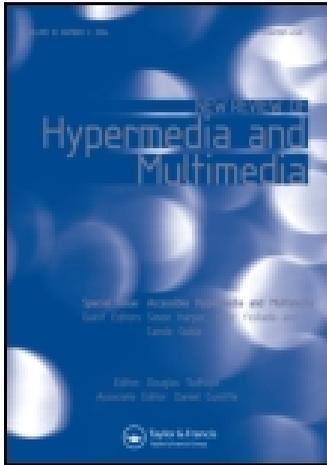


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### Categorizing health-related cues to action: using Yelp reviews of restaurants in Hawaii

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RESEARCH ARTICLE

# Categorizing health-related cues to action: using Yelp reviews of restaurants in Hawaii

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Yelp, a social media site, undeniably has an influence on consumers' food choice in spite of its ability to reflect consumers' real voice being criticized. Since unhealthy food choices contribute to health problems, such as obesity and malnourishment, we attempted to examine these problems by better understanding consumers through health-related cues to action—a construct from the Health Belief Model (HBM)—on Yelp Honolulu's restaurant reviews. Our research revealed 13 main categories: Ingredient, Type of food, Taste, Lifestyle, Cooking, Option, Price, Portion, Well-being, Nutrition, Hygiene, Emotional attachment and indulgence, and Feeling. We argue that these categories may ultimately lead consumers to make healthier food choices. In search of the most appealing way to communicate with the target group, underlying concepts that derived from these categories can be tested. Marketers in food industry (or public health policy-makers) can craft their strategies for healthy food brands/products (or healthy eating scheme) based on the concept test research. Moreover, Yelp can apply these insights in the development of their algorithm and filter system in order to help consumers find healthy food if they wish to do so. Restaurants can also improve their strategy, menu, and communication execution to meet the growing demands of health conscious consumers.

*Keywords:* Food choice; Yelp; Social media; Social recommender systems; Online restaurant reviews; The Health Belief Model, Cues to Action

## Introduction

Poor food choice is directly related to several health problems such as malnourishment and obesity, a chronic disease accompanied by many comorbid conditions. In 2009–2010, 35.7% of U.S. adults were obese. (Centers for

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Disease Control and Prevention, 2012). We believe that a retrospective study of restaurant reviews on social media site Yelp may uncover reasons behind food choices in a networked society. This study is a first step in lessening health problems from inappropriate food choice as we try to better understand how consumers deliberate about food. Social media platforms, such as Yelp, provide numerous opportunities for consumers to create and distribute content that may reflect their own assumptions about food choice and health awareness. Yet, little is known about how and what consumers discuss regarding food and health-related topics on social media. To address this issue, this paper explores the following research questions: (1) Can we meaningfully categorize health-related commentaries in restaurant reviews on the social media website Yelp; and (2) Can these health-related commentaries be interpreted as “cues to action,” a construct that we hope to ultimately utilize for consumers’ healthier food choices?

Yelp is a social media, “a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of User Generated Content” (Kaplan & Haenlein, 2010, p. 61). Within the realm of social media, Yelp falls under the classification of a social network site. boyd and Ellison (2008, p. 211) defined social network sites as web-based services that let individuals “(1) construct a public or semi-public within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system.” Founded in 2004, Yelp has been helping people to choose local businesses like hair stylists and restaurants based on local reviews and social networking functionality. The company’s source of income is advertising fees from local businesses. Yelpers can vote a review as useful, funny, or cool; add friends; send compliments; send messages; follow a reviewer; see reviews similar to the ones they wrote; find events; see lists that other Yelpers created; and participate in talk, a forum where conversations happen. By the end of 2013, Yelp had 61 million local reviews with around 138 million monthly unique visitors (*10 Things you should know about Yelp*, 2014). The strongest motive for Yelp.com users is information seeking (Hicks et al., 2012). A Yelp review consists of star ratings and open-ended comments (Park & Kim, 2008). Empirical data demonstrate that restaurant reviews from Yelp affect food choices among consumers; it increases revenue of independent restaurants when the rating goes up; 5–9% per one-star increase (Luca, 2011).

Reviews on Yelp are not perfect; nevertheless, they are considered a valuable source of consumer insights since they still shape and reflect how people make food choices. Its business model, making profits from restaurants that Yelpers review, has caused numerous lawsuits (Elias, 2014; McClatchy News Services, 2014). There has been criticism that some reviews are not written by real consumers, and the ones written by real consumers might not be representative of the population. Over an eight-year period (2004–2012), Luca and Zervas (2013) estimated that 16% of the Boston area Yelp restaurant reviews were deceptive, mostly driven by increased competition or weak reputation. These reviews were supposed to be captured by Yelp’s algorithm for publicly filtering fake reviews, a

trade secret yet legitimate tool (Mukherjee, Venkataraman, Liu, & Glance, 2013). As Gillespie (2014) mentioned that recommendation algorithms map users' preferences against others in order to suggest forgotten or new bits of culture for its users in spite of the fact that "algorithms remain outside our grasp, and are designed to be" (p. 192). Yelpers can write and publish any review as long as it is within the ideology of consumption, as Kuehn (2013) stated that Yelp has greater tolerance for false reviews than political discourses. The site's architecture allows only noncontentious topics related to restaurants and foods to be discussed, e.g. deliciousness of food, service, price, and consistency in the case of a chain restaurant. Similar to other social network sites, Yelp provides a unique space where consumers, algorithms, and architecture mix to enable a consumer to business model of content creation. Unlike users of other social network sites, Yelpers seem to have less difficulty with context collapse—a social network site's phenomenon that "flattens multiple audiences into one" (Marwick & boyd, 2011) and creates stress from various groups present in the real or imagined audience (boyd, 2008; Lewis & West, 2009; Marwick & boyd, 2011; West, Lewis, & Currie, 2009)—since they do not have to balance personal authenticity and audience expectations in the same manner as Facebook and Twitter users.

