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Five-Star Prices, Appealing Healthy Item Descriptions? Expensive Restaurants' Descriptive Menu Language

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Objective: Prior research shows that America's top-selling inexpensive casual dining restaurants use less appealing language to describe healthy menu items than standard items. This may suggest to diners that healthy options are less tasty and enjoyable. The present research asked whether expensive restaurants also use less appealing language to describe healthy items, or whether healthy items are described with equally appealing language as standard items in high status dining contexts. **Method:** Using Yelp, the name and description of every food item were recorded from the menus of 160 top-rated expensive restaurants across 8 U.S. cities ($N_{items} = 3,295$; $N_{words} = 32,516$). Healthy menu items were defined as salads and side vegetables, and standard items as all other dishes (excluding desserts), with high interrater reliability ($K = .89$). Descriptive words were categorized into 22 predefined themes, and log likelihood analyses compared normalized theme frequencies from standard item and healthy item descriptions. **Results:** Healthy items were described with 4.8-times fewer American region words, 2.7-times fewer exciting words, 1.4-times fewer tasty words, and significantly fewer portion size, spicy, artisanal, and foreign region words. Unlike inexpensive restaurants, however, expensive restaurants did not use any health-focused themes to promote healthy items and used several appealing themes more frequently in healthy item descriptions. **Conclusions:** Like inexpensive restaurants, expensive American restaurants described healthy items as less appealing and less authentically American than standard foods, but to a lesser extent. Implications for ordering behavior and solutions for improving the appeal of healthy menu items are discussed.

Keywords: menu, language, health, food, restaurant

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Poor dietary intake is a leading cause of chronic disease in America (Micha et al., 2017). Yet the majority of Americans consume diets that are low in fruits and vegetables and high in sugars, calories, saturated fats, and sodium (Rehm, Peñalvo, Afshin, & Mozaffarian, 2016). This is particularly true at restaurants and dining settings outside of the home where Americans spend nearly half of all food dollars and consume less nutritious foods than at home (Lin & Guthrie, 2012). Encouraging people to choose healthier menu options when dining out is a public health priority.

To help customers make healthier choices, many restaurants created "healthy menu" sections (e.g., heart healthy, under 600 calories), grouping their lowest calorie options in a separate menu

section or marking them with health icons (e.g., heart, check mark, apple). Though the efficacy of this strategy for promoting healthy choices is unknown, 26 of the 37 top-selling American casual dining chain restaurants (70%) have healthy menus (Turnwald, Jurafsky, et al., 2017). The names and descriptions of items in restaurants' healthy menu sections overwhelmingly use health-focused language compared to other menu items. A linguistic analysis found that top-selling casual dining restaurants in America describe items on their healthy menus with 18-fold more restrictive words (e.g., fat-free, low-carb), nine-fold more macro-nutrient words (e.g., fiber, fat, protein), and over 100-fold more nutritious words (e.g., healthy, wholesome) compared with stan-

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software. Kathryn G. Anderson served in a supporting role for investigation, methodology, software, validation, and writing—review and editing. Dan Jurafsky served in a supporting role for methodology, resources, software, supervision, and writing—review and editing. Alia J. Crum served as lead for funding acquisition, resources, and software and served in a supporting role for supervision and writing—review and editing. Bradley P. Turnwald and Kathryn G. Anderson contributed to data curation equally. The authors declare that they have no conflict of interest.

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dard menu items (Turnwald, Jurafsky, et al., 2017). Moreover, items on restaurants' healthy menus were also described with threefold fewer exciting words (e.g., adventure, blasts), half as many fun words (dippable, tanglers), and significantly fewer tasty, textured, indulgent, and American region words than standard dishes. Together, these results suggest that healthy foods are clearly labeled as healthy but also as less exciting, fun, indulgent, tasty, and American than standard menu foods.

