaller

than when the health perception is disconfirmed. The pattern of findings supports H1a.

As shown in Table 1 and the bottom portion of Fig. 1, the pattern of findings for the evaluation of total fat is similar. The interaction is significant, as are the follow-up contrast tests (p 's < .001) for instances in which the positive health halo or negative health horn is not confirmed (i.e., whole chicken and sirloin steak where $\eta_p^2 > .08$ for both). When health halo and health horn expectations are confirmed, effects associated with the NFP disclosure are substantially diminished. While the difference between fat evaluations when the halo is confirmed (chicken breast) is non-significant ($F(1, 253) = 2.09; p > .10$), the addition of the NFP lowers fat evaluations of the rib eye ($M = 3.06$ and $M = 3.57$; $F(1, 253) = 3.94; p = .048$; $\eta_p^2 = .02$).

For the evaluation of saturated fat, a negative nutrient linked to heart disease, the interaction is also significant ($p < .001$); the plot is shown in the upper portion of Fig. 2. When the health halo (horn) is disconfirmed by the NFP, there is a negative (positive) effect on saturated fat estimates (F 's (1, 253) = 10.6 and 36.6, respectively; p 's < .01). However, when the health halo (horn) is confirmed there also is a significant

Fig. 3 Study 1: the moderating effect of information disclosure on the (dis)confirmation of health halo and horn effects for product choice



positive (negative) effect of the NFP on evaluations ($p's < .05$). The overall pattern of these results offers support for H1a and H1c, and partial support for H1b.²

Hypothesis 2 concerns the anticipation of a post-purchase outcome (i.e., heart disease risk perceptions), a dependent variable that extends beyond the objective information directly offered in the package disclosure (Roe et al. 1999). As shown in the last column of Table 1, the pattern of interactions is similar. As shown in the bottom portion of Fig. 2, the two-way interaction for the refutation of the halo and horn effect (for whole chicken and sirloin steak) is significant ($F(1, 253) = 23.4; p < .001$). When the health *halo* is disconfirmed (whole chicken), the NFP increases the perceived likelihood of future heart disease (M 's of 4.85 and 5.51; $p < .01$). In contrast, the likelihood of anticipated heart disease decreases when the health *horn* is disconfirmed for the sirloin steak (M 's of 6.43 and 5.75; $p < .01$). Differences are not significant when the health horn or health halo is confirmed ($p's > .05$). Thus, these findings support H2a and H2b.

Effect on product choice Hypothesis 3 predicts that the effect of the NFP on product choice would differ across beef and poultry options in which the initial health halo and horn expectations are either confirmed or disconfirmed. Since multinomial models parameterize consumers' representative utility between product choices (Baltas and Doyle 2001), this prediction was tested using multinomial logit. Initial tests of the variation in choices across NFP conditions is significant ($\chi^2 = 9.17, df = 3, p = .027$). As shown in Fig. 3, the whole chicken and sirloin steak items that disconfirm the health halo/health horn perceptions show the crossover pattern that is consistent with prior analyses. When the unfavorable

perception of the beef product (sirloin steak) is not consistent with the objective nutrition disclosure, choice of the item increases significantly ($z = 2.72, p < .05$). More specifically, when the NFP is disclosed, those choosing the sirloin increases from 19% to 34%.

In contrast, when the health halo associated with the whole chicken is disconfirmed by the NFP, the percent choosing this option decreases from 20.6% with no NFP disclosure to 12.4% with the NFP disclosure ($z = -1.77; p < .05$, one-tailed test). As shown in Fig. 3, when the health horn effect is confirmed (for the rib eye steak), there is no effect of the NFP on choice (11% vs. 12% across NFP conditions; $z = 0.32; p > .25$). While there is some apparent difference when the health halo is confirmed, the difference in choice for the chicken breast (49% and 41% across the NFP conditions) does not reach significance ($z = -1.30; p > .10$), consistent with the pattern predicted for confirmation of the health halo. Thus, the pattern for choice supports the predictions in H3a and H3b.

Discussion

Understanding how health halos and horns associated with various retail product categories can mislead consumers' food product evaluations and decisions is an important issue for theory, retailers, producers, and consumer welfare (Roe et al. 1999; Wansink and Chandon 2006). To our knowledge, this is the first study to directly address how the confirmation or disconfirmation of a health halo or health horn by a mandated nutrition disclosure can affect consumer evaluation and choice patterns. Findings support the moderating effect of the objective nutrition information disclosure; there are favorable effects when the horn effect is disconfirmed and unfavorable effects when the halo effect is disconfirmed. In addition, as predicted there are reduced effects when objective information is consistent with the health halo and horn expectations.