Food reviews on Yelp, especially for new food establishments or items that the consumers have not tried, are crucial for food choice decision-making. We will discuss this more in section 3.1. This study is very relevant to contemporary lifestyles since Americans spend more of their food budget on foods prepared outside of home than previous times and those foods' nutritional quality is poorer compared to eating at home (Todd, Mancino, & Lin, 2010).

We next consider the research context and literature review before stating study objectives and propositions. Then, we explain methodology of this study followed by describing the categories of health-related cues to action in the results section, with quotes from the Yelp reviews to bring these categories alive. The last sections discuss the implications and limitations of our study with some concluding remarks.

## 2. Research Context

### 2.1. The Health Belief Model

The Health Belief Model (HBM) contextualizes the importance of health-related cues to action in the area of food choice. Discussing the model facilitates our understanding of why cues to action are important in a larger context. The intent of this study is not to look at HBM as a whole but to focus on the *action* part, especially *cues to action*.

The US Public Health Service social psychologists developed this model during the 1950s in an attempt to analyze why people did not participate in prevention and early detection programs. They fashioned a new behavioral model based on stimulus response (SR) theory and cognitive theory. The HBM explains that an individual's belief influence health behavior. In the field of health behavior research, the HBM (Figure 1) is an often-used framework for explaining change

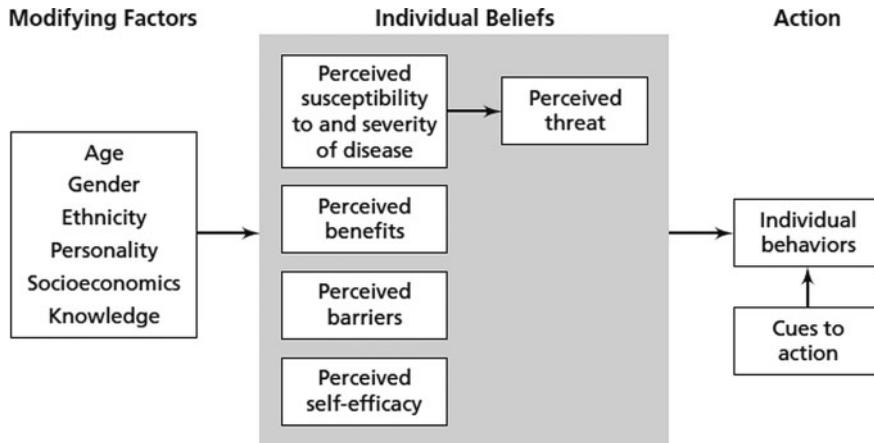


Figure 1. The HBM noting the components and linkages between behavioral antecedents and action. Source: Adapted from Champion and Skinner (2008).

and maintenance of health-related behaviors and guiding health behavior interventions (Champion & Skinner, 2008).

**2.1.1. HBM components.** *Perceived Susceptibility* refers to an individual's perception of having a condition or contracting a disease. *Perceived Severity* refers to how serious a person perceives the health problem to be. Perceived susceptibility and severity are labeled together as *Perceived Threat* (Champion & Skinner, 2008). Both of these constructs have a strong cognitive component—making it somewhat dependent on knowledge (Rosenstock, 1974). *Perceived Benefits* refer to a personal judgment regarding the benefits of available alternatives that address the perceived threat. *Perceived Barriers* refer to negative aspects of a health action that an individual considers taking. *Self-Efficacy* refers to “the conviction that one can successfully execute the behavior required to produce the outcomes” (Bandura, 1997, p. 193).

“Cues to action” refers to people, things, or events that influence health behavior. They can be perception of bodily states, illness of a family member, advice from other people, mass media campaigns, health information on product labels, and postcards from a health-care provider (Champion & Skinner, 2008; Hayden & Paterson, 2009; Rosenstock, 1974). In order for any individual to take an action, a strong cue is needed in the case of low threat perception and a weak cue is enough for high threat perception (Rosenstock, 1974). Cues to action will be more influential in “situations where perceived threat and benefits are high and perceived barriers are low” (Champion & Skinner, 2008, p. 62).

“Cues to action” is a construct that is “necessary to complete the model, but it has not been subjected to careful study” (Rosenstock, 1974, p. 332). Champion and Skinner (2008) also found that it is frequently missing from research; therefore, there is limited knowledge about cues to action and their relative impact. The mysterious quality of this construct calls for more studies. Our study

makes a contribution to this literature by specially examining the cues to action component in the HBM.

**2.1.2. HBM linkages (relationships among HBM constructs).** There are major constructs that are antecedent to individual behaviors: susceptibility, severity, benefits, barriers, and self-efficacy. The combination of susceptibility and severity equals threat. These main constructs—which are influenced by modifying factors—represent individual beliefs. These beliefs (or perceptions), along with cues to action, lead to behaviors. The HBM has been applied in various ways due to the fact that relationships between and among these constructs are not clearly defined.

## 2.2. Barriers and facilitators of healthy eating

Shepherd et al.'s (2006) study identified barriers (personal taste preferences for, cheapness of, and ease of access to fast food) and facilitators (a larger availability of healthy foods, support from family, will power, and a desire to look after one's appearance) to healthy eating. Given the importance for consumers to make healthy food choices, it is important to explore barriers and facilitators of healthy eating, in the form of health-related cues to action, from restaurant reviews on Yelp.

## 2.3. Hawaii as a context for this study

Hawaii is not only personified by its tropical climate, immigrants from all continents, outdoor activities, and diverse culinary delights, but there are also health concerns among its residents that can be alleviated by healthy food choices. From the Obesity Prevalence Maps, 21.8% of adults in Hawaii are obese (Centers for Disease Control and Prevention, 2014). In spite of the advantages of fruits and vegetable consumption—providing essential nutrients that a human body needs, decreasing risks of many chronic diseases, and helping in maintaining a healthy weight (U.S. Department of Agriculture and U.S. Department of Health and Human Services, 2010) many American adults (including the ones in Hawaii) fail to meet the fruit and vegetable (F& V) consumption guidelines (Table 1).