Healthy menu sections and health-focused descriptions are likely intended to increase healthy choices. Yet this disproportionate use of health-focused language for healthier dishes and more appealing language for standard dishes may have a negative impact. Many Americans implicitly and explicitly associate increased healthiness with decreased tastiness and satisfaction (Raghunathan, Naylor, & Hoyer, 2006; Suher, Raghunathan, & Hoyer, 2016), qualities which most diners prioritize in the moment of food choice (Aggarwal, Rehm, Monsivais, & Drewnowski, 2016; Glanz, Basil, Maibach, Goldberg, & Snyder, 1998). As a result, describing foods with an emphasis on nutritional qualities rather than appealing qualities (e.g., flavor, positive experiences) decreases the number of diners choosing (Bacon, Wise, Attwood, & Vennard, 2018; Turnwald et al., 2019; Turnwald, Boles, & Crum, 2017; Turnwald & Crum, 2019) and consuming (Maimaran & Fishbach, 2014; Turnwald et al., 2019; Woolley & Fishbach, 2016) them, and decreases perceived tastiness and satiety (Finkelstein & Fishbach, 2010; Raghunathan et al., 2006; Suher et al., 2016; Turnwald & Crum, 2019). This body of research suggests that America's top-selling casual dining chain restaurants could entice more customers to choose and enjoy healthy foods by exchanging health-focused language for more appealing descriptions.

The prior research comparing restaurant menu descriptions of healthy and standard items was limited to America's most popular casual dining chain restaurants. With affordable price points, these restaurants primarily cater to patrons of lower and middle socioeconomic status (SES). The focus of the present work was to conduct a linguistic analysis of America's popular expensive restaurants, which primarily cater to patrons of higher SES. Do America's expensive restaurants also describe their healthiest menu items as less appealing than standard items?

This question is important in light of growing SES disparities in dietary intake. While fewer than 2% of all Americans consume "optimal" diets (Rehm et al., 2016; Wang et al., 2014), wealthy, educated Americans have healthier diets than poorer, less educated Americans, and the gap is widening (Rehm et al., 2016; Wang et al., 2014). Using a nationally representative sample of tens of thousands of participants, Rehm, Peñalvo, Afshin, and Mozaffarian (2016) showed that 68% of low-income adults (ratio of family income to poverty level <1.3) consumed a "poor diet" compared with 51% of high-income adults (family income to poverty level >3.0) in 2003–2004. By 2011–2012, 61% of low-income adults consumed a "poor diet" compared with 36% of high-income adults. These data suggest meaningful gaps in diet quality by income and that the gap is widening (17% gap in 2003–2004, 25% gap in 2011–2012). Wang et al. (2014) presented converging evidence of the gap in diet quality by SES (composite of education and income) and reported that the gap doubled from 1999–2010 using a different index for assessing diet quality. Moreover, Liu, Rehm, Micha, and Mozaffarian (2020) showed disparities in meal choice specifically at full service restaurants (any restaurant with a

waiter/waitress) using nationally representative data. Between 2003–2016, meals consumed at full service restaurants were poorer in diet quality among patrons with less education, and the income gap in meal health quality at full service restaurants significantly widened by 14%. Given SES differences in dietary intake and that Americans frequently dine out, it is important to understand whether differences exist in how healthier options are described at the moment of purchase in dining settings that differ by socioeconomic status.

Importantly, this research exploring potential differences in descriptive menu language cannot explain SES disparities in dietary intake. Rather, this research tests whether differences exist in descriptive menu language at expensive and inexpensive restaurants and describes the potential for such differences to contribute to and interact with disparities in diet quality. If expensive restaurants use appealing language to describe both healthy and standard menu items while inexpensive restaurants use less appealing language for healthy items than standard items, patrons at expensive restaurants would not be subject to a biased presentation of healthier options as less appealing. This could make it more appealing to choose healthy menu options for people who are already wealthier and healthier, potentially perpetuating SES disparities in dietary intake. Alternatively, if both expensive and inexpensive restaurants use fewer appealing themes to describe healthy items than standard items, then linguistic disparities in how healthy versus less healthy foods are described on restaurant menus may be prevalent irrespective of social class. This would reflect a broader tendency of American restaurants, regardless of price, to describe healthy foods as less appealing than standard options.

