

# Effects of Objective and Evaluative Front-of-Package Cues on Food Evaluation and Choice: The Moderating Influence of Comparative and Noncomparative Processing Contexts

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Many nutrition labeling studies only consider how consumers process health information about a single food product (i.e., in a noncomparative processing context). However, consumers also often comparatively evaluate many different food products at once in more complex shopping environments (i.e., in comparative processing contexts). Directly addressing these important differences, the results of two online studies and two retail laboratory studies demonstrate that the effects of different types of front-of-package nutrition cues (objective vs. evaluative) vary across consumers' processing contexts (comparative vs. noncomparative). When consumers evaluate a single food item in a noncomparative context, objective nutrition cues that offer specific quantitative information lead to higher evaluations and intentions to purchase healthier products than do evaluative nutrition cues (which provide interpretive information about a product's overall healthfulness and/or nutrients). However, these effects are reversed when consumers evaluate multiple food items simultaneously in a comparative context, such that evaluative cues have a more positive impact on evaluations and purchase intentions of healthier products. The authors integrate processing fluency and resource matching theoretical frameworks to explain why evaluative (objective) front-of-package cues are more influential in comparative (noncomparative) processing contexts. Implications for consumer health, the food and retail grocery industries, and public policy are offered.

*Keywords:* front-of-package nutrition labeling, processing fluency, resource matching theory, consumer health, comparative and noncomparative processing, nutrition labeling, consumer information disclosures, food evaluations and choices

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## INTRODUCTION

Identifying the more and less healthful packaged food products can be a daunting endeavor for shoppers when one considers that the typical supermarket carries over 40,000 different items—three times more than in 1980 (Nestle 2006). The friendly advice frequently offered to consumers interested in making more healthful food choices at supermarkets is to “shop the perimeter” (Mayo Clinic Staff 2013). It is here that the less processed, more healthful foods such as produce, eggs, lean beef, chicken, and fresh seafood can be found. However, inside the perimeter, the healthfulness of processed packaged foods can be somewhat more difficult to discern quickly and accurately.

This complex retail choice environment provides excellent opportunities for marketers to influence shoppers' purchase decisions by offering cues to simplify their evaluative and choice processes (Bettman, Luce, and Payne 1998). With consumers now making 82% of their purchase decisions inside the store (Point of Purchase Advertising International 2014), marketing promotions designed to influence consumers' product evaluations at the point of purchase have become critically important. For example, many food manufacturers and retailers are using front-of-package (FOP) labeling to attract attention and influence perceptions at the point of sale. In contrast to the detailed Nutrition Facts panel (NFP) shown on the back or side of most packaged foods, an FOP label presents consumers with a single condensed metric of nutrition information that is presumed to require less effort and time to process.

Numerous retailers, manufacturers, and nongovernmental organizations have implemented a wide variety of FOP labeling programs such as Walmart's “Great for You” initiative, Wingman's Wellness Keys, and Unilever's Choices Programmed. However, these promotional programs vary greatly in terms of both information content and format. Some provide consumers with summarized *objective* nutrition information taken from the NFP; others offer *evaluative* nutrition information that provides an interpretation of a product's overall healthfulness. Although the stated purpose of FOP nutrition labeling is to “educate consumers and help them make healthier food choices” (Federal Register 2010; see also Food and Drug Administration [FDA] 2015), the types of FOP labeling programs that best engage and ultimately influence consumers' product evaluations and decision-making processes are still poorly understood (Andrews, Burton, and Kees 2011; Institute of Medicine [IOM] 2010). Moreover, we are not aware of any prior nutrition labeling research that has specifically considered how the effects of these different systems might vary according to the particular type of processing task encountered by consumers (i.e., noncomparative vs. comparative evaluative tasks) (Hieke and Taylor 2012).

Therefore, across two online experiments and two retail laboratory experiments, we utilize an objective/evaluative cue framework and a comparative/noncomparative processing context framework (Oakley et al. 2008; Olsen 2002) to assess the interactive effects of FOP cue type and processing context on consumers' evaluations and intentions to purchase healthy food products. We also expand on the processing fluency literature (Jacoby and Dallas 1981; Lee and Labroo 2004; Schwarz 2004; Whittlesea 1993) to explain the processes underlying these effects. In the following section, we first present prior literature and background information on fluency, different types of FOP cues (objective vs. evaluative), and different types of processing contexts (comparative vs. noncomparative). We then utilize resource matching theory (RMT) (Anand and Sternthal 1987; Keller and Block 1997; Meyers-Levy and Peracchio 1995) to integrate these concepts and to guide the development of our specific hypotheses.

## THEORETICAL FOUNDATION

### Processing Fluency and Cue Type

Consumers view a product as an array of cues that can be processed with varying degrees of effort, speed, and accuracy (Novemsky et al. 2007). Prior research has demonstrated that consumers base their judgments not only on available cue information, but also on the ease with which they can process that information and generate related thoughts (Schwarz 2004). More specifically, processing fluency is defined as the subjective feelings of ease or difficulty with which external information can be processed (Schwarz 2004). Fluency can arise from either the processing of *physical* characteristics of a stimulus such as modality or shape (perceptual fluency) or from the *meaning* of a stimulus (conceptual fluency) (Lee and Labroo 2004; Tulving and Schacter 1990; Whittlesea 1993). These two types of fluency represent distinct constructs and have unique antecedents and consequences (Cabeza and Ohta 1993; Lee 2002). For example, Labroo and Lee (2006) note that a perceptually fluent brand can be easily recognized and identified by consumers, whereas a conceptually fluent brand is one whose meaning and associations come to mind more easily. Thus conceptual fluency relates to higher order reasoning and interpretive processes (Jacoby, Kelley, and Dywan 1989; Winkielman et al. 2012). Consumers often place more weight on cue information that feels easier to process when forming judgments and making decisions (Shah and Oppenheimer 2007).

In this research, we propose that alternative types of FOP nutrition cues lead to varying levels of conceptual fluency across different processing contexts, and as a result, they have divergent effects on consumers' food evaluations, intentions, and choices. To better understand

and predict these differences, we first offer an objective/evaluative cue framework. Objective cues provide product information that is impartial, measurable, and objective but generally lack a specific interpretive component (Prabhaker and Sauer 1994). Consider the nutrition icon used in the “Facts Up Front” FOP labeling initiative recently developed by the Grocery Manufacturers Association (GMA 2013). This cue presents specific, objective quantitative information about calories and other critical nutrients (i.e., saturated fat, sodium, and sugars) taken directly from the NFP that allows consumers to assess the healthfulness of a single product in a somewhat simpler information environment (compared to the entire NFP). In contrast, evaluative cues provide consumers with interpretive information with respect to the overall product or a specific product attribute. For example, evaluative health cues can provide consumers with an interpretation of a product’s overall healthfulness (e.g., a more or less healthy choice) or certain product attributes (e.g., low or high fat; low or high calories). These cues are designed to help consumers evaluate products more easily and quickly by presumably decreasing the cognitive burden of cue interpretation and utilization, especially in complex settings such as supermarkets where consumers encounter many products at once (Feunekes et al. 2008). Examples of evaluative health cues include Walmart’s “Great for You” and the IOM’s proposed “Healthy Stars” FOP icons.

### Noncomparative and Comparative Processing Contexts

We propose that it is critical for researchers, firms, and public health officials to consider whether the effects of different FOP cues (objective vs. evaluative) vary according to the type of processing context that consumers encounter (comparative vs. noncomparative). Prior research indicates that consumers can engage in either comparative or noncomparative processing (Oakley et al. 2008; Olsen 2002) and that these different processing contexts influence attitudes, intentions, and behaviors in unique ways (Hsee and Leclerc 1998; Hsee et al. 2013; Naylor, Lamberton, and West 2012; Nowlis and Simonson 1997). In comparative processing contexts where multiple options are available, consumers evaluate a product relative to the other products and brands that are present (e.g., “How healthful is this specific cereal relative to other available cereals in this set?”). In order to do so, they must first assess all of the different available options and then make direct comparisons between these alternatives. In noncomparative contexts, however, consumers only need to evaluate a single product in isolation (e.g., “How healthful is this one specific cereal?”). Consumers are not burdened with evaluating other products or making explicit comparisons in these simpler processing contexts (Hsee and Leclerc

1998; Olsen 2002; van Horen and Pieters 2012). Thus comparative processing is often more cognitively challenging for consumers than noncomparative processing (Kardes et al. 2002).

FOP nutrition cues should help consumers make evaluations in these different processing contexts, although to varying extents (Chakravarti and Janiszewski 2003; Slovic and MacPhillamy 1974). The previously discussed differences between cue types (objective vs. evaluative) suggest that a cue’s impact on perceived fluency (and ultimately healthfulness evaluations and purchase intentions) should vary according to the type of processing context encountered by the consumer. Drawing from RMT, we next propose that evaluative cues will lead to higher perceived fluency in comparative processing contexts, whereas objective cues will lead to higher fluency in noncomparative contexts (where evaluative tasks are less difficult).