Table 1 . Percentage of people that report consuming fruits and vegetables less than one time daily.

Food selection	Adults		Adolescents	
	US National	Hawaii	US National	Hawaii
Fruits	37.7	39.5	36.0	45.1
Vegetables	22.6	22.6	37.7	40.8

Source: Centers for Disease Control and Prevention's National Center for Chronic Disease and Health Promotion (2013).

### 3. Literature review

#### 3.1. Online consumer reviews

We look at the nature of new media that changes the way consumers assess products. Then, we discuss consumer reviews, different factors for appraising online reviews, and how people process information in cyberspace.

Before making a purchase, consumers apply criteria that contribute to how they evaluate product performance. Previous studies have shown that products can be classified as search products or experience products (Girard, Silverblatt, & Korgaonkar, 2002; Nelson, 1970). Search products can be precisely “evaluated prior to purchase because they are characterized by concrete and functional attributes for which valid information can be obtained before product use” while experience products “are dominated by intangible attributes that cannot be known until purchase, and for which performance evaluations can be verified only by (sensory) experience or consumption” (Willemsen, Neijens, Bronner, & de Ridder, 2011, pp. 22–23). According to these definitions, food and restaurants are considered experience products. With the new interactive media that provide “virtual experience” and possibly lower a consumer’s perceived risk, an experience product can be virtually turned into a search product (Klein, 1998).

Consumer perceptions of products are also influenced by social factors. In dealing with the plethora and sophistication of information on the Web, people rely on others for credibility assessments of information or source (Metzger, Flanagin, & Medders, 2010). They do so by using group-based tools that are also web-based applications, e.g. online ratings, reputation systems, and social network sites. Consumer reviews play a crucial role in consumer decision-making because social-based information is the most impactful cue on final trustworthiness judgments (Utz, Kerkhof, & van den Bos, 2012). Furthermore, consumers internalize opinions from others as a way to reduce their situational uncertainty (Burnkrant & Cousineau, 1975).

In evaluating online reviews, there are various elements to consider: content of the review, quality of the review, quantity of the review, and information source (website that hosts the review, layperson, self-claimed expert, and peer-rating-based expert). Willemsen et al.’s (2011) study reveals that there is a positive relationship between perceived usefulness of a review and expertise claims; both negative and positive arguments add to a higher perceived usefulness (reviews with high levels of argument diversity and density are perceived as more useful); and the negative effect (or psychological phenomenon that negative information is weighted more than positive one) was found only for experience products. Reviews are not equally created; therefore, they are not equally evaluated—this explains the relation of differences in the perceived usefulness of reviews and differences in the content of reviews (Willemsen et al., 2011). Pan and Zhang’s (2011) study reveals that review valence and length have a positive relationship with perceived review helpfulness. Restaurant reviews on Yelp can also be considered as online word-of-mouth (WOM). WOM affects the decision-making process of consumers; higher valence (more positive review information) and greater volume (more reviews) lead to an increase in restaurant sales (Lu, Ba, Huang, & Feng, 2013). Racherla and Friske’s (2012) study of reviews collected

from Yelp.com revealed that the reviews written by Yelpers with higher reputation (higher number of friends) are perceived more useful than the ones written by Yelpers with lower reputation (less number of friends).

Web reputation systems and recommender systems are increasing their essentiality in contemporary lifestyles. Affordances that come with Web 2.0 allow users to share, rate, and review their experiences collectively. Websites like Yahoo Travel, Trip Advisor, and Yelp are examples of “social web” where broader public co-create meaning with an artifact or place (Owens, 2012).

There are relevant theories of how people process information in the digital media environment that account for both the consumer/user attributes along with the social nature of Web 2.0. Warranting principle (Walther & Parks, 2002) suggests that people evaluate online information from considering information that is not easily manipulated by the source. Utz et al. (2012) found that consumer reviews are a better predictor of the trustworthiness of online stores than assurance seals or store reputation—factors that could be controlled by the store. Signaling theory (Donath, 2007) proposes that reliable signals found online are those that are difficult to fake, are intervened by laws and social mores, or are costly to imitate. In addition, individuals interpret signals differently (Donath, 2011). Flanagin and Metzger (2013) stated that qualities of information receivers and characteristics of the information source must be taken into consideration; people count on cues to establish subjective validity under ambiguous circumstances (p. 1632); and higher information volume means stronger trust. Willmsen, Neijens, and Bronner’s (2012) study determined that perceived source trustworthiness and perceived source expertise—which are both dimensions of credibility—work separately and have differential effects on attitude formation.

Consumer perception is also influenced by the nature of community contents: marketer-generated content (MGC) or user-generated content (UGC). Compared with MGC (B2C), online UGC has a more prominent role in driving purchases (Goh, Heng, & Lin, 2013). Goh et al.’s (2013) study reveals that consumers influence one another’s purchase through informative and persuasive interactions, especially undirected approach is more effective for both persuasive and informative consumer-to-consumer communication. Restaurant reviews on Yelp are not directed to any particular user due to its structure; therefore, they should be quite effective in both informing and persuading other consumers.

### *3.2. Social media and food choice*

We see social media as an influential communication channel for cues to action for two reasons: (1) the validity or the truthfulness of online UGC, and (2) the personalization with provision of social media.

UGC is a preferred source of information for consumers. Unlike editor-created reviews that could be advertising in disguise, consumer-created reviews and their volume significantly enlarge the restaurant’s online popularity (Zhang, Ye, Law, & Li, 2010).

Social media have the potential to become a powerful tool for realizing healthy food choices. Brennan, Dahl, and Eagle (2010) suggested that we should employ new media—such as the Internet and text messages—to deliver personalized

content to individuals, especially in young adults to persuade them to make better dietary choices. Vance, Howe, and Dellavalle (2009) found that Twitter, MySpace, Facebook, and YouTube are the fastest-growing sources of health information among young adults. The study by Nabi, Prestin, and So (2013) indicates that the number of Facebook friends is the predictor of “social support and subsequent health benefits” (p. 725).

