Inferences on Negative Labels and the Horns Effect

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Three studies demonstrate that the horns effect (i.e., a negative halo) influences product inferences associated with negative labels. Moreover, this effect is amplified by consumers low in critical thinking and attenuated by consumers who engage in diagnostic reasoning. These findings collectively demonstrate the bias of negative labels on consumer inferences and subsequent judgments. Taken together, this research identifies an important moderator to the halo effect.

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ABSTRACT

Consumers need information about the ingredients in and manufacturing of food products. However, certain labels such as artificial flavoring, genetically modified organisms (GMOs), and even conventional (as opposed to organic) farming can lead consumers to form negative inferences concerning food products. Perhaps it is no surprise, then, that manufacturers are not motivated to disclose such labels to consumers (Wong 2014). The current debate on mandating negative labels on packaging is controversial (Chokshi 2014). Although consumers demand the right of information, the negative inferences formed by such negative labels on front-of-packaging causes widespread apprehension (McWilliams 2014). This is because although nutrition labels provide concrete information about attribute contents, labels and advertising slogans on the package, used to advertise the product, can be a source of consumer bias.

In particular, research offers insight into how a single attribute can bias a consumers global inferences about the product that can, in turn, influence subsequent inferences toward unrelated attributes (i.e., the halo effect; Asch 1946; Eagly, Ashmore, Makhijani and Longo 1991). Consumers are known to make positive inferences of food products accompanied with a positive health halo (e.g. reduced salt; Andrews, Netemeyer, and Burton 1998). However, little is known about the presence and potential consequences of foods associated with claims that connote negative evaluations (e.g. labels such as artificial flavoring, artificial ingredients or genetically modified organisms- GMOs). Although the term "horn's effect" has been used to connote a negative halo, limited research exists on the extent to which negative labels influence inference formation (Kappes, Schmidt and Lee, 2006).

For over twenty years, up to 70% of processed foods sold in the US has contained modified ingredients (Weasel 2009). In an attempt to promote consumer rights and seller responsibility, the food and Drug Administration (FDA) mandates full disclosure of nutrition information of food products (French and Barksdale 1974). Yet, recent policy debates highlight the disadvantages of ingredient labels that conjure negative evaluations of a product. Although the FDA supports voluntary labeling of such products, manufacturers often avoid such disclosure (Wong 2014). Hence, regardless of scientific research determining safety in consumption of products with negative labels, the challenge is to overcome the negative halo associated with such labels.

Three experiments seek to provide direct evidence of negative health halos and, in doing so, offer novel insight into the processes by which health halos in general alter consumers' inferences. First, we demonstrate that consumers in general make less favorable inferences of food products associated with a negative halo. We then demonstrate the role of critical thinking and show that consumer inferences of food products associated with a negative label affect low critical thinkers. Finally, we demonstrate the underlying role of calorie estimates as affected by negative labels when participants are primed to think diagnostically. Taken together, the results have important implications for consumer bias in response to negative labels.

CONCEPTUAL DEVELOPMENT

Health halos can be nutritional claims about attributes of a product itself (e.g. low fat or sugar free) or other social ethical claims about the food's production (e.g., fair trade; Schuldt et al. 2012). Positive health halos are known to impact consumer inferences on other missing attributes and actual consumption (Wansink and Chandon 2006). For example, when a consumer is led to believe that a fast food restaurant is healthy (e.g., Wendy's), the consumer also makes inferences that the food served (e.g., Wendy's salads) has other positive attributes such as lower calories.

Extending past research on the effects of health halos, it could be inferred that the effect of negative labels is similar to positive halos (Beckwith and Lehmann 1975). That is, negative labels should lead to negative inferences about specific product features. Furthermore, evidence from multiple sources suggests that negative halos may in fact be stronger than positive ones (Baumeister et al., 2001; Felps, Mitchell, and Byington 2006). Additionally, negative (relative to positive or neutral) cues have been shown to elicit less ambiguous inferences that are in general more resistant (Skowronski and Carlston 1989). Hence we hypothesize that:

Hypothesis 1: *Less favorable health inferences should be formed when a negative label is presented.*

When it comes to positive halos, research indicates that consumers are prone to inferring lower calories when a food product is positioned with a positive halo (Chandon and Wansink 2007). Could the reverse of this drive consumer inference on how healthy a product is? When global perceptions of a product are impacted negatively, the halo effect predicts that individual attributes would be inferred in a negative light. Hence, presenting a consumer with just one negative attribute (i.e., a negative health label) would cause them to generate relevant inferences (e.g., calorie estimates). This would in turn affect health inferences made of the product more broadly.