## HYPOTHESES

### Resource Matching Theory

According to RMT, information processing is most efficient when the resources available for processing best match those required for a given task. The effectiveness of processing can be compromised when there are too few or too many resources available for the specific task (Anand and Sternthal 1987; Keller and Block 1997; Meyers-Levy and Peracchio 1995). Within the context of the current research, RMT suggests that perceived fluency should be highest when the type of FOP cue that is provided best supports, or matches, the specific processing demands required by a given processing context (comparative or noncomparative). Processing efficiency should decline (i.e., fluency should diminish), however, when there is a suboptimal match between FOP cue type and the processing context. Thus the “processability” of information largely depends on the congruence between the information format and the specific processing task (Bettman, Payne, and Staelin 1986; Payne, Bettman, and Johnson 1992).

### Noncomparative Processing, Resource Matching, and Fluency for a Single Product

Based on RMT and our conceptualization, we expect that the provision of either an objective or evaluative FOP nutrition cue in a noncomparative processing context will enhance the perceived fluency of a single stimulus, or product (termed product-level fluency here), compared to when no FOP cues are available. However, the RMT perspective further suggests that an objective cue should more strongly impact perceived product fluency than an evaluative cue for several reasons. The cognitive resource demands associated with evaluating a single product in a noncomparative context are considerably lower than those required to relatively

evaluate and compare many different products in a more complex comparative processing context. As such, consumers have sufficient cognitive resources available to dedicate to processing the specific detailed information conveyed by an objective cue in a noncomparative context. They can use their available resources to assess individual levels of the nutrients offered in the objective cue (calories, saturated fat, sodium, sugars), allowing for a more thorough and complete evaluation of the product. In contrast, the more general evaluative cue information does relatively little to assist consumers with this task. Evaluative cues do not fully indicate a product's nutritional quality since only very few (if any) actual nutrient levels are provided. In addition, the interpretation they offer is typically based on only a few select nutrients (Berning, Chouinard, and McCluskey 2008). Consumers are less likely to need this interpretive assistance in noncomparative contexts given that they only need to evaluate a single product in isolation (rather than many different products in a set). These views are consistent with prior nutrition research which has shown that consumers rely more on the detailed information provided in the NFP when evaluating a single food product than on general evaluative nutrition or health claims (e.g., "low in fat" or "heart healthy") (Keller et al. 1997; Mitra et al. 1999). Therefore, objective cues should serve as a relatively better match (i.e., lead to higher levels of product-level fluency) than evaluative cues for less resource-demanding noncomparative tasks.

### Comparative Processing, Resource Matching, and Fluency for a Set of Products

By contrast, we expect that evaluative FOP cues will lead to higher fluency for a set of products (termed set-level fluency here) than objective cues in *comparative* processing contexts. While product-level fluency refers to fluency of a single product (e.g., a single brand of cereal), set-level fluency considers the ease of relative comparisons for a set of products (i.e., product A is healthy, product B is less healthy than A, product C is less healthy than A and B) and refers more to the fluency for the set as a whole. Consumers must compare options in comparative processing contexts in order to make evaluations necessary for categorization and discrimination (Dhar, Nowlis, and Sherman 1999; Nosofsky 1986; Tversky 1977). Although these relative comparisons are often cognitively demanding, they are easier when they can be made along a single similar dimension (Novemsky et al. 2007; Slovic and MacPhillamy 1974). This can be seen in the fact that consumers tend to rely more on alignable attributes than non-alignable attributes when comparing multiple options (Chakravarti and Janiszewski 2003). Therefore, if all products in a set offer the same type of cue information based on a common, uniform dimension (e.g.,

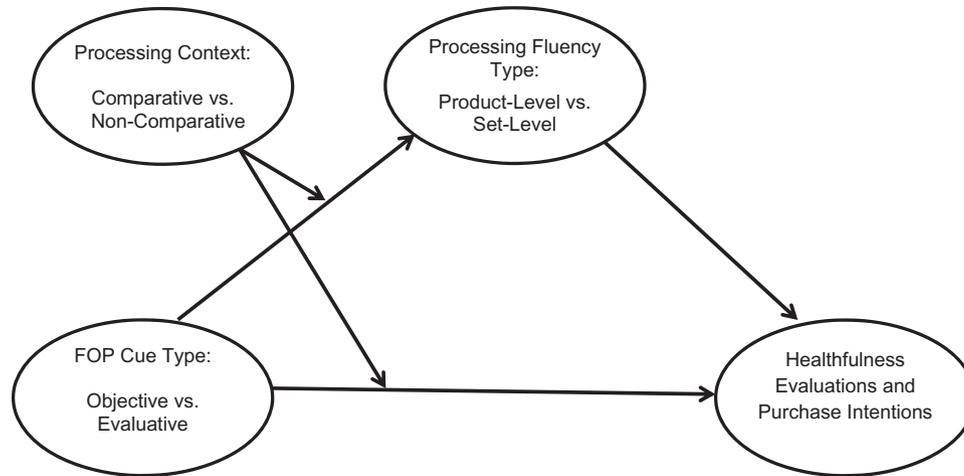
healthfulness), information asymmetry should be attenuated and consumers should be better able to make comparisons across the set of alternatives based on the given cue information (Nosofsky 1986; Tversky 1977). We propose that this shared information, made salient by the cue, will render health information about the set as a whole more conceptually fluent. Thus we expect that the provision of either an objective or evaluative cue to have some positive effect on the overall fluency of a set of products (i.e., set-level fluency) in a comparative context, relative to when no FOP cues are available.

As previously alluded to, however, comparative processing is often arduous and time consuming (Kardes et al. 2002), and it requires considerably more cognitive resources than simpler noncomparative processing tasks. Drawing again from RMT, evaluative cues should be a better match for comparative tasks than objective cues because they simplify the cognitive challenges associated with evaluating and relatively comparing many different food options. That is, evaluative cues provide consumers with "cognitive shortcuts" by interpreting the healthfulness of each product along a common baseline. By contrast, objective cues do not offer this interpretive assistance but instead provide specific, detailed information about multiple nutrients that is difficult for consumers to process repeatedly across many product options. We therefore expect evaluative cues to serve as a relatively better match than objective cues (i.e., lead to higher levels of set-level fluency) for more resource-demanding comparative tasks. Relatedly, we also expect that the provision of *both* types of cues together will not enhance fluency beyond that created by the single cue that best matches the given processing context (i.e., evaluative [objective] cues in comparative [noncomparative] contexts). That is, when an optimal match between the type of cue and processing context is already present, we anticipate that there will be little benefit from the addition of another cue (particularly when the additional cue is *less* appropriate for the specific processing task). Based on RMT and our conceptualization, we predict:

- H1a:** In a *noncomparative* processing context, the presence of an objective cue alone will result in greater product-level fluency than the presence of an evaluative cue alone. Additionally, the presence of both an objective cue and an evaluative cue will not result in increased fluency relative to an objective cue alone.
- H1b:** In a *comparative* processing context, the presence of an evaluative cue alone will result in greater set-level fluency than the presence of an objective cue alone. Additionally, the presence of both an evaluative cue and an objective cue will not result in increased fluency relative to an evaluative cue alone.

FIGURE 1

## PROPOSED CONCEPTUAL MODEL



### Interaction of FOP Cue Type and Processing Context and the Mediating Role of Fluency

As shown in Figure 1, we next propose that the type of FOP cue (objective vs. evaluative) and the type of processing context (comparative vs. noncomparative) will interact to influence consumers' health-related fluency perceptions, as well as their evaluations and purchase intentions of objectively more healthful products. Drawing again from RMT and our previously discussed conceptual framework, we anticipate the effects of FOP cues to differ *across* comparative and noncomparative processing contexts. More specifically, we expect an objective cue to have a more positive influence on perceived fluency, healthfulness evaluations, and purchase intentions in noncomparative contexts (that are less resource demanding) than in comparative contexts. Conversely, an evaluative cue should have a stronger positive impact in more cognitively challenging comparative settings than in noncomparative settings.