#### 4. Study objectives and propositions

Based on our research questions outlined earlier, the study objectives are to identify and categorize health-related cues to action using Yelp reviews of “healthy” and “unhealthy” restaurants.

Donath (2006) defines a cue as “everything that we use to infer a hidden quality” (p. 2). In this study, we use the term “health-related cues to action” to indicate association with the HBM. Even though cues to action encompass many things, the focus of this study is the communication element: advice from others, in the form of reviews on Yelp.com.

We are trying to better understand health-related cues to action people use in restaurant reviews on Yelp in order to apply learning to other contexts. Through Yelpers’ reviews about their dining experiences, we will be able to meaningfully cull and categorize health-related cues to action for food choices.

#### 5. Methodology

The population under investigation is Yelpers (Yelp contributors) who registered for Yelp accounts and have written reviews for food establishments in Hawaii.<sup>1</sup> They can be anyone, as long as they have eaten and written reviews on such food establishments.

For the data collection process, we gathered 400 reviews from 20 restaurants as the material for qualitative content analysis. We speculated that 400 reviews would let us reach the point of data saturation—the state that additional reviews do not contribute to any new category formation (Salazar, Crosby, & DiClemente, 2006).

Within these 20 restaurants, 10 were restaurants that offered healthy food and the rest were restaurants that offered unhealthy food. We did this by putting the Boolean keywords “healthy food” and “unhealthy food” in the Yelp search bar “Find”: and limit search results to “Near: Hawaii.” Some restaurants that showed up in both searches were eliminated. For each list of restaurants that offered healthy food and unhealthy food, we assigned numbers to the first 50 results and randomly selected 10 restaurants through a random number generator. For each chosen restaurant, the 20 most recent reviews were then retrieved. This was done in April 2013. For each restaurant, the comments were put into a data collection instrument form (see [Appendix 1](#)). All obvious misspellings were corrected.

Units of analysis were reviews of the selected restaurants in Hawaii. The unit of coding is the individual theme, or the expressions of an idea (Minichiello, Aroni, Timewell, & Alexander, 1990), or “... a single thought unit or idea unit that

conveys a single item of information extracted from a segment of content” (Budd, Thorp, & Donohew, 1967, p. 34). Defining individual theme as the unit of coding is very common in qualitative content analysis (Zhang & Wildemuth, 2009), in which “the essential factor is not form but meaning” (Henri, 1991, p. 134).

Next, we developed categories and a coding scheme. We built a coding frame by using a combination of concept-driven and data-driven strategies. Building a coding frame from both inductive and deductive approaches is common for qualitative content analysis (Schreier, 2012, p. 89). Prior research and information from reliable sources provided a solid foundation to build the coding frame. Additionally, we let the categories emerge out of the data through the first and second stages of the constant comparative method of qualitative analysis: (1) comparing incidents applicable to each category and (2) integrating categories and their properties (Glaser & Strauss, 1967).

After developing categories and a coding scheme, we divided reviews into units of coding. There were two coders in this study. The two coders tested the coding scheme on a sample of text and compared the coding. The two coders discussed which word/phrase/idea should (not) be considered as health-related cues to action to improve inter-rater reliability. Then, each of the two coders separately coded reviews from another section, compared coding for consistency, and revised coding rules correspondingly. It was an iterative process until satisfactory coding consistency was attained (Weber, 1990), in our case the two coders were able to achieved high inter-rater reliability—83% of agreement. We modified the coding frame and coding rules so that we were able to include different health-related cues to action without overlapping subcategories within the same category.

Sequentially, the coders coded all the text based on our finalized coding rules with constant checking so that the codes maintained their meaning. The categorization was monitored to make sure that the categories “are internally as homogeneous as possible and externally as heterogeneous as possible” (Lincoln & Guba, 1985, p. 349).

We found some words that are exclusive to the Hawaiian context, e.g. “ono” (Hawaiian word for delicious), “broke da mou” (pidgin phrase, also means delicious), “da bomb” (pidgin term means the best), and “pau” (Hawaiian word means finished or done). Whether they are health-related cues to action or not, we needed to define every local word in the reviews in order to understand the context of the reviews.

The coders rechecked the coding consistency after the coding of all reviews was complete. Since the coders’ personal biases were curbed from the earlier stages, this fine-tuning assured the same interpretation of the categories.

## 6. Results

We found 13 main categories<sup>2</sup> of health-related cues to action. Even though this study is a qualitative one, quantitative findings revealed an interesting trend. From [Figure 2](#), the top three most identified categories were ingredient, type of food, and taste. These three items represent specific aspects of food. The least identified categories represent emotional states: emotional attachment and indulgence, and