Hypothesis 2: *Inferences toward specific product attributes (e.g., calorie estimates) will mediate the effect of negative labels on health inferences.*

In making inferences based on prior beliefs, the consumer's ability to evaluate evidence presented in an unbiased manner requires a cognitive style commonly known as critical thinking (Zechmeister and Johnson 1992). Critical thinking is the disposition that a person should be unbiased in his or her reasoning (Stanovich and West 1997). This style of thinking requires individuals to think through a problem by decontextualizing themselves from it, such that assumptions presented can be considered in a more objective manner (i.e., absence of personal biases) when processing information (Sá, West, and Stanovich 1999). Importantly, then, critical thinking is reflective less of a general motivation to process information (Cacioppo and Petty 1982) and more of a specific motivation to engage in unbiased thought. Consequently, critical thinkers often generate more hypotheses in a given situation and are less likely to hone in on one conclusion (Brookfield 1987). Hence, when it comes to negative labels, we posit that highly critical thinkers place lesser weight on negative labels.

Hypothesis 3: *Individuals low (versus high) in critical thinking should be more susceptible to effects of a negative label.*

But critical thinking can be influenced and Fernbach, Darlow and Sloman (2011) showed that when individuals reason about a particular hypothesis or prediction, diagnostic reasoning (i.e., reasoning from effect to cause) results in multiple causes of a prediction to become salient or be evaluated. On the other hand, predictive reasoning (i.e., reasoning from cause to effect) leads individuals to neglect alternative causes of a given prediction. Hence when asked to reason diagnostically, we predict that individuals would consider alternate hypothesis of what makes a product healthy vs. not, and base their judgments on alternate causes. Hence, influencing a consumer's processing can in turn, influence health evaluations, when processing is critical and made to think diagnostically. In contrast, individuals primed to reason predictively would continue to evaluate the effect with the original cause that they are anchored to.

Hypothesis 4: *Individuals primed to engage in diagnostic reasoning would alter health inferences on the label in comparison to individuals primed to reason predictively.*

Study 1 sets up the phenomenon to demonstrate that negative labels do indeed cause negative health inferences. Negative labels are shown to impact calorie inferences, which mediate the effect of the label on healthiness estimates. Study 2 demonstrates the role of critical thinking in inference formation. Finally, Study 3 demonstrates the underlying mechanism of calorie estimates that is attenuated when participants are primed to alter reasoning.

STUDY 1

Study 1 was conducted as an initial test of the effect of negative health halos in biasing consumers' health inferences.

Design. An online panel was recruited (N = 60; 50% females; M_{age} = 35.25) under the guise of evaluating advertising for a new orange juice on the market. The study consisted of three factors (halo label: negative halo v. positive halo v. control). Participants were randomly assigned to a condition.

Procedure. While they were shopping for orange juice, participants were told to review an orange juice advertisement. Importantly, description of the orange juice varied as a function of condition. In the *positive halo* condition, the information "real ingredients" was prominently displayed on the label. In the *negative halo* condition, the information "artificial ingredients" was prominently displayed on the label. Note that in both the positive and negative halo conditions, the label was placed in the same position on the advertisement. In the *control* condition, no additional information was provided.

Measures. Participants were asked to indicate how important the product was to a healthy diet (Ma, Kusum and Grewal, 2013), how healthy was the product (Raghunathan, Walker and Hoyer, 2006), and how many calories were in the product in comparison to other brands of orange juice (Schuldt, Muller, & Schwarz, 2012). Responses to each question were provided on 7-point scales. Demographic information was then captured.

Results. All measures were submitted to a one-way ANOVA, with halo label condition as the independent variable.

Importance of product in a healthy diet. Analysis revealed a significant effect of the labels on participants' inferences of how important the product was as part of a healthy was significant (F(2, 57) = 32.54, p < .001). Pairwise comparisons revealed that participants evaluated the product positioned with artificial ingredients (M = 2.47) as less important than the control (M = 5.05; t(37) = 6.33, p < .001). The difference between the artificial ingredients positioning (M = 2.47) and the real ingredients positioning (M = 5.33) was also significant (t(38) = 8.65, p < .001). The difference between the control (M =5.33) and real ingredients positioning (M = 5.05) was not significant (p = .28).