Relatedly, prior research also suggests favorable effects of fluency on consumers' product evaluations and purchase intentions (Labroo and Lee 2006; Lee 2002; Lee and Labroo 2004; Novemsky et al. 2007). Fluency has also been shown to be positively related to product judgments (Shen, Jiang, and Adaval 2010), brand attitudes (Lee and Aaker 2004), and product extension evaluations (Torelli and Ahluwalia 2012). Therefore, as shown in Figure 1, we additionally propose that product fluency will mediate the effect of an *objective* cue on consumers' evaluations and intentions to purchase healthy products in *noncomparative* processing contexts (but not in comparative contexts). That is, the provision of an objective cue should increase the fluency of a product's health-related information, which

should in turn positively impact healthfulness evaluations and purchase intentions. By contrast, we expect that set fluency will mediate the effects of an *evaluative* cue in *comparative* processing contexts (but not in noncomparative contexts). This is consistent with the proposition that objective cues serve as a better match (i.e., lead to higher fluency) for tasks in simpler noncomparative contexts, whereas evaluative cues are a better match in more complex comparative settings. Here we offer our specific hypotheses regarding the cue type by processing context interactions and the conditional mediation effects:

- H2a:** The processing context moderates the effect of the presence of a FOP cue. An objective cue will lead to higher perceptions of product-level fluency, healthfulness evaluations, and purchase intentions for healthier products in a noncomparative processing context than in a comparative processing context.
- H2b:** The processing context moderates the effect of the presence of a FOP cue. An evaluative cue will lead to higher perceptions of set-level fluency, healthfulness evaluations, and purchase intentions for healthier products in a comparative processing context than in a noncomparative processing context.
- H3:** The favorable effect of an objective FOP cue on (1) healthfulness evaluations and (2) purchase intentions of healthier products is mediated by product-level fluency in a noncomparative processing context but not in a comparative processing context.
- H4:** The favorable effect of an evaluative FOP cue on (1) healthfulness evaluations and (2) purchase intentions of healthier products is mediated by set-level fluency in a comparative processing context but not in a noncomparative processing context.

The remainder of this article is organized as follows. We first present pilot study findings to provide initial empirical support for the proposed differences between cue types based on the RMT conceptual framework. In studies 1A and 1B, we then examine the concepts of product-level and set-level fluency in noncomparative and comparative processing contexts, respectively. Here we conduct controlled tests to initially establish the effects of objective and evaluative cues on consumers' perceptions of fluency (hypotheses 1a and 1b). We next extend these results in study 2 by explicitly manipulating the processing context in a more realistic retail lab setting to allow for comparisons of the cues' effects *across* the different types of processing contexts (hypotheses 2A and 2B). We additionally examine the potentially mediating role of fluency (hypotheses 3 and 4). Study 3 is a concluding retail lab study that further expands on the specific mechanisms underlying cue effects in comparative processing contexts.

## PILOT STUDY

The purpose of the online pilot study was to assess empirically the proposed differences between the tested objective cue and the tested evaluative cues. The 54 adult participants were recruited nationally through Amazon Mechanical Turk (MTurk) (61% female; ages ranged from 19 to 74). All participants were shown three different cues that were used in our main studies: an objective cue that offers calorie and nutrient levels, a tiered evaluative cue that ranges from zero to three stars, and a dichotomous evaluative cue that indicates whether a product is a healthful or unhealthful choice (see online appendix A). They responded to the same series of questions about each of the three cues (that were presented in random order). For example, they responded to a set of questions about the first cue presented, and then they answered the same set of questions about the second and third cues presented.

Participants reported the extent to which they perceived each cue as specific (very general/very specific), detailed (not detailed at all/very detailed), and interpretive (not interpretive at all/very interpretive). We also measured their perceptions of how cognitively demanding it would be to use each cue in a comparative processing context and in a noncomparative processing context, specifically ("Using the nutrition icon above to evaluate many different products [a single product] in a comparative [noncomparative] manner would require:" with end points of little effort/a lot of effort and little attention/a lot of attention) (adapted from Keller and Block 1997). We additionally assessed participants' perceptions of how well each cue would fit the task requirements of the two processing contexts examined in our studies ("The nutrition icon above is most relevant for evaluating many different products [a single product] in a comparative [noncomparative] manner" with

end points of strongly disagree/strongly agree) (adapted from Mantel and Kellaris 2003). Prior to answering any questions about specific cues, participants were asked how cognitively demanding they perceived it would be to complete comparative and noncomparative tasks, in general ("In general, evaluating many different products [a single product] in a comparative [noncomparative] manner would be a:" with end points of very easy task/very difficult task and very simple task/very complex task). All constructs were measured on 7 point scales (all  $r$ 's ranging from .77 to .94; all  $p$ 's < .01).

Since we measured each participant's perceptions of all three icons, we performed within-subjects analyses of variance with follow-up contrasts (a table with means and tests of differences can be found in online appendix A.) As expected, planned contrasts indicate that the objective cue was perceived as more detailed ( $M = 6.61$ ) than both the Healthy Stars evaluative cue ( $M = 3.26$ ;  $F(1, 53) = 203.10$ ,  $p < .001$ ) and the dichotomous evaluative cue ( $M = 2.06$ ;  $F(1, 53) = 334.94$ ,  $p < .001$ ). The objective cue was additionally perceived as more specific ( $M = 6.67$ ) than the Healthy Stars evaluative cue ( $M = 3.54$ ;  $F(1, 53) = 179.59$ ,  $p < .001$ ) and dichotomous cue ( $M = 2.26$ ;  $F(1, 53) = 217.99$ ,  $p < .001$ ). Also as expected, the objective cue was perceived as *less* interpretive ( $M = 3.28$ ) than the Healthy Stars cue ( $M = 4.37$ ;  $F(1, 53) = 9.92$ ,  $p < .01$ ) and dichotomous cue ( $M = 4.28$ ;  $F(1, 53) = 3.54$ ,  $p < .04$ ).

In addition, contrasts confirmed that comparative tasks were perceived as more challenging ( $M = 4.46$ ) than noncomparative tasks, in general ( $M = 2.34$ ;  $t = 6.03$ ;  $p < .001$ ). Given these higher resource requirements in comparative contexts, our conceptualization suggested that evaluative cues would be perceived as a better match for comparative tasks than objective cues. Results confirmed that the evaluative Healthy Stars cue ( $M = 5.07$ ;  $F(1, 53) = 9.79$ ,  $p < .01$ ) and evaluative dichotomous cue ( $M = 4.69$ ;  $F(1, 53) = 3.13$ ,  $p < .04$ ) were both viewed as better matches than the objective cue ( $M = 3.83$ ) for tasks in comparative contexts. Providing additional support for our rationale, contrasts further revealed that using either the Healthy Stars cue ( $M = 2.98$ ;  $F(1, 53) = 21.54$ ,  $p < .001$ ) or dichotomous cue ( $M = 2.45$ ;  $F(1, 53) = 26.92$ ,  $p < .001$ ) to evaluate multiple products in comparative contexts was perceived to require less resources than using the objective cue ( $M = 4.34$ ). By contrast, our conceptualization also suggested that objective cues would be perceived as a better match than evaluative cues for *noncomparative* tasks because consumers should have sufficient cognitive capacity to meet the relatively low resource requirements associated with noncomparative tasks. Results confirmed that the objective cue was viewed as a relatively better match for evaluating a single product in a noncomparative context ( $M = 4.98$ ) than both the Healthy Stars cue ( $M = 4.02$ ;  $F(1, 53) = 6.20$ ,  $p < .02$ ) and dichotomous cue ( $M = 4.19$ ;  $F(1, 53) = 2.82$ ,  $p < .05$ ).

Collectively, these findings provide empirical support for the proposed differences between objective and evaluative FOP cues and for the RMT conceptual framework. They also provide initial general support for our proposition that perceived fluency should be highest when the type of FOP cue information provided best supports, or matches, the processing demands elicited by the specific processing context. We now directly examine the effects of different FOP cues on fluency in noncomparative and comparative processing contexts in studies 1A and 1B, respectively.

## STUDY 1A

### Methods

Study 1A was a 2 (objective FOP cue: present vs. absent)  $\times$  2 (evaluative FOP cue: present vs. absent) between-subjects online experiment. The 207 participants were recruited nationally through MTurk and randomly assigned to one of the four experimental conditions. The median household income was \$40,000 to \$49,000, approximately 63% were female, and ages ranged from 18 to 81. Manipulations were placed on the front of a hypothetical frozen pizza package (see online appendix B). Pizza was chosen to be consistent with prior health marketing research that used a nutritionally mixed (moderate) product (Andrews et al. 2011). The nutrient values available in the NFP mirrored those of a similar pizza on the market. When the objective cue was present, it was consistent with the nutrient information disclosed in the product's NFP. The evaluative cue used in this study (and in study 1B) was dichotomous such that a product only qualified for the icon if specific nutritional standards related to saturated fat, trans fat, sodium, and sugar levels were met (consistent with the standards needed to qualify for Walmart's Great for You icon or to be eligible for the IOM's Healthy Stars). The nutrition profile of the product (available in the NFP to all participants) remained constant across all conditions.

### Dependent Measures

Manipulation checks were used to assess the awareness of the FOP cues. After responding to all dependent variables, participants were asked about each of the cue types (e.g., Did you see a nutritional icon on the front of the packaged food item that was presented?) with a picture of the specific icons included. Both questions had "no" or "yes" response categories.