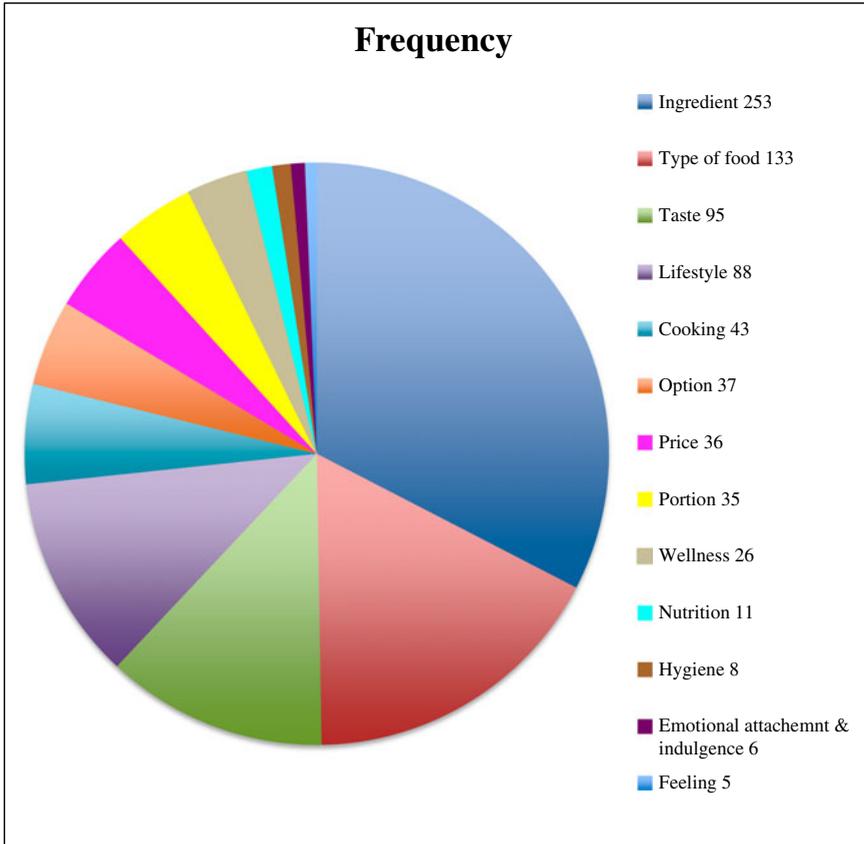


Figure 2. Quantitative findings of health-related cues to action categories.

feeling. Categories representing specific aspects of health such as wellness, nutrition, and hygiene were less common. Economic considerations, such as price and portion, were more prevalent compared to aspects of health in the Yelpers' reviews. Since both concept-driven and data-driven strategies were used to develop categories, there are some information from reliable sources and prior research embedded in description of some categories.

### 6.1. Ingredient

Ingredient is an essential part of any dish. This category incorporates all kinds of ingredients: vegetable, fruit, condiment, spice, herb, and meat. Ingredients that are part of a dish/drink's name are not considered as health-related cues to action (the ingredients are considered as health-related cues to action if they are mentioned outside of the dish/drink's name); however, all salad dishes (except for macaroni salad) are considered as health-related cues to action that signify healthy food choices since most salad dishes contain vegetables as main ingredients.

**6.1.1. Signifying healthy food choices.** Concepts that signify healthy food choices comprise (1) the use of “healthy” meat, which can be white meat, chicken breast (lean part), grass-fed beef, and fake meat (substituting with healthier ingredient); (2) the existence of fruit or vegetable; (3) the compensation for the lack of meat by playing up spices and textures; (4) the humble use (or the absence) of oil and the use of healthier oils such as extra virgin olive oil; (5) the missing of some ingredients like gluten-free and dairy-free; (6) ingredient source or production, e. g. organic, natural, non GMO; (7) vegan/vegetarian ingredients like tofu and alfalfa; and (8) fresh ingredients:

lots of vegetables mixed in.

If you're vegan or vegetarian, their selection of faux meats is really amazing.

Some of the fake meat is very convincing.

The 7 layer salad—super fresh and comes with guacamole—I would recommend it! made from quality ingredients.

**6.1.2. Signifying unhealthy food choices.** Concepts that signify unhealthy food choices include (1) the use of “less healthy” meat, which can be red meat, meat with a lot of fat, chicken thigh, and pork belly; (2) the existence of harmful chemicals such as food coloring and Monosodium Glutamate (MSG); (3) the high amount of ingredients that should not be over-consumed, e.g. sugar (“topped with a heap of powdered sugar”), carbohydrate, and oil/fat (“greasy,” “creamy,” “rich,” “fatty,” “buttery,” “cheesy,” “oily,” “oil puddle on my plate,” and “lots of gravy slathered over the bed of rice”); and ingredients that are not fresh (turned bad and pre-frozen):

there's hardly any meat on mochiko chicken (full with fat and batter).

## 6.2. *Type of food*

A type of food or a specific menu may imply whether the meal is healthy.

**6.2.1. Signifying healthy food choices.** Vegan/vegetarian food, live food, and raw food are associated with healthiness. Labeling food as healthy also falls within this subcategory:

vegan-organic food.

is supposedly known for its 'healthy' American Chinese cuisine.

**6.2.2. Signifying unhealthy food choices.** Fast food, comfort food, and specific menu rich in fat like pizza or deep fried foods are associated with unhealthiness. Labeling food as unhealthy also falls within this subcategory.

Pizza's pretty tasty but also pretty greasy so you know it's not healthy

### 6.3. Taste

Taste is defined broadly by the sensory properties detectable in foods: color, aroma, flavor, and texture. (Kittler, Sucher, & Nelms, 2011, p. 13)

**6.3.1. Signifying healthy food choices.** Concepts in this subcategory are sensory properties detectable in foods that connote healthy food choices, e.g. deliciously healthy, a surprise that nutritious food tastes good or a vegetarian/vegan food item is delicious and tastes like meat, guilt-free taste, homemade taste, and natural taste:

The flavors were simple yet delicious and healthy.  
 You can get great taste, without the guilt.  
 tastes like hippie.  
 the items that they offer are shockingly delicious for veggie fare.  
 It tastes too good to be healthy.

**6.3.2. Signifying unhealthy food choices.** Concepts include in this subcategory are sensory properties detectable in foods that imply unhealthy food choices. Prominent themes are (1) deliciousness worth the extra calories and (2) the tendency that unhealthy foods taste good:

It's the only one worth the calories in my book;  
 What a waste of carbs. (when 'unhealthy food' tastes bad)  
 things that taste really good aren't usually healthy anyway!

### 6.4. Lifestyle

This category stands for a mode of living (depending on individual needs and one's stage of life or health), routine, culture, consumption behavior, and eating scheme.