However, there are a number of issues that may restrict the generalizability of these findings. For example, exposing

² Results of additional contrasts are as follows: calories 'health horn' confirmation ($p > .1$) and 'health halo' confirmation $F(1, 253) = 4.98, p < .05$; total fat 'health halo' disconfirmation $F(1, 253) = 20.7$ and 'health horn' disconfirmation $F(1, 253) = 31.2$ ($p < .001$ for each); saturated fat 'health horn' confirmation ($p > .1$). (All contrasts across all studies are available upon request).

consumers to meat and poultry stimuli online differs from the marketplace environment, in which consumers are exposed to additional contextual stimuli and make evaluations rapidly. Therefore, we seek to extend these findings in Study 2 by examining consumer evaluations and choices in a retail store laboratory environment. Specifically, we examine product choice as well as relative perceptions of more and less healthy products. We anticipate a moderating effect of the interaction similar to that proposed in H2 and H3 in Study 1.

Study 2

Method

Design Study 2 was one component of a retail shopping study that took place in a behavioral research lab. In this study, participants examined, evaluated, and made choices for various product categories (e.g., detergents, dish soaps, beverages) located in the simulated retail store environment. One portion of the shopping trip concerned the evaluation and choice of beef and poultry options found in the retail store lab. The experiment was a 4 (Product Type: health halo or horn for chicken and beef) × 2 (NFP: absent/present) mixed experimental design. As in Study 1, product type was a within-subjects factor, and the nutrition levels on the NFP (when available) reflected the actual nutrition profile for the product.

Procedures and participants A total of 180 students at a major southern university participated in the study for course credit ($M_{\text{age}}=21.4$ years). Approximately 47% of the participants were male (53% female). When they checked in for the study, participants were given instructions containing information about the shopping task and a folder containing a survey. In the instructions, a cover story for the study was provided which informed the subjects that they were selected to participate in a retail pilot test of various types of product or shelf labeling. Next, participants were escorted to the retail lab where one shelf in the lab presented the meat and poultry products. The participants were randomly assigned to conditions and rotated between the five retail category stations, minimizing any potential demand effects (i.e., there was no evidence of hypothesis guessing related to the manipulations). To simulate a natural shopping environment, all participants were instructed to freely examine any available products before making choices and answering questions. After completing the shopping session, participants completed an online survey in an adjacent computer lab. This follow-up survey included background variables and questions related to the shopping trip and any possible demand effects.

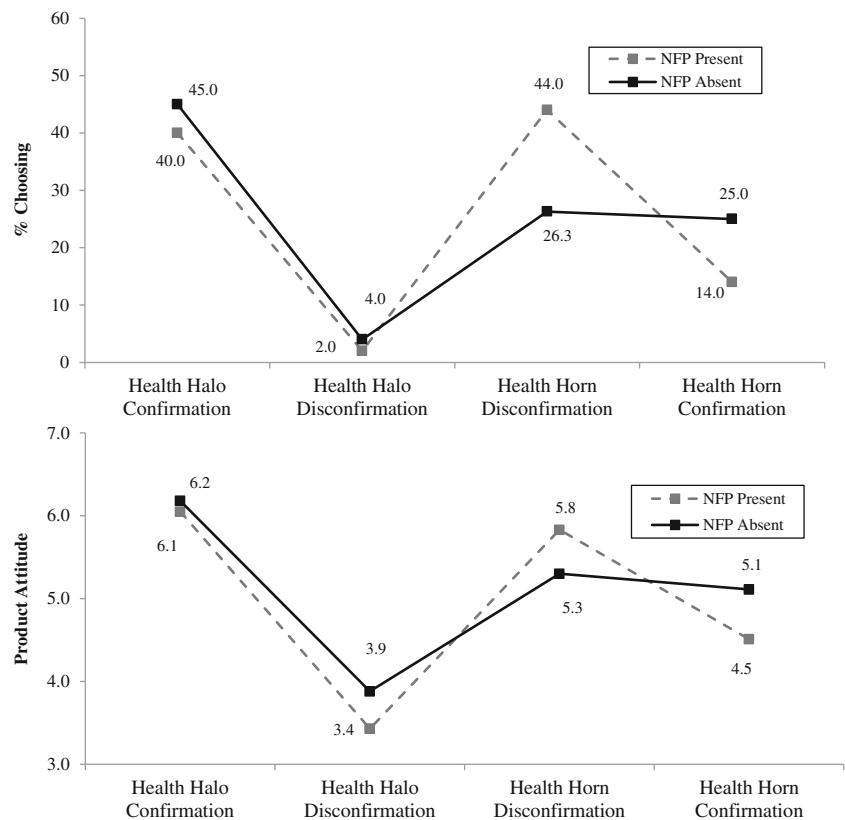
Measures All of the focal dependent variables were measured at the retail shelf where participants examined the products. The dependent variables included product choice (“If you were choosing one of the products shown below, which one product would you select?”) and selecting the most and least healthy product (i.e., “Which product is the healthiest [least healthy]?”) from the four product choice set. In addition, we measured overall attitude toward each of the four product options (“Based on the information shown for each of these products, what is your overall attitude toward each of the four products below?”) using seven-point scales (two items with endpoints of unfavorable-favorable and negative-positive; higher scores indicate more favorable attitudes). Correlations between the two items ranged from .84 to .94.