The primary dependent variable of interest in this initial study was product-level fluency. Specifically, we focused on how easily participants were able to discern the healthfulness of the product given the presence or absence of objective and evaluative FOP nutrition cues. Product fluency was assessed through four 7 point bipolar adjective scales (modified from Fang, Singh, and Ahluwalia 2007; Lee and

Aaker 2004) with end points of "strongly disagree/strongly agree" (i.e., "Given the information on the package, it is easy to determine how healthy the product is;" "Given the information on the package, it is clear whether the product is high or low in its level of nutritiousness;" "I feel confident about whether this product is a healthy or unhealthy choice based on the information on the package;" and "It is easy to understand whether this product is a healthy or unhealthy choice given the information shown on the package") ( $\alpha = .94$ ). Higher values indicate higher levels of perceived fluency.

## RESULTS

### Manipulation Check

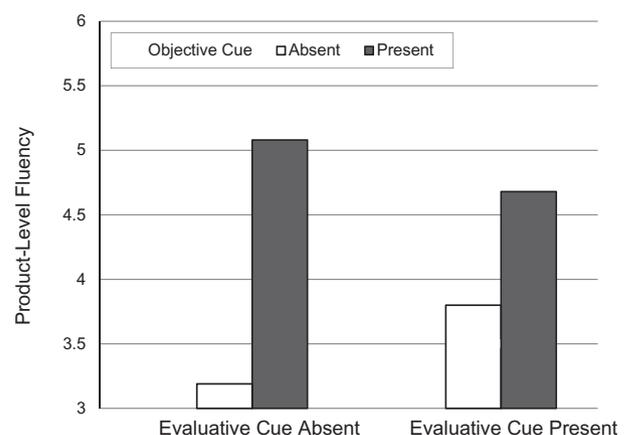
The checks revealed a high level of awareness of the cue manipulations. When the evaluative cue was present (absent), 90% (81%) reported seeing (not seeing) it ( $\chi^2 = 105.55, p < .001$ ). When the objective cue was present (absent), 88% (92%) reported seeing (not seeing) it ( $\chi^2 = 134.83, p < .001$ ).

### Effects of Objective and Evaluative FOP Nutrition Cues on Product Fluency

The FOP objective cue  $\times$  evaluative cue interaction was significant for perceived product fluency ( $F(1, 203) = 5.93, p < .02, \eta_p^2 = .028$ ). The plot of means can be found in Figure 2. Perceived product fluency was lowest in the control condition ( $M = 3.19$ ) and increased significantly when either the objective cue ( $M = 5.08; F(1, 203) = 43.65, p < .001, \text{Cohen's } d = 1.25$ ) or the evaluative cue ( $M = 3.80; F(1, 203) = 4.48, p < .04, \text{Cohen's } d = .37$ ) was provided in isolation. However, as expected the objective cue (alone) led to higher perceived fluency than the

FIGURE 2

STUDY 1A: EFFECTS OF OBJECTIVE AND EVALUATIVE FOP CUES ON PRODUCT-LEVEL CONCEPTUAL FLUENCY



evaluative cue (alone) (5.08 vs. 3.80;  $F(1, 203) = 20.13$ ,  $p < .001$ , Cohen's  $d = .85$ ). Additionally, both cues together on the package did not increase fluency more than the objective cue alone did (4.68 vs. 5.08;  $F(1, 203) = 1.79$ ,  $p > .15$ ). That is, the evaluative cue had no additional effect on product fluency when added to a package that already offered an objective cue. This pattern of results supports hypothesis 1a, and offers initial insight on our product-level fluency concept.

## DISCUSSION

The purpose of study 1A was to examine the effects of objective and evaluative FOP cues on perceived product fluency. The results provide preliminary support for our proposition that objective cues enhance product fluency more in noncomparative processing contexts than evaluative cues. As previously noted, extensive prior consumer research has focused on how calorie and nutrient information can affect health-related perceptions of a single product (Hieke and Taylor 2012). While consumers can evaluate a single product in a noncomparative manner, they often also simultaneously evaluate and compare multiple products within a set during a typical shopping experience (Nedungadi 1990). Consequently, many prior studies have not sufficiently accounted for the more complex comparative processing settings frequently encountered by consumers at the point of purchase. Therefore, in the next study we consider the effects of objective and evaluative cues on consumers' perceptions of *set*-level fluency in a *comparative* processing context (when evaluating multiple options). As suggested in hypothesis 1b, we expect a pattern of results nearly opposite to those observed in study 1A such that evaluative cues should have a greater influence on set fluency than objective cues.

## STUDY 1B

### Methods

Study 1B was a 2 (objective FOP cue: present vs. absent)  $\times$  2 (evaluative FOP cue: present vs. absent) between-subjects experiment conducted online. The 190 participants were again recruited nationally through MTurk and randomly assigned to one of the four experimental conditions. The median household income was \$40,000 to \$49,000, approximately 62% were female, and ages ranged from 18 to 76.

Manipulations were again placed on the front of hypothetical frozen pizza packages (see online appendix C). Participants were presented with a pizza product that had a nutritional profile identical to the pizza used in study 1A (and thus again qualified for the same dichotomous evaluative cue used in study 1A). However, this product was presented in combination with two other pizza products (that

did not qualify for the evaluative cue) to create a set of three frozen pizzas. The nutrient values available in the NFP's closely mirrored those of similar products on the market, and they were again made available to all participants. When the objective cue was present, it was again consistent with the nutrient information disclosed in the NFP for each product. The nutrition profiles of the products remained constant across all conditions.

### Dependent Measures

The dependent variable of interest in this study was set-level fluency. That is, instead of focusing on participants' evaluations of one specific product (as in study 1A), this study measured health-related conceptual fluency across a *set* of products. After initial pilot testing, four set fluency measures with end points of "strongly disagree/strongly agree" were used (i.e., "Overall, given the information provided on the packages in the set of three pizza products, it is easy to determine which ones are the more healthy options;" "Based on the information on the packages in the set of three pizza products, I know which brands are the healthy ones;" "The information presented on the packages in the set of three pizza products makes it easy for me to choose a healthy option;" and "For the set of three pizza products available, I can easily tell which ones are more healthy and which ones are less healthy") ( $\alpha = .98$ ). Higher values indicate higher levels of perceived fluency. The same manipulation check from study 1A was used again.

## RESULTS

### Manipulation Check

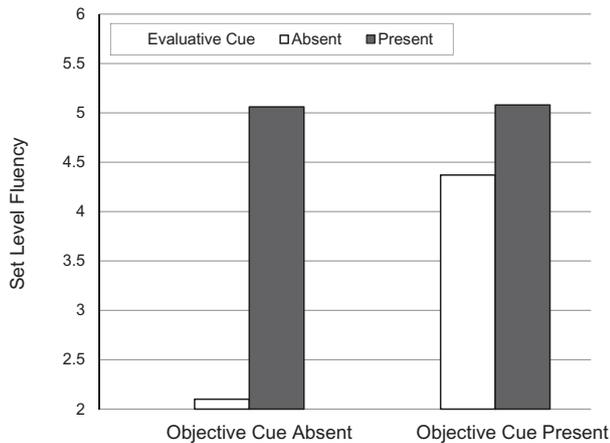
The check again revealed a high level of awareness of the cue manipulations. When the evaluative cue was present (absent), 91% (98%) reported seeing (not seeing) it ( $\chi^2 = 147.42$ ,  $p < .001$ ). When the objective cue was present (absent), 99% (95%) reported seeing (not seeing) it ( $\chi^2 = 165.07$ ,  $p < .001$ ).

### Effects of Objective and Evaluative FOP Nutrition Cues on Set Fluency

As expected, the FOP objective cue  $\times$  evaluative cue interaction was significant for perceived set fluency ( $F(1, 186) = 19.29$ ,  $p < .001$ ,  $\eta_p^2 = .094$ ). The plot of means is shown in Figure 3. Perceived fluency was again lowest in the control condition ( $M = 2.11$ ) and increased significantly when either the evaluative cue ( $M = 5.06$ ;  $F(1, 186) = 69.82$ ,  $p < .001$ , Cohen's  $d = 1.60$ ) or objective cue ( $M = 4.37$ ;  $F(1, 186) = 39.73$ ,  $p < .001$ , Cohen's  $d = 1.25$ ) was provided in isolation. However, as expected, the evaluative cue (alone) led to higher perceived fluency than the objective cue (alone) (5.06 vs. 4.37;  $F(1, 186) = 4.08$ ,  $p < .05$ , Cohen's  $d = .40$ ). Additionally, both cues together

FIGURE 3

STUDY 1B: EFFECTS OF OBJECTIVE AND EVALUATIVE FOP CUES ON SET-LEVEL CONCEPTUAL FLUENCY



did not increase fluency more than the evaluative cue alone did (5.08 vs. 5.06;  $F(1, 186) = .004, p > .90$ ). That is, the objective cue had no additional effect on set fluency when the evaluative cue was already available. This pattern of results provides support for hypothesis 1b.