**6.4.1. Signifying healthy food choices.** Themes found are (1) control of food intake in which there are three subcategories (1.1) reduce/without meat (1.1.1 vegan/vegetarian, and 1.1.2 less meat), (1.2) on a diet, and (1.3) body building; (2) family in which there are two subcategories (2.1) setting a good example for children, and (2.2) eating for the little one (being pregnant); and (3) eating well in general:

last week after the gym I was starving but wanted something light  
 My husband and I agreed that we needed to start making healthier food choices to set a good example for our baby son.  
 if you like to eat clean, this is a good place.  
 If you are a complete vegetarian or health nut.

#### 6.4.2. Signifying unhealthy food choices.

Themes found are (1) meat lover; (2) dessert lover (e.g. “sweet tooth”); (3) exercise as a panacea/reward (exercise to burn calories eaten or eating unhealthy dish to reward oneself after exercising); (4) blame it on the culture (e.g. “unhealthy Filipino food norm”); and (5) uncontrollable appetite—which consists of binge eating (last meal mentality or eat/order like there’s no tomorrow), late night meal, and addiction.

Who ever invented spam musubi is a genius! I think I’m addicted to that.

My mom always overorders and can pack away the food like no tomorrow.

I love a good steak and truly believe that bacon and butter make everything better.

#### 6.5. Cooking

Klosse (2013, p. 128) discussed characteristics of the principal techniques in cooking: cooking (meaning “the product is kept in the boiling water until it is done”) and blanching, poaching, steaming, frying/pan frying/stir frying (Bao technique), sautéing/stir frying (Chao technique), roasting/baking, grilling/barbecuing, simmering/braising/stewing, deep-frying/shallow frying. Other techniques to achieve or maintain flavor are searing, papillote, clay pot, croûte, sous-vide, cold cooking (brining, curing, and smoking), drying, pickling, marinating, very cold cooking (liquid nitrogen and other molecular novelties), pressure cooking/frying, and microwaving.

Our category “Cooking” refers to various methods or manners of food preparation that directly or indirectly relate to health.

**6.5.1. Signifying healthy food choices.** Cooking methods with minimal or no use of oil like steaming, foods that are prepared without heat (e.g. raw and live foods), anything homemade, and a dish that is freshly made are perceived as healthy:

I also get an order of the steamed dumplings.

freshly baked.

fresh and hot.

salad dressings are all made in house.

**6.5.2. Signifying unhealthy food choices.** Cooking methods that involve oil (e.g. fried and deep fried), foods that are cooked more than once (refried, reheated, microwaved, pre-refrigerated, and premade), and under-cooked foods are perceived as unhealthy:

the pata<sup>3</sup> was most likely leftovers that were refried again which is why we needed the lobo knife.

#### 6.6. Option

“Humans must be flexible enough to eat a variety of items sufficient for physical growth and maintenance” (Kittler, Sucher, & Nelms, 2011, p. 2).

**6.6.1. Signifying healthy food choices.** This subcategory encompasses a variety of healthy food items/dishes and healthy options. The brown rice option was much recognized and appreciated in the context of this study:

Plenty of vegan options, as well as vegetarian.

The brown rice isn't just regular brown rice. It seemed like it was the multi grain kind of brown rice ... It had a better texture to it which I loved.

**6.6.2. Signifying unhealthy food choices.** Likewise, the more choices may encourage more consumption of less healthy food.

When you walk in it's like BAM pastries, breads and cakes galore.

## **6.7. Price**

**6.7.1. Signifying healthy food choices.** Many reviews indicated that healthy foods are somewhat expensive, making it difficult to consume on a regular basis. Some Yelpers look at it as the nutrition justifies the price:

Just a warning that it is healthy ... So you know what that means right? It's expensive. I would eat that everyday if I could. It IS pricey. And it's worth it.

**6.7.2. Signifying unhealthy food choices.** Cheap foods are often unhealthy:

One thing I dislike about food in Hawaii is that cheap food is so unhealthy. I mean a typical plate lunch is breaded, deep-fried meat with rice, mac<sup>4</sup> salad. It's really a nightmare for your blood sugar level. And "mac salad" isn't even salad!

## **6.8. Portion**

**6.8.1. Signifying healthy food choices.** Small(er) portion is associated with healthier food choices. Many reviewers expressed their unfamiliarity with the small portion. They were initially doubtful; however, they tended to be satisfied at the end of the meal:

The portions look small but because it's so nutritious and flavorful you really don't feel hungry.

**6.8.2. Signifying unhealthy food choices.** Large portion is associated with unhealthy food choices. Even though the food can be packed as leftovers, large portion tends to make people consume more food than they really need. This is consistent with Todd, Mancino, and Lin's (2010) finding that people have more calorie intake on the days they at least have one meal away from home:

We both basically stuffed ourselves and still had plenty left over for a FULL second meal the next day.

The portion size is massive. Even for me and my gargantuan appetite, a regular plate = lunch + leftover for dinner or next day's lunch.  
generous portion.

## 6.9. *Well-being*

This category deals with the condition of the body including weight, size, and health state.

**6.9.1. Signifying healthy food choices.** This subcategory refers to anything that is good for well-being:

Long story short: Eat here! Your body will thank you. ☺  
It helps your digestive track.

**6.9.2. Signifying unhealthy food choices.** This subcategory refers to anything that is bad for well-being, e.g. obesity, out-of-proportion waistline, diabetic, heart attack, gout, and high blood sugar level:

Wife and I came back from a week's vacation ... She lost 6 pounds! I gain 6 pounds! That's my bad karma for eating half her entrees at all our stops.  
So yeah you're eating the loco moco, then the waffles come out and yeah ... you're just heart attack heaven:)

## 6.10. *Nutrition*

According to the World Health Organization or WHO (2014), "nutrition is the intake of food, considered in relation to the body's dietary needs." Our category follows this definition. Commentaries of nutrients like calorie, vitamin, fat, and sodium are categorized as Nutrition in this study.

**6.10.1. Signifying healthy food choices.** This subcategory represents diets that are well balanced and adequate (WHO, 2014).

it's so nutritious!