Published linguistic analyses of restaurant menus are sparse. One large study by Jurafsky, Chahuneau, Routledge, and Smith (2016) examined 6,511 American restaurant menus and compared general linguistic differences between expensive and inexpensive restaurant menus, without regard for food healthiness. The authors found that expensive restaurants describe food as naturally authentic (mentioning provenance, quality, and hand-processing) as opposed to traditionally authentic (mentioning family members, comfort, and traditions), and use longer, fancier, and more foreign words that signal educational capital. They also signal quality by refraining from highlighting abundance, offering fewer choices, and using fewer adjectives overall. These general linguistic differences between expensive and inexpensive food contexts were also observed in studies of descriptive language on food packaging (e.g., potato chips; Freedman & Jurafsky, 2011) and in consumer reviews on Yelp (Jurafsky, Chahuneau, Routledge, & Smith, 2014).

To our knowledge, only the aforementioned study (Turnwald, Jurafsky, et al., 2017) analyzed how inexpensive casual dining restaurants describe healthy compared to standard menu items, and no studies have analyzed how expensive restaurants describe their healthier menu items compared to standard items. The present research collected descriptive menu language from 160 top-rated expensive restaurants across eight American cities and quantified which of 22 predefined descriptive themes (e.g., taste, texture, size) were preferentially used to describe standard items versus healthy items. Results were then compared with prior research on menu language from inexpensive restaurants to answer the question of whether expensive restaurants, like inexpensive restaurants, also describe healthy items as less appealing.

Method

Restaurant Sample

To examine how expensive restaurants portray their healthier foods compared with standard foods, restaurant menus were collected from Yelp for each of the 20 top-rated restaurants within the highest price categories (\$\$\$ or \$\$\$\$) in each of the following eight U.S. cities: Los Angeles, New York, Chicago, Houston, Phoenix, Philadelphia, Seattle, and Denver.¹ According to Yelp.com, price categories refer to the approximate price per person for a meal, including one drink, tax, and tip, where \$ = under \$10, \$\$ = \$11–30, \$\$\$ = \$31–60, and \$\$\$\$ = over \$61. Data were collected in November and December 2017. Restaurants that had fewer than 300 reviews or did not have a viewable menu were excluded and the next highest-rated restaurant that fit the criteria was used. De jour (seasonal/daily), table d'hôte (fixed), and static à la carte (standard) menus were all included. Dessert and beverage menus were excluded. Ethics approval was not required because the study did not involve human research subjects.

Menu Composition

Research assistants manually recorded the name and description of every food item on each menu and noted whether each menu contained a healthy menu section (nutrition-related icons or menu subsections with a health-related heading). For descriptive purposes the number of items per restaurant menu, words per item, and characters per word were calculated, and items were categorized into common food types (e.g., seafood, pizza).

Dish Classification

Next, each menu item was coded as a healthy or standard item. In the study of inexpensive restaurants by Turnwald, Jurafsky, et al. (2017), this classification was simple because restaurants clearly labeled which dishes belonged to the healthy menu section. In this study of expensive restaurants, it was more challenging because few expensive restaurants had “healthy menu” sections (see Menu Composition section in Results). Therefore, the present study used a conservative definition of healthy items as leafy green salads and side vegetable dishes. Leafy green salads included salads with meat, but excluded pasta salads, potato salads, tuna salads, and salads made primarily of cheese, such as burrata or caprese salads. Side vegetable dishes (e.g., “grilled asparagus,” “sautéed spinach,” “charred broccoli”) were inclusive of all side or small vegetable plates, but excluded white potatoes and entrees, even vegetable-based entrees, such as eggplant parmesan, vegetable tacos, and pastas served with vegetables. All other items that were not salads or side vegetables were considered standard items.