## DISCUSSION

The findings from studies 1A and 1B offer initial insight on our product-level and set-level fluency concepts, respectively. Results support our proposition that objective cues have a more positive impact on product fluency than evaluative cues in noncomparative processing contexts, whereas evaluative cues have a more positive impact on set fluency than objective cues in comparative contexts. This contention was strengthened by the fact that the combination of both cues did not increase fluency in either processing context beyond that created by the single cue that was expected to enhance fluency the most. That is, fluency was equivalent in the noncomparative (comparative) processing context, regardless of whether both cues were present or only a single objective (evaluative) cue was present.

Next, study 2 extends studies 1A and 1B in several important ways. As Hsee et al. (2013) recently noted, judgments and choices can vary greatly across comparative and noncomparative contexts and a “failure to recognize the difference can lead to systematic and serious errors” (182). Also, the online setting common to many nutrition labeling studies may at times restrict the generalizability of reported findings (Hieke and Taylor 2012). To address these points collectively, we explicitly manipulate the processing context in a realistic retail store laboratory environment in study 2. This allows us directly to compare each cue’s effects on

fluency and other important outcomes related to consumer health (i.e., healthfulness evaluations and purchase intentions for healthier products) across the comparative and noncomparative contexts (as outlined in hypothesis 2).

An additional objective of study 2 is to assess whether fluency serves as an underlying mechanism for the effects of the different cue types on evaluations and purchase intentions for healthier products. More specifically, we aim to demonstrate that product fluency mediates the effects of *objective* cues in *noncomparative* processing contexts, whereas set fluency mediates the effects of *evaluative* cues in *comparative* processing contexts (as indicated in hypotheses 3 and 4). We further enhance the generalizability of our conceptualization by examining these effects in a different product category (single-serve meals) with a different evaluative icon (the Healthy Stars icon recommended by the IOM).

## STUDY 2

### Methods

Study 2 utilized a 2 (processing context: comparative vs. noncomparative)  $\times$  3 (FOP cue: objective vs. evaluative vs. control) between-subjects experiment. Participants were recruited from a research subject pool consisting of both students and adults at a large public university, resulting in mixed sample of 126 adults and students. Approximately 62% of this sample was male, and ages ranged from 19 to 43 (mean age = 22). Research was conducted in the Shopper Experimental Lab Facility (ShELF), a behavioral research lab designed to look like a retail store with a wide range of products (e.g., food, cleaning supplies, DVDs) and numerous arrangements (e.g., end caps, aisles, islands), as shown in online appendix D. Each participant was randomly assigned to one of the six conditions.

We closely followed the procedures outlined by van Horen and Pieters (2012) to manipulate the processing context. We first presented participants in the comparative processing condition with a set of five meal products on a retail shelf (similar to study 1B). We asked them to examine all of the products simultaneously in a comparative manner and to base their healthfulness evaluations and purchase intentions for the single objectively healthiest meal product on how it compared with the other four products. They also recorded their perceptions of set fluency while relatively evaluating the products in a comparative manner. In order to further facilitate comparative processing, these participants answered all of the dependent measures with all five of the meal products always visible to them.

Conversely, we showed the healthy product of interest alone on a retail shelf to participants in the noncomparative condition (similar to study 1A). We asked them to form a general impression of the product and to base their healthfulness evaluations and purchase intentions for the product on that impression (van Horen and Pieters 2012). They

also recorded their fluency perceptions of this single product while evaluating it independently in a noncomparative manner. Participants were not able to see any other meal products when completing the dependent measures to prevent comparative evaluations. After all of these dependent measures had been completed, we took every participant to a separate area of the ShELF and provided them with the stimuli from the alternative processing condition (e.g., participants in the noncomparative condition saw all five meal products together in a single set on the shelf). After examining the stimuli while in their manipulated processing modes (van Horen and Pieters 2012), participants in the noncomparative condition completed the set fluency measure and participants in the comparative condition completed the product fluency measure. This enabled us to compare the cues' effects on fluency across the different processing contexts. See online appendix E for an example of the stimuli used in each processing context.

To manipulate the FOP cue, we presented each product with either the objective cue from studies 1A and 1B, a new evaluative cue (the Healthy Stars cue proposed by the IOM), or no FOP nutrition information (control condition). We placed all cue manipulations on shelf tags in front of the meal products (FDA 2013). When the objective cue was present, it was consistent with the nutrient information disclosed in the NFP for each product. The evaluative "Healthy Stars" cue offers calorie information for a product and assigns it with zero to three stars based on predetermined nutrient standards (more stars indicate healthier products). We used the IOM's exact nutrient standards to assign a star level to each of the five meal products; one product was the objectively healthiest and qualified for three stars, three products were moderately healthy and qualified for one or two stars, and another product was unhealthy and did not qualify for any stars. Consistent with the previous studies, the nutrient values available in the NFP's closely mirrored those of similar products on the market and were available to all participants. The nutritional profiles of the products again remained constant across all conditions, and any potentially confounding package indicators of product healthfulness (e.g., "low in fat") were discreetly removed. We counterbalanced the presentation of products on the shelf to control for any positioning confounds (e.g., prominence due to eye level or right/left placement).

### Dependent Measures

We assessed the perceived fluency of the objectively healthier meal product (i.e., product-level fluency) with the items "Given the information on the package, it is easy to determine how healthy this product is" and "Information about this product is easy to process" with end points of "strongly disagree/strongly agree" ( $r = .90$ ,  $p < .01$ ). We slightly adjusted the previously used set-level fluency

measure to reflect the new product type, and it again exhibited strong reliability ( $\alpha = .96$ ). We then performed tests of convergent and discriminant validity for the product and set fluency constructs. The two factor confirmatory factor results showed standardized  $\lambda$ 's ranging from .89 to .94 for product fluency and .81 to .94 for set fluency. The  $\chi^2$  for the two factor model was nonsignificant ( $\chi^2 = 12.1$ ,  $df = 8$ ,  $p > .10$ ), and significantly less than that of the one factor model ( $\chi^2_{diff} = 116.1$ ,  $df = 1$ ,  $p < .001$ ). Results also show the  $\phi^2$  (.325) for the two measures was less than the average variance extracted estimate of .83. These findings support both discriminant and convergent validity.

We assessed participants' healthfulness evaluations of the objectively healthy meal product with two 7 point bipolar adjective scales using end points of "not at all nutritious/ highly nutritious" and "very unhealthy/very healthy" in response to the question: "Please consider the nutrition level of the food product shown. Do you believe that the food product is:" ( $r = .93$ ,  $p < .01$ ). We measured purchase intentions for the healthy meal with two 7 point bipolar adjective scales with end points of "very unlikely/very likely" and "not probable/very probable" ( $r = .98$ ,  $p < .01$ ). Lastly, we assessed the effectiveness of the processing manipulation on a 7 point scale with the items, "I based my product evaluations on how well it compared to the other available options" and "I based my product evaluations on my overall impression of it" with end points of "strongly disagree/strongly agree" (van Horen and Pieters 2012). We used the same cue manipulation check from previous studies and coded the dependent measures so that higher values indicate more favorable responses.

## RESULTS

### Manipulation Check

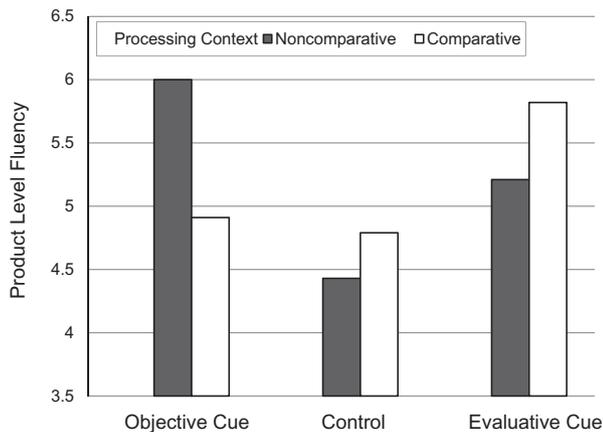
Analysis of variance results indicated that participants in the comparative condition based their evaluations on relative comparisons to other options more so than those in the noncomparative condition (5.60 vs. 2.59;  $p < .001$ ), while those in the noncomparative condition based their evaluations on their impression of the single product more than participants in the comparative condition (5.97 vs. 2.34;  $p < .001$ ). The checks also again revealed a high level of awareness of the cue manipulation: when the evaluative cue was present (absent), 96% (90%) reported seeing (not seeing) it ( $\chi^2 = 93.07$ ;  $p < .001$ ), and when the objective cue was present (absent), 98% (91%) reported seeing (not seeing) it ( $\chi^2 = 89.68$ ;  $p < .001$ ).