**6.10.2. Signifying unhealthy food choices.** This subcategory includes various themes that revolve around poor nutrition according to WHO's (2014) description: reduced productivity, reduced immunity, impaired physical and mental development, and increased susceptibility to disease.

a million-calories shake!

## 6.11. *Hygiene*

This category deals with the preservation of health.

**6.11.1. Signifying healthy food choices.** This subcategory covers anything that manifests cleanliness and leads to the preservation of health.

the bathroom was very clean. Bathrooms are very important. If the bathroom is dirty and/or has no soap, what does that say about the cleanliness of the kitchen and the food?

**6.11.2. Signifying unhealthy food choices.** This subcategory specifies a condition or practice that may worsen the health state of the consumer. Themes that showed up frequently were the discovery of objects that were not supposed to be in the food, e.g. hairs and bugs:

a couple times tho we found hair in our food.  
Actually killed a roach on my table once.

### **6.12. Emotional attachment and indulgence**

This category represents emotional relationships that people have with food, e.g. nostalgia.

**6.12.1. Signifying healthy food choices.** This subcategory contains cravings and affection for healthy food:

I love the acai bowls here.

**6.12.2. Signifying unhealthy food choices.** This subcategory contains guilty pleasure, affection, and cravings for comfort food:

I was expecting greasy spoon comfort food that is whipped up in seconds.  
Some nights these are the best times, because of the feeling of tradition that surrounds these late night fast food binges and chats. It's like we're back in high school wondering about what graduation and college will be like.

### **6.13. Feeling**

This category collects commentaries explicitly stated by Yelpers about their feelings that are related to health.

**6.13.1. Signifying healthy food choices.** This subcategory consists of feelings that indicate the consumer made healthy food choices, e.g. regaining vitality, feeling healthy, and feeling less guilt:

My vitality began to return! I felt energized and satiated.  
Hello, organic I already feel okay eating it...;P

**6.13.2. Signifying unhealthy food choices.** This subcategory consists of feelings that indicate the consumer made unhealthy food choices, e.g. regret, a gross feeling of fullness:

make you feel full and gross and regretful afterward.

## 7. Discussion

Our findings suggest that health-related cues to action found on online restaurant reviews—one form of e-WOM—may have noticeable effects on health behavior, particularly on food choice. This study contributes to the HBM in the era of computer-mediated communication by focusing on the under-researched cues to action. Health-related cues to action revealed in this study could be thought of as barriers and facilitators of healthy eating, depending on the degree of health consciousness present in the information receiver or a reader of restaurant reviews on Yelp. Even though this study was done in the context of Yelp and Hawaii, the implication of the findings is possible for other social media and locations as well.

It is not surprising to see ingredient as the most frequent category, followed by Type of food and Taste. However, Wellness and Nutrition rank quite low—considering we were analyzing reviews that are quite health conscious (from the search term “healthy food” and “unhealthy food.” Since we can use it to infer about health, our categories of health-related cues to action can directly address the important question: How to make people eat healthy without talking about nutrients? (Raats, 2014).

Figure 2 also encourages other questions about the nature of online consumer reviews. Yelpers mostly want to describe the aspects of food when they review an establishment. Prior research indicates that there is a strong social component when evaluating an online review (Metzger, Flanagin, & Medders, 2010; Utz, Kerkhof, & van den Bos, 2012). Our findings demonstrate that there is most likely a social norm that privileges aspects of food as the epitome for evaluating the quality of a restaurant. In practical terms, this makes sense. If we ask members in our social network about their reasons for suggesting a restaurant, we almost expect an answer that describes the quality of the food served there. What is also notable from Figure 2 is that reviewers are less likely to describe health-related concerns directly, i.e. wellness or nutrition. According to Hicks et al. (2012), information seeking is a primary motive for Yelp users. Therefore, when Yelp users want to find information about a restaurant, their primary concern is the quality of food rather than health concerns. What our findings reveal is the social nature of online consumer reviews. Yelp reviewers focus on aspects of food because we expect them to when we attempt to make our own decisions on where to eat (Burnkrant & Cousineau, 1975). It is also a demonstration of the power of UGC toward driving consumer purchases (Goh, Heng, & Lin 2013).

Marketers who want to promote food product positioned as healthy and public health policy makers who want to promote healthy eating scheme can benefit from categories of health-related cues to action. They can choose underlying concepts from these categories to test with target consumers/audiences in the

pre-campaign stage. If “Cooking” is the winning concept from the concept test research, they will be able to craft the campaign strategy based on cooking method and style. The marketer would emphasize the way the food is cooked or processed—e.g. *freeze dried* fruit snack—in the marketing communication message. The public health policy maker would emphasize healthy cooking and disseminate electronic recipe cards through social media, e.g. News Feed in Facebook for anyone that clicks “Like” the healthy eating scheme campaign page, and links in Tweets. If “Emotional attachment and indulgence” is the winning concept for the new salad menu, strategic planners will mostly likely ask the graphic designer to create a sentimental poster with the “craving for wholesome salad” as the main message. Nutrients from this salad would also be available in the poster but with less importance. Nevertheless, nutrients of this salad will be the Unique Selling Point if the winning concept is “Nutrition.” In supermarket, vegetarian/vegan food products tasting booth could be executed based on the concept *a surprise that vegetarian/vegan food item is delicious and tastes like meat*. Supermarket shoppers might participate in a game in which they guess the Ingredients of delicious sample that they tried. They would get some vegetarian/vegan food products, along with discount coupons for the products, as a prize for getting the answer right. The ones that do not get the correct answer might get only discount coupons for the products. The category “Well-being” can inspire the communication strategy of a new functional beverage brand that offers healthy meal replacement drink to revolve around slimming waistline. Consumer would share their selfies with #byebyeBelly or #SlimmingWaistline on social media. The technological infrastructure for such recommendation process is algorithm that is able to capture nuances of health-related cues to action from online food reviews.