Salads and vegetables were chosen because they are inversely associated with all-cause mortality, particularly cardiovascular-related mortality (e.g., Miller et al., 2017; Oyebode, Gordon-Dseagu, Walker, & Mindell, 2014). Additionally, salads and vegetables are recommended by the Academy of Nutrition and Dietetics, American Cancer Association, and U. S. Department of Agriculture as top tips for eating healthily when dining out. Most people, dietary professionals, and recommendations consider these foods to be healthy (e.g., Brown-Kramer, Kiviniemi, & Winseman,

2009; Scarborough, Rayner, Stockley, & Black, 2007). To ensure reliable coding of menu items, two coders each coded all 3,295 menu items as either healthy or standard. Interrater reliability was high (Cohen's $\kappa = .89$), indicating “almost perfect agreement” (Landis & Koch, 1977). All disagreements were resolved by the first author.

Sensitivity Analyses

Because other types of restaurant foods could also be considered healthy beyond salads and vegetables, two sensitivity analyses were conducted after the planned primary analysis. A first sensitivity analysis separately compared vegetables to standard options and salads to standard options in order to test whether theme differences were specific to salad or vegetable dishes rather than generalizing across healthy items. It was not possible to conduct analyses based on objective nutrition information, such as caloric or sodium content, because few restaurants provided nutrition information online (and no restaurants provided it on their menus). Therefore, a second sensitivity analysis compared descriptive themes used for seafood dishes (a healthier lean protein, $n = 821$ items) to red meat dishes (beef, lamb, and pork dishes, $n = 654$ items). Seafood dishes are often recommended as healthier protein sources than red meats, and confer benefits to cardiovascular health and longevity relative to red meats (Zhong et al., 2020). However, the evidence linking fish consumption to cardiovascular health and longevity (Zhong et al., 2020) and red meat consumption to cardiovascular disease and mortality (Zeraatkar et al., 2019) suggests weaker effects on health compared with the benefits of salads and vegetables. Therefore, this comparison was included and was expected to produce consistent but weaker effects than the primary comparison of salads and vegetables to standard menu items.

Linguistic Themes

To assess linguistic themes, descriptive words were organized into the same 22 qualitative themes generated in the prior analysis of inexpensive chain restaurants (Turnwald, Jurafsky, et al., 2017). The prior research constructed these themes based on established lexicons and published descriptive themes, as well as created new themes where there was no precedent in the literature (Freedman & Jurafsky, 2011; Jurafsky et al., 2014, 2016; Ochs, Pontecorvo, & Fasulo, 1996; Turnwald, Jurafsky, et al., 2017; Zwicky & Zwicky, 1980). Importantly, the prior research sorted all descriptive words into themes blind to which part of a menu the words came from. In the present research, novel descriptive words that did not appear in the prior study were also sorted into one of the existing 22 themes by two researchers blind to which part of the menu the word came from. The same 22 themes were chosen for the present research to minimize bias and to facilitate comparison between inexpensive and expensive restaurants.

Four of these themes represent health-focused themes (macronutrients, thinness, deprivation, and nutrition). Sixteen of the themes contain words that are high in positive valence, according

¹ In contrast, all restaurants in prior research on inexpensive chain restaurants (Turnwald, Jurafsky, et al., 2017) fell within the lowest price categories on Yelp (\$ or \$\$).

to participant valence ratings for over 20,000 English words (Mohammad, 2018). As such, these themes are referred to as “appealing” themes (see Figure S1), including exciting, indulgent, fun and engaging, traditional, artisan, social, choice, vague positive, American region, foreign, farm, texture, portion size, fresh, simple, and tasty. The two remaining themes, spicy and provocative, score negatively on valence. Thus, these two themes are not referred to as appealing (some diners may find spicy foods aversive), though they are potentially perceived as far more appealing in restaurant contexts than in the general context in which these words were originally measured (Mohammad, 2018). For example, “dynamite” (from the provocative theme) as an adjective in a food description context is likely more appealing than as a noun outside of the food description context.