### Interactive Effects of FOP Cue Types and Processing Contexts

The overall FOP cue X processing context interaction was significant for both perceived product fluency

FIGURE 4

STUDY 2: EFFECTS OF FOP CUES AND PROCESSING CONTEXT ON PRODUCT-LEVEL CONCEPTUAL FLUENCY



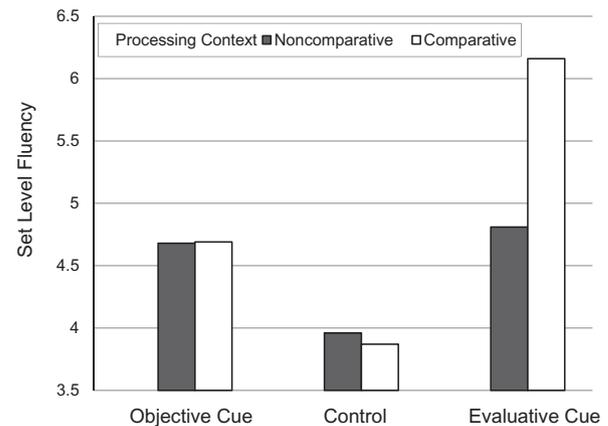
( $F(2, 120) = 4.20, p < .02, \eta_p^2 = .065$ ) and perceived set fluency ( $F(2, 120) = 3.60, p < .04, \eta_p^2 = .057$ ). The plots of means are shown in Figures 4 and 5, respectively. For Figure 4, our primary focus lies on the effects of the *objective cue on product fluency* across the two processing contexts (see hypothesis 2a). As expected, the objective cue led to higher fluency in the noncomparative processing context than in the comparative context (6.00 vs. 4.91;  $F(1, 120) = 5.32, p < .03, d = .72$ ). Also, compared to the no cue control condition in the noncomparative context ( $M = 4.43$ ), product fluency increased when either the objective cue ( $M = 6.00$ ;  $F(1, 120) = 8.17, p < .01, d = 1.32$ ) or the evaluative cue ( $M = 5.21$ ;  $F(1, 120) = 3.25, p < .05, d = .60$ ) was provided. Also, as expected, the objective cue led to higher product fluency than the evaluative cue ( $F(1, 120) = 3.00, p < .05, d = .73$ ). These results are consistent with the findings presented in study 1a.

In Figure 5, our primary focus is on the effects of the *evaluative cue on set fluency* across the two processing conditions (see hypothesis 2b). As expected, the evaluative cue led to higher fluency in the comparative processing context than in the noncomparative context (6.16 vs. 4.81;  $F(1, 120) = 12.35, p < .001, d = 1.09$ ). Additionally, compared to the control condition in the comparative context ( $M = 3.87$ ), set fluency increased when either the evaluative cue ( $M = 6.16$ ;  $F(1, 120) = 32.41, p < .001, d = 2.37$ ) or objective cue ( $M = 4.69$ ;  $F(1, 120) = 2.84, p < .05, d = .62$ ) was provided. The evaluative cue also led to higher set fluency than the objective cue ( $F(1, 120) = 12.94, p < .001, d = 1.29$ ), as expected. These results are consistent with the study 1b findings.

The overall FOP cue X processing context interaction was also significant for healthfulness evaluations ( $F(2, 120) = 5.10, p < .01, \eta_p^2 = .087$ ) and purchase intentions

FIGURE 5

STUDY 2: EFFECTS OF FOP CUES AND PROCESSING CONTEXT ON SET-LEVEL CONCEPTUAL FLUENCY



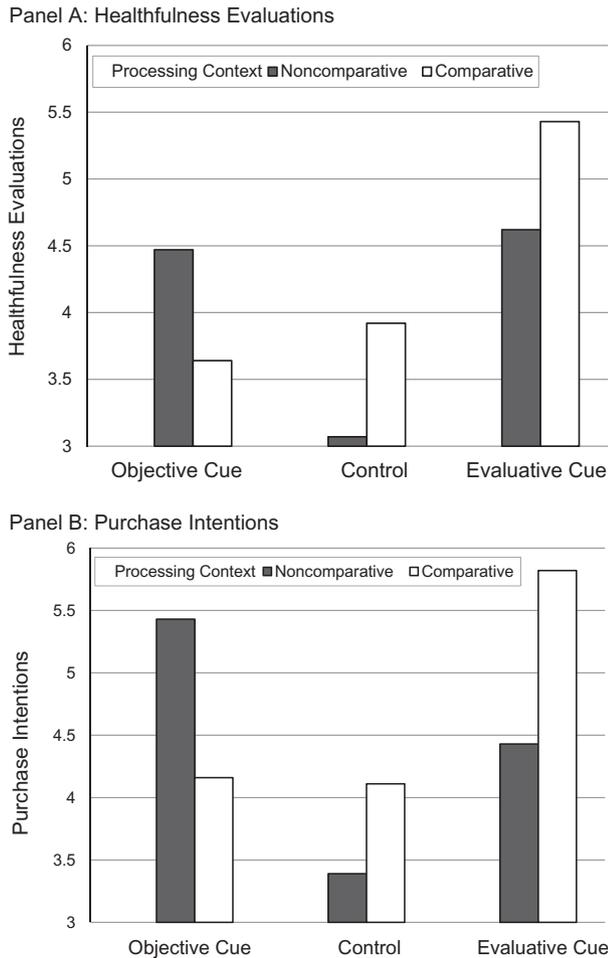
( $F(2, 120) = 8.43, p < .001, \eta_p^2 = .123$ ) for the healthy meal product. We expected that the pattern of the cues' effects on these outcomes across processing contexts would be similar to that just described for fluency. The plots of means for both dependent measures are shown in Figure 6. As anticipated, results reveal that the *objective cue* led to higher healthfulness evaluations (4.37 vs. 3.64;  $F(1, 120) = 3.17, p < .04, d = .56$ ) and purchase intentions (5.43 vs. 4.16;  $F(1, 120) = 6.22, p < .01, d = .86$ ) in the noncomparative processing context than in the comparative context. Conversely, the *evaluative cue* led to higher healthfulness evaluations (5.43 vs. 4.62;  $F(1, 120) = 6.04, p < .01, d = .60$ ) and purchase intentions (5.82 vs. 4.43;  $F(1, 120) = 11.50, p < .001, d = .88$ ) in the comparative context than in the noncomparative context. Taken together, these findings support hypotheses 2a and 2b.

Another objective of study 2 was to examine the indirect effects of the cues on healthfulness evaluations and purchase intentions for the healthy meal (via fluency) across the different processing contexts (see hypotheses 3 and 4). We performed a series of bootstrap analyses using 1000 samples and 95% bias-corrected confidence intervals (CIs) in PROCESS Model 8 (Hayes 2013). Findings relevant to the mediating roles of product fluency and set fluency are shown in Tables 1 and 2, respectively, for the dependent variables of healthfulness evaluations and purchase intentions (see models 2 and 3 in each table).

Results indicate that the indirect effect (IE) associated with the cue type X processing context interaction through product fluency was significant for both healthfulness evaluations (IE =  $-.48$ ; CI [ $-1.102, -.110$ ]) and purchase intentions (IE =  $-.33$ ; CI [ $-1.009, -.003$ ]) (i.e., neither CI contained zero; see Hayes 2013; Zhao, Lynch, and Chen 2010). Similarly, the IE associated with the same

FIGURE 6

## STUDY 2: EFFECTS OF FOP CUES AND PROCESSING CONTEXT ON HEALTHFULNESS EVALUATIONS AND PURCHASE INTENTIONS OF A HEALTHY PRODUCT



interaction through set fluency was significant for healthfulness evaluations (IE = .16; CI [.012, .507]) and purchase intentions (IE = .15; CI [.001, .511]). These findings formally indicate that the mediating role of fluency is moderated by the processing context (Hayes 2013).

More specifically, findings show that compared to the evaluative cue, the IE of the *objective* cue through product fluency was significant in the *noncomparative* processing context for healthfulness evaluations (IE = .23; CI [.052, .552]) and purchase intentions (IE = .15; CI [.006, .496]). By contrast, the IE of the *objective* cue through the *same* mediational path in the *comparative* processing context was not significant for either dependent measure (i.e., both CIs contained zero). These results provide support for hypotheses 3a and 3b. Next, compared to the objective cue, the IE of the *evaluative* cue through set fluency was significant in the *comparative* processing context for healthfulness evaluations (IE = .17; CI [.027, .402]) and purchase intentions (IE = .17; CI [.001, .378]). By contrast, the IE of the evaluative cue through the *same* mediational path in the *noncomparative* processing context was not significant for either dependent measure. These findings support hypotheses 4a and 4b.