Results

To assess product choice, a multinomial logit regression was performed with the disclosure (absent or present) as the predictor variable and choice among the four products as the dependent variable. We also included taste perceptions for the products as covariates in the analyses. The overall model was significant ($\chi^2=144.9$; $p<.001$; Nagelkerke $R^2=.61$). The effect of the package NFP disclosure was significant ($\chi^2=10.9$; $p=.012$), and the plot for choices across disclosure conditions is shown in the top of Fig. 4. The most notable difference is when the negative health horn perception for beef is disconfirmed by the sirloin steak. When there was no NFP disclosure, 26% selected this option, but when the NFP was presented, 44% chose this option ($z=2.46$; $p<.01$). For the rib eye steak, when the disclosure confirmed health horn perceptions, choice fell from 25% to 14% ($z=1.87$; $p=.06$). As expected, the chicken breast (i.e., health halo was supported) was a popular choice across the disclosure conditions ($p>.20$). The pattern of results in Fig. 4 offer partial support for H3.

The pattern of results for the selection of the least healthy option was similar to the effects described above. The multinomial logistic regression model was significant ($\chi^2=45.7$; $p<.001$; Nagelkerke $R^2=.26$). The greatest effects of the disclosure occurred for the two beef options. When there was no disclosure, 24% selected the sirloin steak (i.e., health horn not supported) as the least healthy, and this decreased to 10% when there was an NFP ($z=-2.49$; $p=.012$). In contrast, for the rib eye steak, the percentage selecting it as the least healthy option increased from 53.7 to 71% when the NFP was present ($z=2.39$; $p=.017$). Not surprisingly, for the healthiest choice among the chicken and beef consideration set, the effect of the inclusion of the NFP disclosure was minimal. The retail package information disclosure simply confirmed the chicken breast as the healthiest choice, leading to no effect across the information conditions (89% selected this option in both package disclosure conditions).

Fig. 4 Study 2: the moderating effect of information disclosure on the (dis)confirmation of health halo and horn effects for product choice and product attitude



A mixed analysis of variance was performed for the product attitude measures across the four product options. As anticipated, there was a significant interaction between the presence of the disclosure and product type ($F(3,474)=4.81$; $p<.01$). The main effect of meat type is significant ($p<.001$), while the presence of the disclosure is not ($p>.10$). A plot of the interaction is shown at the bottom of Fig. 4. As predicted, the two items that disconfirm health halo and horn perceptions are primary drivers of the significant interaction ($F(1,158)=6.64$; $p=.01$). Further, as shown in the plot, the predicted crossover pattern was confirmed. While the contrasts indicate that the increase in attitude for the sirloin is significant ($F(1,158)=5.63$; $p<.05$), the contrast does not reach significance for the whole chicken ($F(1,158)=2.92$; $p<.10$). Consistent with the choice and health evaluations, there are significant effects for the rib eye steak. When the NFP disclosure is added to the product package, the decrease in attitude is significant ($F(1,158)=4.86$, $p<.05$).

Discussion

Study 2’s findings offer mixed results for our predictions regarding evaluations and choices when there is either confirmation or refutation of health halo and horn effects. Support for our predictions is found when the health horn for beef is

disconfirmed by the disclosure, with choice among the options increasing by 18% (26% to 44%). For this set of items, there is a 69% increase in choice share when consumers are exposed to objective information levels. While the pattern of findings for the whole chicken was in the predicted direction, effects were non-significant when the health halo was disconfirmed. In this context, the choice of the whole chicken is low and thus appears to be subject to a floor effect. In addition, including the nutrition information on the rib eye package significantly decreased choice of the product, decreased perceived healthfulness, and reduced overall attitudes towards the product.

Studies 1 and 2 examined the effects of nutrition information package disclosures on consumers’ evaluations. However, as noted earlier, the recent USDA ruling allows the retailer to provide that information on alternative POP materials such as posters. In fact, the USDA provides examples of the types of POP posters that might be used for specific cuts of beef, veal, lamb, chicken, and turkey. It is unclear, though, whether the presentation format of the nutrition information (e.g., located on a packaged good versus presented on a poster) will have similar effects on consumers’ product evaluations. Thus, Study 3 seeks to provide further evidence of health halo and health horn effects under different, alternative information exposure contexts.