Table S1 presents all words in all themes. Each word or phrase was examined case-by-case in sentence context to ensure that it was indeed used in the context embodied by a given theme (e.g., “extra meat” represented the size theme, but “extra virgin olive oil” did not). This step resulted in exclusion of 133 instances of theme words (0.4% of the dataset) and each exclusion is noted in Table S1. Word frequencies were calculated using NVivo qualitative data analysis software (QSR International Pty Ltd., Version 10, 2012), and a normalized frequency for healthy items and for standard items was obtained for each theme. The data are openly available on the Open Science Framework (https://osf.io/sgwbu/?view_only=e0d6fc4a94ec4c68abdf5e1705266071).

Statistical Analyses

As in the prior analysis of inexpensive restaurants, log likelihood ratios were used to quantify differences in themes between standard and healthy items. For each theme, a log-likelihood ratio of the normalized word frequency for standard items compared to healthy items was calculated. Normalized word frequencies included all words from menu items’ names and descriptions. Log likelihood ratios were compared to the chi-squared test statistic critical value (1 degree of freedom) to determine whether each theme was represented significantly differently (log likelihood >3.84 , $p < .05$) in the standard corpus compared to healthy corpus.

Comparison to Inexpensive Restaurants

Details regarding the sample of inexpensive restaurants are fully described elsewhere (Turnwald, Jurafsky, et al., 2017). In brief, the sample comprised all 26 casual and family dining chain restaurants in the top 100 restaurants in 2015 U.S. sales that contained a healthy menu section. This sample included restaurants such as Applebee’s, Chili’s, Olive Garden, and Outback Steakhouse (full list of restaurants in Table S2), rather than fast food or quick service restaurants. By limiting the comparison to casual and family dining restaurants that are typically for dine-in purposes, comparisons of expensive and inexpensive restaurant menus controlled for potentially confounding qualities of dining context such as ambiance, expectations, menu formats, and drive-throughs. The present research used the prior published data on inexpensive restaurant menu language (available at <https://osf.io/nda78/>) but additionally excluded all desserts ($n = 158$) because the data from expensive restaurants also excluded desserts. The final sample for

inexpensive restaurants comprised 262 healthy menu items (5,873 words) and 2,128 standard menu items (36,096 words). See Table S3 for results by theme from the sample of inexpensive restaurants. To provide context throughout the Results section, novel results for expensive restaurants are qualitatively compared to corresponding results for inexpensive restaurants from the prior investigation.

Results

Menu Composition

In total, the 160 expensive restaurant menus contained 847 healthy items with 7,467 words, and 2,448 standard items with 25,059 words. Just one of 160 expensive restaurants (0.6%) contained a healthy menu section or health-related icon (“Trust Me Lite”), compared with 26 out of 37 (70.3%) top-selling inexpensive restaurants in prior research (Turnwald, Jurafsky, et al., 2017). Among expensive restaurants, the most common restaurant type (see Table 1) was American (28.8%), followed by steakhouses (12.5%), Japanese restaurants (11.9%), Italian restaurants (7.5%), and seafood restaurants (7.5%). Representing a much smaller sample but with many more nationwide locations per restaurant, inexpensive chain restaurants (Table S2) had a similar proportion of American restaurants (38.5%), steakhouses (11.5%), Italian restaurants (11.5%) and seafood restaurants (7.7%) as expensive restaurants. However, the inexpensive restaurant sample had a greater proportion of breakfast and brunch restaurants (19.2%), and a smaller proportion of foreign cuisines than expensive restaurants (e.g., Japanese, Greek, French, Brazilian, Mediterranean). For expensive restaurants, the most common items offered (see Table 1) were seafood (24.9%), steak/beef (14.1%), vegetables (14.0%), salads (13.7%), and pasta/grains dishes (7.3%). Table S4 compares this distribution with the most common item types at inexpensive restaurants, which comprised sandwiches (14.2%), seafood (12.8%), breakfast (10.2%), salads (9.5%), and poultry dishes (9.4%).