Healthiness Inferences. Analysis revealed a significant effect of the labels on participants' healthiness inferences (F(2, 57) = 35.27, p < .001). Pairwise comparisons revealed when participants were exposed to the artificial ingredients positioning (M = 2.47) they made lower healthiness inferences than the control (M = 5.05; t(37) = 6.33, p < .001) or when the product was positioned as consisting of the real ingredients (M = 5.33; t(38) = 8.65, p < .001). The difference between the control and real ingredients positioning was not significant (p = .45).

Calorie Estimates in Comparison to Other Products. Analysis revealed a significant effect of the labels on calorie estimates (F(2, 57) = 4.19, p < .05). Pairwise comparisons revealed that participants thought the product was likely to have more calories with the artificial ingredients positioning (M = 4.42) than the control (M = 3.85; t(37) = 2.00, p < .05). The difference in estimates between the artificial ingredients positioning (M = 4.42) and the real ingredients positioning was also significant (M = 3.57; t(38) = 2.39, p < .05). The difference between the control and real ingredients positioning was not significant (p = .26).

Mediation Analysis. To determine whether calorie estimates of the product accounted for the variations in perceptions of importance, a mediation analysis was conducted (Hayes 2012; Model 1; bootstrapped with 5,000 draws). Results indicated that calorie estimates mediated the effect of the label on perceptions of importance ($\boldsymbol{\beta}$ = 1.56, SE =.22; p < .001).

The results of this study confirm that negative labels do lead to negative evaluations of the product. Consumers infer negative health attributes, which is driven by estimates of calories of a product perceived as less desirable. In the next two studies, we sought to evaluate the role of reasoning in the formation of consumer inferences and, in particular, whether reasoning could be altered to influence health inferences.

STUDY 2

Study 2 was conducted to evaluate the moderating role that critical thinking played in inference formation due to negative labels. Participant reasoning style was also primed.

Design. Participants (N = 198; 59.1% females; M_{age} = 36.86) were recruited from an online panel an exposed to one of two conditions (i.e. control or a negative label). The experiment was a between-subjects design. In addition, critical thinking was measured.

Procedure and Measures. Participants were asked to review new packaging for a cereal product. For the negative label, we used the words "Contains Additives" were prominently displayed on the packaging. First they were asked they were asked to indicate out how important they the product they reviewed was as part of a healthy diet (anchored: 1: *not very important*; 7: *extremely important;* Ma, Kusum and Grewal 2013). Then they filled out a 15-item critical thinking scale (Halpern and Riggio 2003). Participants first reviewed each of the thinking skills listed and then were asked to rate their ability with each skill on a 7-point scale. Finally demographic information was captured.

Results. Importance of Product in a Healthy Diet. We conducted an analysis of covariance with label and composite critical thinking score predicting importance of the product in a healthy diet, in a full factorial model. The two-way interaction of the model was significant ($F(1, 194) = 3.60$, $p < .05$). A spotlight analyses of low critical thinkers at plus one standard deviation from the mean critical thinking score revealed a significant difference in estimates of importance of the product in a healthy diet between participants in the control condition ($M = 5.04$) and those in the negative-label condition ($M = 3.70$; $F(1, 62) = 14.32$, $p < .001$). However, no distinction emerged between control and negative-label conditions for low critical thinkers ($p = .49$).

The results of this study indicate that low critical thinkers did indeed modify health inferences based on the label. In the next study, the mediating role of calorie estimates was evaluated across priming conditions.

STUDY 3

Study 3 was conducted to identify the underlying mechanism of calorie estimates on health inferences.

Design. Using an online panel ($N = 180$; 48.3% females; $M_{age} = 36.67$) the study was posed a new package evaluations study. Participants were randomly assigned to conditions in a 2 (label: control vs. negative halo) × 3 (reasoning style: control vs. diagnostic vs. predictive) between-subjects design.