Study 3

In the first two studies we examined various outcomes that are conceptually interrelated, including nutrition evaluations, disease risk, and more general product evaluations. Results show that there are differences in the strength of effects, and theory suggests that effects on purchase intentions should be mediated through perceptions of healthfulness and risk perceptions (Howlett et al. 2008). Specifically, again drawing from expectations theory and HSPM, we expect the following mediational chain of relationships: nutrition information [absent, present] → product healthfulness perceptions → disease risk perceptions → purchase intentions. We propose that a consumer's perception of product healthfulness is the primary driver of this indirect effect when a package or poster disclosure disconfirms the health horn/halo. As such, the perception of product healthfulness is the *proximal* mediator; this perception is formed based directly on the nutrition disclosure and its effect on purchase intentions should be somewhat larger in magnitude (Shrout and Bolger 2002). The more *distal* mediator, long-term disease risk perceptions (e.g., heart disease, weight gain risk), is dependent on the healthfulness evaluation and is a direct antecedent to the primary outcome of purchase intentions. Thus, we propose a conditional total indirect effect path through the mediators of healthfulness and long term risk (Hayes 2013). The indirect effect should be positive (negative) and significant when the health horn (halo) is disconfirmed, but this path should be somewhat attenuated when the external information is supportive of the halo/horn perception. More formally, we predict:

- H4: Consumers' product healthfulness and disease risk perceptions will mediate the effect of an objective nutrition disclosure on purchase intentions. Specifically, (a) when the health horn (halo) is disconfirmed, there is a positive (negative) indirect effect on purchase intentions, and (b) when the disclosure confirms category expectations, the indirect effect is reduced.

In sum, the purpose of Study 3 is to assess the linkages by which effects related to the inclusion of package and poster information occur when there is (and is not) support for the halo/horn category perception and to determine whether the presentation format of nutrition information (i.e., package vs. poster) works similarly in impacting the likelihood of health halo and health horn effects.

Method

Experimental design Participants were randomly assigned to one nutrition disclosure condition (nutrition information was absent, provided on the package, or presented on a poster) for the four product types (health halo or health horn for chicken

and beef, consistent with the prior studies). In the poster condition, participants were given an option to view or bypass the nutrition information (i.e., they were asked "Would you like to examine a poster showing nutrition information for the products?"). If they chose to view the poster, they were shown nutrition information based on the USDA recommendations. The poster included the four target beef and poultry items plus several other meat/poultry options for which disclosures are required. In the poster condition, no nutrition information was included on the product packages. Thus, the manipulations were consistent with the two information presentation format options currently available to retailers for displaying the disclosures. As with the prior studies, the information disclosure was a between-subjects factor and the product type was a within-subjects factor, and all nutrient levels were consistent with the products' actual nutrition profiles.

Sample and procedure Participants were 435 adult consumers who were recruited for an online study using mTurk. Cell sizes for those who (1) saw no disclosure on the packages, (2) saw the disclosure on the packages, (3) had the option to see the information on the retailer's poster and chose to do so, and (4) had the option to see the information on the retailer's poster but chose *not* to do so, ranged between 95 and 116. We again used counterbalancing procedures to control for any effect associated with the presentation order of the products, and there was no effect of order in subsequent analyses. The majority of the sample was female (56%), and the mean age of the participants was 32. Approximately 90% of the sample had at least some college education.

Measures Given an interest in the mediational process by which Study 1 and 2 effects occurred, we measured the following for each of the four products: (1) perceived healthfulness, (2) perceived risk associated with long term consumption, and (3) purchase intentions. For risk perceptions, we assessed the risk associated with both heart disease and gaining weight. Measures for risk were consistent with the prior studies, again using endpoints of "would decrease the likelihood" and "would increase the likelihood." Because the two measures were highly correlated for each of the four food items (r 's ranging from .63 to .67, $p < .001$), and consistent with prior research, we created a summed scale measure for risk perceptions (Howlett et al. 2008). To measure the perceived healthfulness of each product, participants were asked "Overall, each of these products are:" on a seven-point scale with endpoints of "unhealthier than I expected" and "healthier than I expected." Based on prior packaged food studies (Keller et al. 1997), purchase intentions for each of the four items were measured with two items on a seven point scale with endpoints of "not probable/very probable" and "not likely/very likely" (all r 's $> .80$). To assess awareness of the nutrition disclosure on the product packaging/poster,

participants stated whether they saw nutrition information on a package, on a poster, or not at all. Consistent with Studies 1 and 2, no information was provided that would draw participants' attention to the package or poster nutrition information.

Results

Initial checks When participants in the poster condition were given the opportunity to examine it, 62% chose to do so. This percentage closely mirrors actual reported consumer use of nutrition labels (International Food Information Council 2013). After all dependent measures had been collected, consumers were asked a social desirability scale measure (Strahan and Gerbasi 1972), and subsequent results showed no evidence of socially desirable responding. When the NFP was disclosed on the package (poster), 94% (100%) recalled seeing the information when it was available (package $\chi^2=160.6$, $p<.0001$; poster $\chi^2=188.4$, $p<.0001$).