Consistent with prior research on menu composition (Jurafsky et al., 2016), expensive restaurants offered approximately five times fewer menu items than inexpensive restaurants ($M_{expensive} = 21$ items $SD = 9$; $M_{inexpensive} = 98$ items, $SD = 45$). Also consistent with prior findings, expensive restaurants used approximately half as many words to describe items than inexpensive restaurants ($M_{expensive} = 9.8 \pm 5.8$ words/item; $M_{inexpensive} = 17.6 \pm 12.4$ words/item), but used longer words than inexpensive restaurants ($M_{expensive} = 6.1 \pm 1.1$ characters/word; $M_{inexpensive} = 5.7 \pm 0.9$ characters/word). These differences by restaurant price were more pronounced for descriptions of healthy items, where expensive restaurants used just 8.9 ($SD = 5.3$) words/item compared with 22.8 ($SD = 17.7$) words/item at inexpensive restaurants, and 6.4 ($SD = 1.0$) characters/word compared with 5.7 ($SD = 0.8$) characters/word at inexpensive restaurants.

Theme Differences in Standard Versus Healthy Item Descriptions at Expensive Restaurants

Log likelihood analyses comparing the normalized frequency of words within each theme for standard versus healthy items at expensive restaurants are presented in Table 2. Descriptions of

Table 1
Restaurant and Item Types in Expensive Restaurant Sample

Restaurant type	Freq.	Percent	Item type	Freq.	Percent
American	46	28.8	Seafood	821	24.9
Steakhouse	20	12.5	Steak/beef	466	14.1
Japanese	19	11.9	Vegetables	462	14.0
Italian	12	7.5	Salad	453	13.7
Seafood	12	7.5	Pastas/grains	240	7.3
Seafood/steakhouse	8	5.0	Other	213	6.5
French	7	4.4	Chicken/poultry	183	5.6
Brazilian	5	3.1	Sushi	109	3.3
American/French	4	2.5	Pork	106	3.2
Mexican	3	1.9	Lamb	82	2.5
Sushi	3	1.9	Soup	48	1.5
Tapas bar	3	1.9	Sandwich	44	1.3
Asian Fusion	2	1.3	Pizza	33	1.0
Latin American	2	1.3	Steak and seafood	27	0.8
Mediterranean	2	1.3	Tofu	8	0.2
Other	12	7.5			

Note. Classifications based on Yelp's cuisine listing on each restaurant's Yelp.com page. Restaurant Types marked as Other include 1 entry from each of the following: American/Tapas, Cajun/Creole, European, German, Greek, Italian/Seafood, Japanese/French, Korean/Seafood, Middle Eastern, Peruvian, South African, Vegan. Items categorized as Other included antelope, escargot, goat, poutine, foie gras, sampler plates, and "choose your own" combinations. Total restaurants = 160, total items = 3,295.

healthy items used 4.8-times fewer American regional words (e.g., Kansas City, Rocky Mountain; OR = 4.84, 95% CI [3.15, 7.45]), 2.7-times fewer exciting words (e.g., exotic, rainbow; OR = 2.68, 95% CI [1.44, 5.00]), 2.5-times fewer portion size words (e.g., colossal, giant; OR = 2.46, 95% CI [1.32, 4.60]), 2.2-times fewer spicy words (e.g., zesty, chipotle; OR = 2.17, 95% CI [1.24, 3.79]), 1.6-times fewer artisan words (e.g., hand-selected, imported; OR = 1.60, 95% CI [1.21, 2.12]), 1.4-times fewer tasty words (e.g., tangy, flavors; OR = 1.44, 95% CI [1.03, 2.02]), and 1.4-times fewer foreign region words (e.g., Hungarian, Israeli; OR = 1.40, 95% CI [1.11, 1.78]) compared with standard menu items.

Healthy menu item descriptions used 1.5-times more traditional words (e.g., classic, original; OR = 0.69, 95% CI [0.54, 0.87]), 1.5-times more farm words (e.g., harvest, farmer; OR = 0.67, 95% CI [0.54, 0.84]), and 1.9-times more fun and engaging words (e.g., wedge, skewers; OR = 0.53, 95% CI [0.39, 0.73]) compared with standard menu items. There was no difference in the use of health-related themes, including thinness, macronutrients, deprivation, or nutritious themes between healthy and standard menu items. There was also no difference in the use of vague positive, provocative, social, simple, indulgent, texture, choice, or fresh themes between healthy and standard items (see Table 2). Across the 10 themes that significantly differed between healthy and standard menu items at expensive restaurants, Figure 1 presents word clouds of the specific words within each theme that were represented more in healthy items or in standard items. The size of each word indicates the extent to which it was overrepresented in one corpus relative to the other.