There are suggestions for Yelp and other similar social recommendation sites. This study shows that people have different needs, which effect their food choice decision. To facilitate the process of selecting restaurant, social recommendation sites may compile a list of restaurants for consumers with particular needs, e.g. restaurants that offer gluten-free dishes, restaurants that offer low-fat dishes, pregnant-friendly restaurants, kids-friendly restaurant, restaurants that offer healthy yet reasonable priced foods, restaurants that are safe for people with different kind of allergies, and restaurants that welcome people with diabetes or the ones at risk.

Restaurants can simply improve their menus if they would like to attract more health-conscious consumers. From category “Option,” they should consider serving brown rice as an option. In combination with category “Price,” they would increase the competitive edge by keeping the price of brown rice same as white rice so that they directly address the notion of healthy food being more expensive. From the concept *the nutrition justifies the price* from category “Price,” a restaurant owner might have the menu redesigned so that nutrition of each dish is displayed explicitly along with its relatively high price.

Not only policy makers, marketers, social media sites, and restaurants can benefit from these categories of health-related cues to action; anyone who cares about healthy eating can also make use of it. A mother might find that talking about nutrition is not an effective way to make her child consume more fresh

vegetable. So instead of “Nutrition,” she might try “Taste” and persuade her child to have more fresh vegetable by serving it with delicious dipping in a creative presentation such as from a scene of her child’s favorite fairytale. These categories do not have to be strictly used individually; they can be synthesized for the best outcome. The users of these categories, no matter who they are, must consider all factors—what they have to offer, what are the benefits (both functional and emotional) of their food item/food products/healthy eating schemes/restaurants, what is the concept that resonates most with their target audiences/consumers, and what are the competitors are doing and saying, and—in order to come up with the most appropriate strategy to make their target groups make healthier food choices.

There are some limitations in this study. First, Yelp’s algorithm is trade secret. It is not clear how Yelp operates their search function since a few restaurants came up with both searches (“healthy food” and “unhealthy food”). Second, the coding was done manually since words, phrases, and sentences are context sensitive. There were cases of double negation and contemplating about other restaurant, memory, type of food, and eating style while writing a review for a particular restaurant. For example: “I miss the rich, creamy curries with the large slices of chicken breast with tons of veggies.” For larger sample, a sophisticated methodology must be carefully planned if any textual analysis software would be included. Third, information receivers’ ability to judge cues to action is varied; therefore, cues to action might affect audiences differently.

## 8. Conclusion

We can meaningfully categorize health-related cues to action from restaurant reviews on Yelp through a qualitative content analysis. From 20 restaurants on Yelp Honolulu, we found 13 main categories: Ingredient, Type of food, Taste, Lifestyle, Cooking, Option, Price, Portion, Well-being, Nutrition, Hygiene, Emotional attachment & indulgence, and Feeling. These categories, subcategories, and underlying concepts are definitely useful for marketers, policy makers, Social media site, and anyone who cares about healthy food choices. This study contributes to understanding the knowledge that will eventually lead to healthier eating. Further research is needed to find more categories, subcategories, or underlying concepts of health-related cues to action from other type of restaurants and diverse mentalities of consumers. Additional research should investigate the impact of Yelp’s algorithm on deciding healthy and unhealthy food choices. For example, how much does the algorithm consider the content of Yelp reviews versus the self-provided ratings by the food establishment?

## Notes

- [1] The web address is <http://www.yelp.com/honolulu>.
- [2] Excluding category “Miscellaneous” since it is a residual category.
- [3] Deep fried pork legs.
- [4] Macaroni.

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**Appendix 1. Health-related cues to action data collection instrument**

Name of establishment		
Date of review		
Search result of Yelp	Healthy food	Unhealthy food

*Health-related cues to action* are being examined from statements that describe food experiences on Yelp. The food reviews displayed may instigate action for healthy or unhealthy food choices when dining out. The coders shall examine health-related cues to action for 20 most recent reviews or until data saturation have been reached.

**Including:**

- A word or phrase that the reviewer describes as a healthy eating experience. These may include adjectives describing healthy food, such as “fresh” or “light.” Cues do not necessarily have to discuss the traditional healthy diet, but can also be vegetarian, non-GMO, grass-fed beef, or any other experience that the reviewer perceives as healthy. This could be a positive or negative experience.
  - Example: “The tostadas are more like ... healthy nachos. With no melted cheese.:( ”
  - Example: “The produce ... most of it looks vibrant and yummy! Some look very very sad. But that is organic produce, it doesn’t have all the poisonous chemicals to make and keep them pretty.”
- A word or phrase that the reviewer describes as an unhealthy eating experience. Cues do not necessarily have to follow a traditional unhealthy diet; they can include any phrase the reviewer perceives as unhealthy. These may include adjectives describing unhealthy foods, such as “cheesy,” “greasy,” “fried,” or “salty.” This could be a positive or negative experience.
  - Example: “Definitely the place to go when you want a good dose of Filipino diabetic-heart attack-gout food ... Yum!”
  - Example: “Fried chicken, fried shrimp, fried, fried, fried.”

**Excluding:**

- Phrases that describe parking or customer service experiences.
  - Example: “Definitely quick and convenient. As soon as I order I wait no longer than a minute and my food is ready!”
- Phrases that describe positive or negative food experiences and do not include any health-related connotation.
  - Example: “Again, the spicy ahi portion of the meal was, as other reviewers have said, more like pâté—which isn’t a bad thing, however I prefer a chunkier spicy ahi.”

**Mentioning health-related cues to action****Phrases that should not be included:**

Copy and paste reviews into the boxes below. All words, phrases, sentences, or paragraph that represent a concept should be highlighted as health-related cues to action.

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Review #1

Review #2

Review #3

Review 4

Review 5

Review 6

Review 7

Review 7

Review 8

Review 9

Review 10

Review 11

Review 12

Review 13

Review 14

Review 15

Review 16

Review 17

Review 18

Review 19

Review 20

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(add more reviews until data saturation).