Effects of the package and poster information We used a repeated measures ANOVA to initially assess effects of the added nutrition information presented via the poster or the package on the proposed mediators of healthfulness and risk perceptions (i.e., gaining weight and heart disease).³ Consistent with our predictions and previous findings, there is a moderating effect of the disclosure ($F(9, 1290)=22.88$; $p<.001$).⁴ The plot for perceived healthfulness is shown at the top of Fig. 5. When the addition of the nutrition information disconfirms the positive health halo (or negative horn) expectation, there is a negative (positive) effect on health evaluations, but there is a somewhat weaker effect when the nutrition information is consistent with the halo/horn status of the category. As shown in the center of the plot in the two halo/horn disconfirmation conditions, the anticipated cross-over interaction is evident and significant ($F(3,430)=41.72$; $p<.001$). The follow-up contrasts that assess the effect of the disclosure when the health halo is disconfirmed for the chicken product ($F(3,430)=28.2$; $p<.001$), and when the health horn is disconfirmed for the beef product ($F(3,430)=14.11$; $p<.001$), are both significant. These results are consistent with the pattern indicated in H1 when a horn or halo is disconfirmed.

As shown in the top of Fig. 5, when the information is added to the package or poster and confirms the health halo for the chicken breast product, there is a reduced effect for the healthfulness perception, as predicted in H1. When the nutrition information, presented either on the poster or the package,

is consistent with the health horn for the beef product, it significantly lowers the healthfulness evaluations of the product ($F(3,430)=12.98$; $p<.01$). Note that, in general, when the information is provided on a poster or on the package, the means are quite similar for each product. (As might be expected, results are also quite similar when there is no access to the information, regardless of the package or poster format.)

The plot for risk perceptions is shown in the bottom of Fig. 5. The proposed moderating influence of the disclosure is again significant ($F(9,1290)=8.49$; $p<.001$). Consistent with the pattern suggested in H2 when the halo/horn expectations are *not* supported by the objective information, the proposed disordinal interaction for the items in the center of the plot is significant ($F(3,430)=11.26$; $p<.001$). However, because such risk evaluations extend beyond more direct product healthfulness in a possible chain of effects, it was anticipated that effects may be somewhat less strong, and these F-values are consistent with this supposition. To address this supposition more directly, we present results from conditional mediation tests.

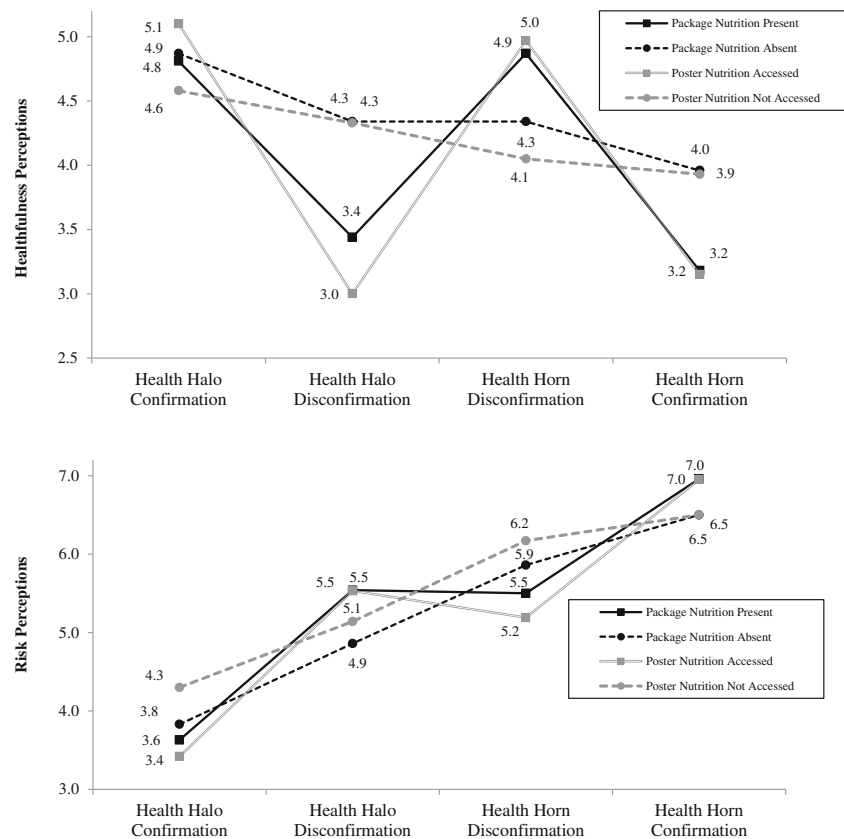
Mediation analyses Consistent with our Study 3 objective to address the process underlying observed effects (as proposed in H4), we examined the indirect effect of adding the nutrition information to (1) a package or (2) a poster on consumers' purchase intentions when the added information was consistent/inconsistent with halo/horn expectations. More specifically, we examined the following mediational chain for effects of the package or poster when the halo (horn) was supported or not supported: disclosure (absent=0; present=1)→perceived healthfulness→perceived risk→purchase intentions. As suggested above, unfavorable nutrition levels will not always extend to longer term risk perceptions (Roe et al. 1999), but in combination we expect a total indirect effect due to healthfulness and risk as mediators. We performed a series of tests using Hayes' (2013) PROCESS algorithm (model 6 with 95% bias-corrected confidence intervals (CIs); bootstrap sample of $n=1,000$). Results are in Table 2.