Sensitivity Analyses of Expensive Restaurants

The first sensitivity analysis, which separately compared vegetables to standard items and salads to standard items (presented in Table S5), showed a similar pattern of results for many themes (American

region, exciting, artisan, size, spicy, vague positive, foreign, provocative, texture, choice, and farm). However, this analysis revealed several pronounced differences for taste, indulgent, traditional, fun and engaging, and fresh themes depending upon whether salads or vegetables were compared with standard items. Salads were more likely to use fun and engaging, traditional, and fresh themes, differences that were driven by the use of the word "house" in the traditional theme and the word "wedge" for the fun and engaging theme for salad descriptions (removal of each word removed the association). In contrast, vegetables used the indulgent theme significantly more than standard items and showed a nonsignificant trend toward using the taste theme more than standard items.

The second sensitivity analysis (presented in Table S6) also showed that red meats (the less healthy option) were described with significantly more appealing themes (artisan, indulgent, traditional, vague positive, and choice themes) than seafood dishes (the healthier option). Many other themes were trending in a direction favoring red meats, but did not reach significance in this sample that was less powered than the full sample. The only appealing themes that were used significantly more for seafood were the foreign, fresh, and taste themes. The difference for the taste theme was driven by the word "spicy" (removing this word removed the association). Overall, these sensitivity analyses support the conclusion that healthier menu items are described with fewer appealing themes than standard menu items, though the exact themes for which the comparison reached statistical significance varied depending upon the comparison groups.

Detailed Comparison to Prior Research on Inexpensive Restaurants by Theme

Figure 2 compares the results by descriptive theme for expensive restaurants (black) to inexpensive restaurants (gray). Where the odds ratio is greater than 1.0 for both inexpensive and expensive restaurants, it indicates that both inexpensive and expensive

Table 2
Results of Healthy Versus Standard Item Descriptions in Expensive Restaurants

Theme	Odds ratio [95% CI]	Log likelihood	Frequency in healthy items (% of words)	Frequency in standard items (% of words)	Exemplar words
Words more likely to occur in standard item descriptions					
American region	4.84 [3.15, 7.45]	83.25****	0.30	1.43	Maine, Kansas City, Rocky Mountain, Napa
Exciting	2.68 [1.44, 5.00]	12.46***	0.15	0.40	extravaganza, safari, exotic, rainbow
Size	2.46 [1.32, 4.60]	10.04**	0.15	0.36	colossal, double, giant, "hanging off the plate"
Spicy	2.17 [1.24, 3.79]	8.93**	0.19	0.41	spicy, zesty, mesquite, chipotle
Artisan	1.60 [1.21, 2.12]	12.34****	0.79	1.27	distinctive, delicately, hand selected, slowly
Taste	1.44 [1.03, 2.02]	4.97*	0.55	0.79	tangy, flavors, fragrant, briny
Foreign	1.40 [1.11, 1.78]	8.39**	1.10	1.54	Hungarian, Israeli, Ecuadorian, Chilean
No difference in standard items versus healthy items					
Vague positive	2.26 [0.89, 5.75]	3.61	0.07	0.15	great, extraordinary, remarkable, wonderful
Thinness	2.01 [0.70, 5.74]	2.01	0.05	0.11	lean, light, petite, lightly
Provocative	1.60 [0.75, 3.40]	1.65	0.11	0.17	insane, forbidden, ugly, "what's the dill yo"
Social	1.25 [0.47, 3.32]	0.21	0.07	0.08	family, grandmother, wife, "to share"
Simple	1.19 [0.25, 5.61]	0.05	0.03	0.03	simple, mild, simply, dry
Deprivation	NA	0.52	0.00	0.00	non-sweet
Indulgent	0.95 [0.80, 1.13]	0.29	2.35	2.24	rich, glazed, sumptuous, elysian
Macronutrients	0.89 [0.18, 4.42]	0.02	0.03	0.02	whole wheat, whole grain, monounsaturated
Texture	0.79 [0.63, 1.00]	3.83	1.33	1.05	crispy, velvety, crunchy, puffed
Choice	0.77 [0.41, 1.42]	0.69	0.19	0.14	choose, request, your liking, your favorite
Fresh	0.73 [0.49, 1.11]	2.07	0.43	0.32	fresh, freshly, freshest
Nutritious	0.18 [0.02, 1.97]	2.59	0.03	0.00	superfood, health
Words more likely to occur in healthy item descriptions					
Traditional	0.69 [0.54, 0.87]	9.14**	1.33	0.91	classic, tradition, signature, original
Farm	0.67 [0.54, 0.84]	11.64****	1.49	1.00	farmer, field, harvest, grown
Fun and engaging	0.53 [0.39, 0.73]	14.51****	0.82	0.43	bites, stix, wedge, skewers