## DISCUSSION

Study 2 addressed some important limitations of many previous nutrition labeling studies by testing the interactive effects of FOP cues and processing contexts in a more realistic retail laboratory setting. By explicitly manipulating the processing context, we were able to demonstrate that objective cues have a more positive impact on fluency, healthfulness evaluations, and purchase intentions for healthier products in noncomparative processing contexts than in comparative contexts. Conversely, we also showed that evaluative cues lead to higher fluency, healthfulness evaluations, and purchase intentions for healthy products in comparative processing contexts than in noncomparative

TABLE 1

## STUDY 2: MEDIATING ROLE OF PRODUCT-LEVEL FLUENCY FOR THE EFFECTS OF AN OBJECTIVE CUE RELATIVE TO AN EVALUATIVE CUE

Independent variables	Model 1 Product-level fluency (mediator)		Model 2 Healthfulness evaluations of healthier product (with added mediator)		Model 3 Purchase intentions of healthier product (with added mediator)	
	Coefficient	T value	Coefficient	T value	Coefficient	T value
Objective cue	.79	1.73	-.38	-.93	.85	1.70
Processing context	.61	1.58	.63	1.84	1.27	3.02**
Cue × context	-1.70	-2.75**	-1.15	-2.03*	-2.33	-3.38**
Product-level fluency	-	-	.29	3.06**	.19	1.71

NOTE.—All coefficients are unstandardized, and cue type was coded as 0 = evaluative cue, 1 = objective cue. The indirect effect of the interaction through product fluency was significant for both healthfulness evaluations (IE = -.48; CI [-1.102, -.110]) and purchase intentions (IE = -.33; CI [-1.009, -.003]). The indirect effects of the *objective* cue through fluency were positive and significant in the noncomparative processing condition (but not in the comparative condition), providing support for hypotheses 3a and 3b. \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

**TABLE 2**  
STUDY 2: MEDIATING ROLE OF SET-LEVEL FLUENCY FOR THE EFFECTS OF AN EVALUATIVE CUE  
RELATIVE TO AN OBJECTIVE CUE

Independent variables	Model 1 Set-level Fluency (mediator)		Model 2 Healthfulness evaluations of healthier product (with added mediator)		Model 3 Purchase intentions of healthier product (with added mediator)	
	Coefficient	T value	Coefficient	T value	Coefficient	T value
Evaluative cue	.06	.28	.06	.30	-.52	-2.11*
Processing context	.01	.02	-.83	-1.93	-1.28	-2.48*
Cue x context	.67	2.20*	.66	2.33*	1.18	3.49***
Set-level fluency	—	—	.23	2.42*	.22	1.92*

NOTE.—All coefficients are unstandardized, and cue type was coded as 0 = objective cue, 1 = evaluative cue. The indirect effect of the interaction through set fluency is significant for both healthfulness evaluations (IE = .16; CI [.012, .507]) and purchase intentions (IE = .15; CI [.001, .511]). The indirect effects of the *evaluative* cue through fluency were positive and significant in the comparative processing condition (but not in the noncomparative condition), providing support for hypotheses 4a and 4b. \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

contexts. Study 2 additionally demonstrated that the effects of an objective cue (but not an evaluative cue) are mediated by product fluency in noncomparative settings, whereas the effects of an evaluative cue (but not an objective cue) are mediated by set fluency in comparative settings.

Our final study (study 3) serves to expand on the insights gained in study 2 regarding *how* package cues influence important consumer health-related outcomes. Consumers often engage in comparative processing in everyday retail choice environments where they are confronted with many different options at once (such as supermarkets) (Nedungadi 1990). Therefore, this study more strongly focuses on the direct effects and IEs of an evaluative cue on consumers' actual choices in a comparative processing context. We focus exclusively on an evaluative cue in study 3 since evaluative cues appear to have the strongest influence on fluency, healthfulness evaluations, and purchase intentions for healthy products in comparative settings. We aim to show that an evaluative cue increases perceived set fluency, which should lead to greater perceived differentiation between more and less healthful options in a set of products. This increase in relative healthfulness perceptions should, in turn, lead to healthier choices from the available set. We test this final assertion in study 3.

### STUDY 3

#### Methods

Study 3 utilized a 2 (evaluative FOP cue: present vs. absent)  $\times$  2 (product healthfulness: more healthful vs. less healthful) mixed experimental design. The cue manipulation was again a between-subject factor; product healthfulness was a within-subjects factor. Each participant was randomly assigned to one of the two cue conditions. Participants were recruited from a research subject pool consisting of both students and adults at a large public

university, resulting in a mixed sample of 100 adults and students. Approximately 56% of this sample was female, and ages ranged from 18 to 44 (mean age = 23).

We again collected data in the ShELF retail lab and used the same evaluative cue as in study 2. We placed the experimental cue manipulation on the front of nine microwavable soup products (see online appendix F). According to the IOM's Healthy Stars nutrient standards, three products were deemed healthy and qualified for three stars, three products were moderately healthy and qualified for one or two stars, and three products were unhealthy and did not qualify for any stars. We again counterbalanced the products in the set and discreetly removed any potentially confounding healthfulness indicators on the front of the packages (e.g., "low in fat"). All participants were presented with the set of soup products at the retail shelf and were allowed to handle and compare the products freely throughout the questionnaire.

#### Dependent Measures

Choice was the primary dependent measure of interest and assessed by the question, "Which soup product would you be most likely to purchase?" (coded as 1 if a three star product was selected and as 0 otherwise). The same set fluency measure from studies 2 and 3 was used and again exhibited satisfactory reliability ( $\alpha = .94$ ). The same healthfulness perception measure from studies 2 and 3 was also used again to assess evaluations of a healthy three star soup and an unhealthy zero star soup ( $r = .73$  and  $r = .87$ , respectively). Consistent with prior nutrition labeling research (Feunekes et al. 2008; Viswanathan, Hastak, and Gau 2009), we computed a healthfulness difference variable by subtracting the perceived healthfulness of the zero star soup from the perceived healthfulness of the three star soup. This provided a relative measure of the perceived differences in healthfulness of the healthier and unhealthier products in the set.

## RESULTS

Logistic regression results indicate a higher likelihood of choosing a healthier product from the set when the evaluative cue was on the packages ( $b = 1.13$ , standard error = .43,  $p < .01$ ). More specifically, results revealed that the probability of choosing a healthier product from the set significantly increased from 48% when the evaluative cue was absent to 74% when it was present ( $z = 2.33$ ,  $p < .02$ ). In order to expand on the processes underlying this effect, we performed a series of bootstrap analyses using 1000 samples and 95% bias-corrected CIs in PROCESS Model 6 (Hayes 2013) to formally test the “cue→set fluency→perceived differentiation between more and less healthful products in the set→choice” serial mediational path. As expected, the indirect effect of the evaluative cue through this mediational path was significant (IE = .05; CI [.001, .244]). These concluding findings build on our prior studies by explaining in more depth how evaluative cues assist consumers with making healthier choices in complex comparative processing environments such as grocery stores. The implications of this research for theory and consumer health are discussed in the final section.

## GENERAL DISCUSSION

The typical consumer makes an average of 200 to 300 decisions related to food choice and consumption in a given day (Wansink and Sobal 2007). However, consumers rarely have the cognitive capacity to process all available information, and they often use only a limited number of product attributes in their evaluations to avoid information and choice overload (Bettman, Luce, and Payne 1998). Consumers therefore frequently rely on less complex communications such as FOP nutrition cues (Roberto et al. 2012). It is still not clear, though, if and how FOP nutrition labeling can satisfy its stated intended purpose of helping consumers make healthier food choices (FDA 2015; Federal Register 2010). Moreover, prior research has given little specific consideration to how the effects of various types of FOP nutrition cues may differ across noncomparative and comparative processing contexts (in which consumers process health information for a single product in isolation vs. a set of multiple products, respectively). This relationship between FOP cue type and processing context type is growing in importance as consumers continue to face an increasing variety of food choice tasks and environments (e.g., evaluating a specific product online vs. evaluating many different products at once on a supermarket shelf).

Drawing from Resource Matching Theory (RMT), we examined the effects of different FOP nutrition cues (objective vs. evaluative) on consumers' evaluations and intentions to purchase healthy products across different processing contexts (comparative vs. noncomparative). We

then integrated a processing fluency theoretical framework to help explain *why* these important interactive effects occur. Study 1A demonstrated that objective cues, which offer specific quantitative nutrition information, increase (product-level) fluency more than evaluative cues in simpler noncomparative processing contexts. Conversely, study 1B showed that evaluative cues, which provide interpretive information about a product's overall healthfulness and/or nutrients, enhance (set-level) fluency more than objective cues in more complex comparative processing contexts. After establishing these initial cue effects, we then explicitly manipulated the processing context in study 2. Here we demonstrated that objective cues positively influence fluency, healthfulness evaluations, and purchase intentions for healthy products more strongly in noncomparative contexts than in comparative contexts. In contrast, we showed that evaluative cues lead to higher fluency, evaluations, and intentions in comparative settings than in noncomparative settings. Study 2 results also demonstrated that product fluency and set fluency are important mechanisms that underlie the observed effects of objective and evaluative cues in noncomparative and comparative processing contexts, respectively.