Hypothesis 4 suggests significant indirect effects on purchase intentions, through healthfulness and risk perceptions, when the nutrition information does *not support* the halo (a negative indirect effect) or the horn (a positive indirect effect). As shown in Panels A and B of Table 2, (1) the total indirect effects are significant (none of the CIs contain a value of zero) for either the package or the poster disclosure, and (2) coefficients are in the predicted direction. Acting sequentially in combination, perceptions of product healthfulness and disease risk mediate the effects of a nutrition information disclosure when *either* a health horn or halo is disconfirmed. These results support H4a. As shown in Panel C, when the health halo is supported through information on the package, the total indirect effect is non-significant (i.e., the path coefficient is near zero and the CI contains a value of zero). In Panel D,

³ The positive correlation between these risk measures was high for each of the products ($all>.60$; $p<.001$), and thus separate analyses for these risk measures were consistent with results for the multi-item measures.

⁴ As suggested in Fig. 5, results also showed that when information was accessed, there were no significant differences between the package and poster conditions, when compared to the no information controls.

Fig. 5 Study 3: the moderating effect of information disclosure on (dis)confirmation of health halo and horn effects for healthfulness and risk perceptions



when the health horn was supported by information on the poster or package, the indirect effect is negative, reducing the influence on intentions, a pattern consistent with effects shown in Fig. 5.⁵ Results from both health halo and horn confirmations (Panels C and D) provide partial support for H4b. Note that in panels A–D, the indirect effect of the information for the poster always appears at least as strong as the package-based information.

General discussion

The vast majority of prior research on consumer inferences and categorization effects has focused only on the effects of *positive* health biases (i.e., health halos) on product

evaluations and intentions. Consequently, the simultaneous comparison of negative biases (health horns) and positive biases (health halos) for potential substitute products has been largely neglected. We address this gap in the literature by examining both of these effects across two product categories (chicken and beef) recently impacted by mandated changes in the retail POP information environment. Building on expectations theory and the heuristic-systematic processing model (Chaiken et al. 1989), we extend these findings by further examining how objective POP information interacts with preexisting category healthfulness perceptions to impact pre-purchase product attribute evaluations, choice, and anticipated post-purchase health-related outcomes. Our findings, as well as implications for theory and practice, are discussed below.

Health halos, health horns, and objective product information disclosures

Consumers may make potentially incorrect inferences about the healthfulness (or unhealthfulness) of individual food products based on category-level expectations (Chandon and Wansink 2007; Howlett et al. 2009). However, these expectations can be (dis)confirmed by the provision of objective nutrition information at the POP. Study 1 results show the anticipated crossover interaction when the health halo or horn

⁵ We focus on the total indirect effect, as is recommended in examining multiple mediator effects (see MacKinnon 2008; Kenny 2013). However, while due to length considerations we limited the presentation of all mediation results, we extended our analyses to assess the relative strength of the two mediators on the indirect effect. Consistent with what may be inferred from Fig. 5, healthfulness mediated effects on both risk perceptions and purchase intentions, for both the poster and the package. In addition, there was little evidence that perceived risk contributed to the indirect effect on intentions beyond the healthfulness measures (i.e., risk did not tend to mediate the effect of healthfulness on purchase intent). This pattern supported the general contention that the primary mediational effect would be through overall perceptions of healthfulness.

Table 2 Study 3: the indirect effects of the inclusion of package and poster information across halo and horn confirmation and disconfirmation

Mediation paths	Indirect effect (SE)	95% confidence interval (CI)
Panel A: indirect effects for health halo disconfirmation (whole chicken)		
Package NFP → Healthfulness → Risk → Purchase Intention	-.42 (.14)	[-.77, -.18]
Poster NFP → Healthfulness → Risk → Purchase Intention	-.57 (.16)	[-.91, -.28]
Panel B: indirect effects for health horn disconfirmation (sirloin)		
Package NFP → Healthfulness → Risk → Purchase Intention	.26 (.09)	[.11, .48]
Poster NFP → Healthfulness → Risk → Purchase Intention	.42 (.11)	[.22, .61]
Panel C: indirect effects for health halo confirmation (chicken breast)		
Package NFP → Healthfulness → Risk → Purchase Intention	.01 (.06)	[-.12, .14]
Poster NFP → Healthfulness → Risk → Purchase Intention	.31 (.11)	[.13, .59]
Panel D: indirect effects for health horn confirmation (ribeye)		
Package NFP → Healthfulness → Risk → Purchase Intention	-.29 (.14)	[-.54, -.13]
Poster NFP → Healthfulness → Risk → Purchase Intention	-.30 (.11)	[-.56, -.11]