Pretests. A pretest ($n = 30$) was conducted to obtain reasoning style statements based on past research (Fernbach, Darlow and Sloman, 2010). Participants were asked to provide likelihood estimates of a series of statements that were either predictive or diagnostic. In the predictive mindset condition, participants were asked to provide likelihood ratings for seven statements that evaluated the effect given the cause (e.g. If Mary has blue eyes, how likely is it that her daughter has blue eyes?). In the diagnostic mindset condition, participants were asked to provide likelihood ratings for seven statements that evaluated the cause given the effect (e.g. If Mary's daughter has blue eyes, how likely is it that Mary has blue eyes?). After reviewing each statement, participants were asked to rate the likelihood of the prediction on an 11-point scale (anchored: 0= *not at all likely*; 10 = *highly likely*). An independent sample t-test comparing the mean likelihood between the two sets of statements indicated that participants reported a greater likelihood score when in the predictive mindset ($M = 8.33$) than the diagnostic mindset ($M = 7.20$; $t(1, 28) = 3.05$, $p < .005$). Hence these two sets of statements were carried forward to the study.

Procedure. Participants were told that a new product was being introduced across multiple retailers and the study was intended to capture opinions on the new food package. Participants were first asked to review statements on likelihood predictions. Participants either rated predictive statements, diagnostic statements or no statements. Then participants were shown a package of a rice product called Field's Finest. In the negative label condition, "Genetically Modified Organism (GMO)," was used, where the label was positioned prominently on the package. In the control condition, there were no labels on the package.

Measures. After the manipulation, participants were told to imagine that they had found a new exciting recipe that needed rice as an ingredient. They were then asked to imagine shopping for rice in their grocery store. First they were asked they were asked to indicate out how important they the product they reviewed was as part of a healthy diet (anchored: 1: *not very important*; 7: *extremely important;* Ma, Kusum and Grewal 2013). Following this, participants were asked to estimate the calories in one serving of the product. Finally demographic information was captured.

Results. Importance of Product in a Healthy Diet. A 2× 3 between-subjects analysis of variance performed on importance of the product in a healthy yielded a significant reasoning style × label interaction ($F(2, 174) = 5.07$, $p < .01$). Contrast analysis confirmed that the reasoning style moderated the effect that the negative label had on perceived importance. Specifically, in the negative label condition, the reasoning style affected perceptions of importance such that in the control condition perceived importance of the product was rated lower ($M = 3.23$) than either the predictive ($M = 4.46$) or diagnostic priming condition ($M = 4.33$; $F(2, 174) = 6.15$; $p < .01$). When no label was present, priming mindset did not significantly impact inference ($p = .58$).

Calorie Estimates. A 2 × 3 between-subjects analysis of variance performed on nutritional inferences yielded the predicted mindset × halo interaction, $F(2, 174) = 3.09$, $p < .05$. Contrast analysis confirmed that the reasoning style only moderated the effect that the negative label had on calorie estimates. Specifically, in the negative label condition, the reasoning style affected calorie estimates such that in the control condition calorie estimates were higher ($M = 280.66$) than either the predictive ($M = 178.26$) or diagnostic priming condition ($M = 163.60$; $F(2, 174) = 4.80$; $p < .01$). When no label was present, priming mindset did not significantly impact inference ($p = .63$).

Mediation Analysis. To determine whether calorie estimates of the product accounted for the variations in perceptions of importance, a moderated mediation analysis was conducted (Hayes 2012; Model 5 bootstrapped with 5,000 draws). Results indicated that calorie estimates mediated the effect of the label on perceptions of importance negative label condition ($\beta = .48$, $SE = .19$; $p < .01$) but not in the absence of a label ($\beta = -.10$, $SE = .19$; $p = .59$). This study suggests that the varying effects on importance of the product, was anchored on the availability of the label. Priming only influenced health inferences when the negative label was present.

GENERAL DISCUSSION

This paper makes several contributions to literature and considerations important to policy on labels. The studies in this paper first that demonstrate negative labels causes the halo effect on calorie estimates that lead consumers to make negative health inferences. This effect is pronounced for individuals who in general less engage in critical processing of information. Priming individuals to think diagnostically, and hence consider multiple hypotheses to a given event, negates the effect of negative labels. Since the healthiness of a product is determined by other factors (e.g. sodium content, sugar content etc.), participants could be considering other alternatives to making health inferences of the product, when primed to think diagnostically. Finally, it was only when the negative label was present that priming processing style showed an effect on health inferences.

This research lends insights to policy makers attempting to regulate information presented on labels on packaging. Consumers in general react unfavorably to the presence of negative labels (that are deemed safe for consumption, while at the same time perceived as undesirable). However, this paper provides evidence that the horns effect only impacts individuals predisposed to low critical thinking. Finally, regardless of individual differences, encouraging critical thought can cause consumers to consider other factors when a negative label is present. Future research should evaluate the beliefs that drive negative inferences on negative labels.

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