Lastly, in study 3 we expanded more on the processes underlying the effects of evaluative cues on consumers' actual food choices in comparative settings (such as grocery stores). Findings revealed that evaluative cues increase the perceived fluency of a set of products, which in turn leads to greater perceived differentiation between the more and less healthful products in the set. As a result, consumers are more likely to choose healthier items from the available options. Both studies 2 and 3 were conducted in a more realistic retail lab setting with different product categories to overcome potential restrictions to generalizability posed by the online settings used in many previous experimental labeling studies (Hieke and Taylor 2012).

## Theoretical Contributions

The present research offers new conceptual insight into the relationships between cue type, processing contexts, and fluency. Drawing from RMT (Anand and Sternthal 1987; Keller and Block 1997; Meyers-Levy and Peracchio 1995), we highlighted the importance of distinguishing between comparative and noncomparative processing contexts when considering effects of different types of FOP cues on fluency and other critical health-related outcomes. Findings supported our predictions regarding the moderating role of the processing context; objective cues enhanced fluency more in noncomparative contexts than in comparative contexts, while evaluative cues increased fluency more in comparative settings than in noncomparative settings. We additionally showed similar effects of cue type across processing contexts on consumers' evaluations and purchase intentions for objectively healthy products.

Drawing from prior research on the role of fluency in cue effects (Berger and Fitzsimons 2008; Lee and Labroo 2004; Whittlesea 1993), we also introduced the concepts of product-level and set-level fluency and identified them as important mechanisms that underlie the positive impact of FOP cues on consumers' food evaluations, intentions, and choices. We then extended these findings by showing that the IEs of the cues through fluency are conditional on the nature of the processing context. More specifically, we demonstrated that the positive IEs of objective (evaluative) cues only occur in noncomparative (comparative) settings. We therefore highlighted the processing context type as an influential moderator of the mediating roles of product and set fluency (as proposed in Figure 1). These findings, combined with the other results of this research, collectively suggest that set fluency appears to be both conceptually and empirically distinct from other measures that focus only on the fluency of a single stimulus (i.e., product fluency). Future studies may consider the potential usefulness of this construct and whether it can be adapted for use in other research contexts.

Next, our findings extended previous research that has showed the salience and importance of a cue increases (e.g., price, origin) when multiple products are organized based on it (Hutchinson and Alba 1991). For example, Areni, Duhan, and Kiecker (1999) demonstrated that when wine bottles were physically reorganized and shelved according to region, the sales of wines from preferred regions increased while wine sales from less favorable regions decreased (relative to when they were displayed by variety). We similarly showed that the provision of a standardized cue (i.e., a FOP evaluative cue) can influence consumers' evaluations of a set of products with varying nutritional profiles and ultimately their intentions and choices. It can be argued that the consistent, comparable information presented by the cue encourages consumers to focus more on this health-related information and thus is more likely to influence their evaluative and choice processes. However, unlike the reshelving of wines just noted, our findings are strengthened by the fact that they were observed without physically rearranging and grouping the products according to the cue (e.g., placing relatively healthier products together in a "healthy section"). These effects also largely held across multiple types of food categories and experimental settings. This highlights the importance of cue exposure and the IEs that they have through conceptual fluency on consumers' evaluations, intentions, and choices—particularly at the set level.

Lastly, note that the consistent IEs of cues through conceptual fluency observed here suggest support for a cognitive-based role of fluency, rather than an affective one (Labroo, Dhar, and Schwarz 2008; Winkielman et al. 2003). Our results demonstrate that the positive impact of fluency is not only a perceptual process, but also part of a cognitive linkage in which consumers critically distinguish

healthier products from less healthy ones based on the specific information conveyed by the cues (Mogilner, Rudnick, and Iyengar 2008). For example, study 3 demonstrated that evaluative cue information indirectly helped participants better (cognitively) differentiate between more and less healthful products through enhanced set fluency. These differences in healthfulness perceptions then increased the likelihood that participants made healthy choices. These findings reveal that fluency affects not only evaluations of a single object but also evaluations of other conceptually related objects (i.e., products in a set). More broadly, they are also suggestive of the potential role that set fluency can play in cognitive evaluation processes in comparative processing contexts.

### Implications for Consumer Health and Public Policy

Our research additionally shows when and how different types of FOP nutrition labeling systems influence consumers' evaluations, purchase intentions, and choices of healthy products. These findings have timely and important implications for consumer health and welfare, the food and retail grocery industries, and public policy. The Nutrition Labeling and Education Act (NLEA) had a specific goal to "provide clear, unambiguous nutrition information" that would "assist consumers in maintaining healthy dietary practices." However, since its passage and implementation in 1994, obesity has reached epidemic proportions in the United States where two thirds of adults are now considered overweight or obese (Flegal et al. 2012).

Our research suggests that one potential reason that the standardized NFP (developed in response to the NLEA) has not been effective in preventing the rise in obesity may lie in its failure to directly address the fact that consumers' evaluative contexts and decision environments can vary greatly. We argue conceptually, and show empirically, that the type of processing environment faced by consumers (comparative vs. noncomparative) influences the extent to which food package cues can positively impact their food-related evaluations and decisions. Our findings suggest that information that is more detailed and objective may benefit consumers more when they noncomparatively assess the healthfulness of a single product. However, when consumers make relative comparisons between many different brands in a set (e.g., in large supermarket environments), information that is more evaluative in nature is likely to be more beneficial in assessing product healthfulness and making healthy choices.

We believe that these critical differences should be directly considered by policymakers, particularly in light of the numerous different FOP labeling systems currently in the marketplace (and those currently being developed). If the specific goal of the health community and policy makers is to help consumers make healthier choices, then the

ability to easily identify the most healthful alternatives from broad choice sets at the retail level is crucial (IOM 2010). The implementation of a standardized evaluative FOP cue in these comparative processing settings would likely be most beneficial to consumers and positively influence the healthfulness of their choices. More specifically, a standardized evaluative cue should help shoppers better distinguish between relatively more and less healthful products at the retail shelf, thereby increasing the likelihood that they choose healthier products. However, in general, our findings suggest there also may be some potential benefits of adding either type of FOP nutrition information (evaluative or objective), relative to food packages that only offer the NFP.

### Limitations and Future Research

The present research has several limitations that suggest a number of potentially promising future research opportunities. The objective/evaluative cue, comparative/noncomparative processing, and product/set fluency frameworks used here have not been directly tested in other contexts to our knowledge. Future research can further examine these typologies for any possible context effects and enhanced generalizability. While we tested several different FOP labeling systems, a number of other objective and evaluative formats can also be assessed. Subsequent research may also seek to manipulate both evaluative and objective cues together across different processing contexts to expand on the experimental designs used here. Next, our studies did not consider the price, implied or explicit FOP health or nutrient content claims (FDA 2015), or other promotions that may influence consumers' evaluations and choices. Research on a broader array of cue types with a consideration of price and other promotions, as well as potential differences across various segments of consumers (e.g., levels of objective knowledge and expertise, low income and education, high body mass index consumers, nutrition processing motivation), is desirable. Additionally, while our results provide some initial support for the product and set fluency concepts, more research is needed to further refine these measures and to assess their reliability and predictive validity in other contexts.

Future research could also assess potential differences in processing contexts posed by a retailer's online choice environment and its in-store choice environment. Objective cues might be more beneficial to online shoppers (who may more often engage in noncomparative evaluations of single products), while evaluative cues may be more beneficial to in-store shoppers (who are likely confronted with many options simultaneously on retail shelves). Relatedly, we varied the size of the product set in the comparative settings in our studies, but future research could further assess how the effects of cues may vary as the number of products in the set increases (i.e., as the complexity of the

processing task increases). Doing so may identify important boundary conditions for the effectiveness of (evaluative) FOP cues in comparative settings. Lastly, while we conducted two of our studies in a retail lab that offers a somewhat more realistic environment than many online experimental settings, it is acknowledged that actual retail store environments are more challenging comparative processing settings for consumers and offer opportunities for additional studies and analyses in general. Overall, additional research on the complex relationships between different types of cues, processing contexts, and fluencies beyond those examined here is warranted.

### DATA COLLECTION INFORMATION

All three authors contributed to the design of each study. The first author was primarily responsible for the data analysis of each study. The pilot study was collected online in Summer 2015 from MTurk. Study 1A was collected online in Fall 2011 from MTurk, and study 1B was collected online in Fall 2014 from MTurk. Studies 2 and 3 were collected in the Shopper Experimental Lab Facility at the University of Arkansas in Fall 2014 and Spring 2012, respectively, with the assistance of three undergraduate lab assistants under the primary supervision of the first author. These samples were recruited through both undergraduate classes and the lab's subject pool. All three authors contributed to the construction and editing of the manuscript.

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