The model shows the total indirect effect for the package and poster information for the serial mediation path (Hayes 2013; Model 6) for each of the halo/horn considerations. Values for the upper and lower confidence interval are estimated with bias-corrected confidence intervals with a bootstrap sample of $n=1,000$. The absence of a zero in the interval indicates statistical significance

category-based perception is not supported by the objective information. Specifically, there is a positive effect on evaluations for the beef product (when the health horn is disconfirmed) and a negative effect for the chicken product (when the health halo is disconfirmed). Thus, objective information potentially can be used to correct erroneous preconceived biases of category (un)healthfulness. As predicted, the effects on evaluations are relatively smaller when healthfulness expectations are generally consistent with the disclosure. When consumers must utilize the information to evaluate anticipated health-related consumption outcomes (i.e., disease risk likelihood), results remain significant, but effects appear slightly weaker (see Fig. 2). Such findings are consistent with theories of cognitive processing and memory which suggest that effects diminish for concepts related less directly to the target information (Anderson 1983). This proposition was expanded upon in Study 3 and is discussed in greater detail below.

In Study 2, where effects were extended to a simulated retail store in which actual products were on display, findings were generally stronger for beef than chicken products. There was a substantial positive effect on choice when the health horn was contradicted by the disclosure (sirloin steak). As expected, the impact on choice did not reach significance ($p > .05$) when either halos or horns were confirmed, but there was a significant reduction in product attitudes when the horn was supported (rib eye steak). This latter finding appears consistent with an asymmetric effect of negative information in which new negative information may be weighted more heavily than positive information (Baumeister et al. 2001; Tversky and Kahneman 1981).

In Study 3, we extended this research by examining the underlying explanations behind the effects of the added

disclosures and how these effects did *not* vary as a function of presentation format (i.e., a package or a poster). Results were highly similar for the package and poster conditions (when it was accessed); as expected, there was support for predicted health halo and health horn effects. In addition, when the information (on a package or poster) confirmed the health horn, there was again a negative effect on healthfulness. Mediation analyses showed that the information disclosure, whether on a package or poster, generally had an indirect effect on purchase intentions through its impact on healthfulness and risk perceptions. This conditional indirect effect was significant for both conditions in which the halo or horn was disconfirmed and when the health horn was confirmed. As expected, the effect was comparatively weaker when the halo was confirmed. Thus, the findings from these three studies generally show much stronger effects when nutrition information disclosures disconfirm prior healthfulness (or unhealthfulness) expectations compared to when they simply are more supportive of such expectations. The contributions and implications of this research are discussed in the subsequent sections.

Heuristic-systematic processing, information disclosures, and modification of expectations

This research takes an integrated view of preexisting biases by assessing the interactive effects of (1) both positive and negative prior expectations (i.e., health halos and horns) and (2) POP information for substitute products. More specifically, our findings build upon the heuristic-systematic processing model by showing that an erroneous negative bias can exist (in addition to a positive bias) when consumers only heuristically evaluate the healthfulness of food products. Integrating the

disconfirmation paradigm, we then demonstrate that these heuristically driven expectations can be (dis)confirmed when consumers more systematically consider detailed, objective POP information. More specifically, we demonstrate how discrepancies between prior healthfulness expectations and objective information disclosures (un)favorably influence consumers' product evaluations, health risk perceptions, purchase intentions, and choices when health horns (halos) are disconfirmed. Highlighting the mechanisms underlying these effects, this research further demonstrates that consumers' product healthfulness expectations, and to a lesser degree risk perceptions, mediate the impact of information disclosures on purchase intentions. Thus, we extend prior research by specifically focusing on how added nutrition information may reverse consumers' prior erroneous healthfulness beliefs (both positive *and* negative) and consequently influence evaluations of competing substitute products.

Implications for consumer health and welfare

One specific goal of the NLEA, which mandated the provision of the Nutrition Facts panel, was to “to provide clear, unambiguous nutrition information” that would “assist consumers in maintaining healthy dietary practices” (NLEA 1990, Section 2). However, recent criticism has emerged implying that mandated disclaimers or disclosures rarely have the desired effects on consumer outcomes (Green and Armstrong 2012). Results here largely support theory-based predictions regarding when and how these types of mandated information disclosures update evaluations for competing substitute food products (Block and Peracchio 2006), and appear to have implications for this discussion.

Results suggest that providing calorie and nutrient information for both the beef and chicken categories, given the substantial variance in healthfulness across the different items, is likely to help consumers make more informed choices. For example, horn disconfirmation may direct attention to objectively healthier alternatives. Findings also show that the total indirect effect of mandatory nutrition information on purchase intentions generally do not vary according to presentation format (i.e., when information is accessed from the package or a poster). Thus, even when the information is presented on a poster, as long as consumers choose to access it, they should be able to make more informed product evaluations. However, consumers will still lack nutrition information for less popular types of meat. Consistent with the inference-making literature, it seems possible that more subtle, granular health halo and health horn effects may develop. Nevertheless, given the relatively widespread availability of calorie and nutrient information, it should become obvious to consumers that using simple heuristics (e.g., chicken is healthy; beef is unhealthy) may be unwise. Thus, this research answers a prior call for research on how consumers may update their product

evaluations when given new and (in)consistent nutrition information to process (Block and Peracchio 2006), and a recent call for additional research on the effectiveness of nutrition labeling (Wilkie and Moore 2012).

Implications for marketing and retail practice

Because U.S. retailers have recently become required to present nutrition information for certain cuts of meat and poultry at the POP, this research offers some relevant findings. Recent research has shown that both retailers and consumers potentially can benefit from voluntarily providing nutrition information at the POP (Newman et al. 2014). Our results suggest that the provision of *mandatory* POP information also may benefit retailers, consumers, and producers by disconfirming health horns or (to a lesser extent) confirming health halos. That is, food evaluations, purchase intentions, and choices may increase for objectively healthier foods when horns are disconfirmed, and remain high for objectively healthier products when halos are confirmed. Conversely, producers and retailers should also understand that nutrition information may negatively impact objectively unhealthier food options when POP information disconfirms health halos or (to a lesser degree) confirms health horns. Thus, producers and retailers that offer healthier options may want to consider promotional strategies that position the products based on their healthfulness, rather than on other attributes (particularly if the product is a relatively healthy item in a category that is generally perceived as unhealthy). Over time, retailers may consider offering a product mix of more healthful options and/or less unhealthful cuts of meat and poultry.

While the provision of nutrition information is mandatory for many chicken and beef products, managers are still afforded the opportunity to strategically decide *where* to offer the information (i.e., on individual food packages or on a poster). Study 3 results indicate that consumers' healthfulness and risk perceptions, as well as their purchase intentions, were largely unaffected by presentation format (i.e., information provided on a package or a poster) when they chose to access the poster. However, some 38% chose *not* to examine the poster in this study. This represents a portion of the market that is not being directly exposed to information that has been shown to potentially affect product evaluations and choices. (When the poster was not examined, findings mirror those of the no disclosure control package condition.)

Limitations and future research

Although we examined consumers' evaluations and choice behaviors in online and retail store laboratory settings, several issues may affect the generalizability of our findings. While results from Study 2 were generally consistent with the findings of Studies 1 and 3 (which used non-student consumers),

having students serve as participants is a limitation. Also, we presented nutrition information for four specific types of beef and poultry in a package format that maximizes awareness and may differ from retail shopping venues. While this is consistent with academic research that tests theory involving moderating effects and is commonly employed in product labeling studies, extensions to other contexts and beef and poultry options are of interest. Future market-based studies examining how retailers have complied with the new legislation, as well as the effect of this information on consumers' awareness, evaluations, and category sales, would be relevant to many stakeholders. In addition, we utilized the HSPM framework as a basis for predictions, but did not directly measure the specific processing of information. Future research should seek to create more valid, reliable scales to capture systematic and heuristic processing, or use protocol studies to measure and examine the precise processing of information more directly.

There are several other possibilities for additional research. For example, extension to actual product purchases and consumption would be intriguing and useful. Because prior research has shown that health halos may lead to greater consumption or may encourage adding higher calorie side items or desserts (e.g., Wansink and Chandon 2006), would the provision of unfavorable objective nutrition information lead to decreases in consumption of the focal product but increases in less healthful side items? Conversely, does the disconfirmation of a health horn effect lead to greater future consumption of the described item or related products? Are category-based health inferences "permanently modified" by disconfirming evidence, and do certain subgroups of meat and poultry develop new refined halo/horn perceptions? Further, it can be argued that mistakenly believing that beef is always unhealthy may at times be beneficial from a consumer welfare standpoint. For example, if information that disconfirms health horns associated with beef in general leads consumers to eat more beef than they would have otherwise, does this potentially reduce consumption of healthful fresh fruits and vegetables?

Also, the disclosure used in this research lists calorie and nutrient levels for a (standard) four-ounce serving, based on the USDA guideline. However, many who purchase a 12-oz steak (three servings based on the criteria) commonly view the product as a *single* serving and will consume it as such. Clearly, this shows how objective serving size levels may appear far more favorable than consumers' actual consumption. Thus, relationships between other objective health-related disclosures, such as serving sizes, and existing health halo and horn expectations are of considerable interest. Further, how other individual-difference variables such as a consumer's objective nutrition knowledge and motivation combine to affect product evaluations and consumption in this disclosure context warrants future research interest (Burton et al. 1999). Lastly, further opportunities exist to identify both contextual conditions and segments for which the

effectiveness of presentation formats (i.e., poster vs. package) possibly may vary. In sum, the combination of halo and horn perceptual biases, in conjunction with changes in the information environment at the retail point-of-purchase for certain widely-consumed food products, offers many potential opportunities for future research important to managers, producers, retailers, and consumer welfare.

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