Note. Themes are organized by odds ratio from overrepresentation in descriptions of standard menu items (top section) to overrepresentation in descriptions of healthy menu items (bottom section). Themes in the center section showed no significant difference by item type. For reference, the frequency of "and" (the most common word) was 2.40% in the entire data set. All odds ratios were calculated by dividing the normalized frequency of the standard corpus by the normalized frequency of the healthy corpus. CI = confidence interval; NA = odds ratio not calculable.

* $p < .05$. ** $p < .01$. *** $p < .001$. **** $p < .0001$.

restaurants used that theme more frequently to describe standard items than healthy items. Where the odds ratio is less than 1.0 for both inexpensive and expensive restaurants, it indicates that both used that theme more frequently to describe healthy items. Where estimates for inexpensive and expensive restaurants lie on opposite sides of the dotted line, their patterns diverged.

The pattern of results shows that expensive and inexpensive restaurants tended to use more appealing themes to describe standard items than healthy items, including American region, exciting, artisan, taste, size, and vague positive themes. They also tended to use spicy and provocative themes more for standard items than healthy items, which are themes composed of high arousal words (Figure S1). Expensive and inexpensive restaurants also showed a similar pattern in their tendency to use farm and fresh themes more for healthy items than standard items.

However, patterns diverged between expensive and inexpensive restaurants for a variety of themes. Notable among these differences was the trend for expensive restaurants to have lower odds of using the appealing themes of fun and engaging, traditional, texture, and indulgent for standard items compared with inexpensive restaurants. Expensive restaurants even used the fun and engaging and traditional themes significantly more for healthy items than standard items, differences that were driven by the word "wedge" for the fun and engaging theme (e.g., "wedge salad") and "house" for the traditional theme (e.g., "house dressing" for salads).

The bottom of Figure 2 also shows large differences by restaurant type in the use of health-focused themes. While inexpensive restaurants preferentially described healthy items with health-focused themes (thinness, macronutrients, nutrition, and deprivation), expensive restaurants did not use health-focused themes preferentially to describe healthy items. Expensive restaurants contained few health-focused words to describe any items (represented by the large 95% confidence intervals).

Finally, though not the primary aim of this study, there were several notable differences in general theme emphases between standard descriptions at expensive and inexpensive restaurants (regardless of food healthiness) that relate to prior research (Table S7). Replicating findings from Jurafsky et al. (2016), expensive restaurants used more artisan, farm, and provenance words (American region and foreign themes) than inexpensive restaurants, whereas inexpensive restaurants used significantly more size, choice, and more appealing themes overall.

Discussion

This research quantified the descriptive language that 160 expensive restaurants from eight U.S. cities used to describe their healthier versus standard menu items. Aligning with findings from inexpensive restaurants in prior research (Turnwald, Jurafsky, et al., 2017), healthy items were described with fewer appealing

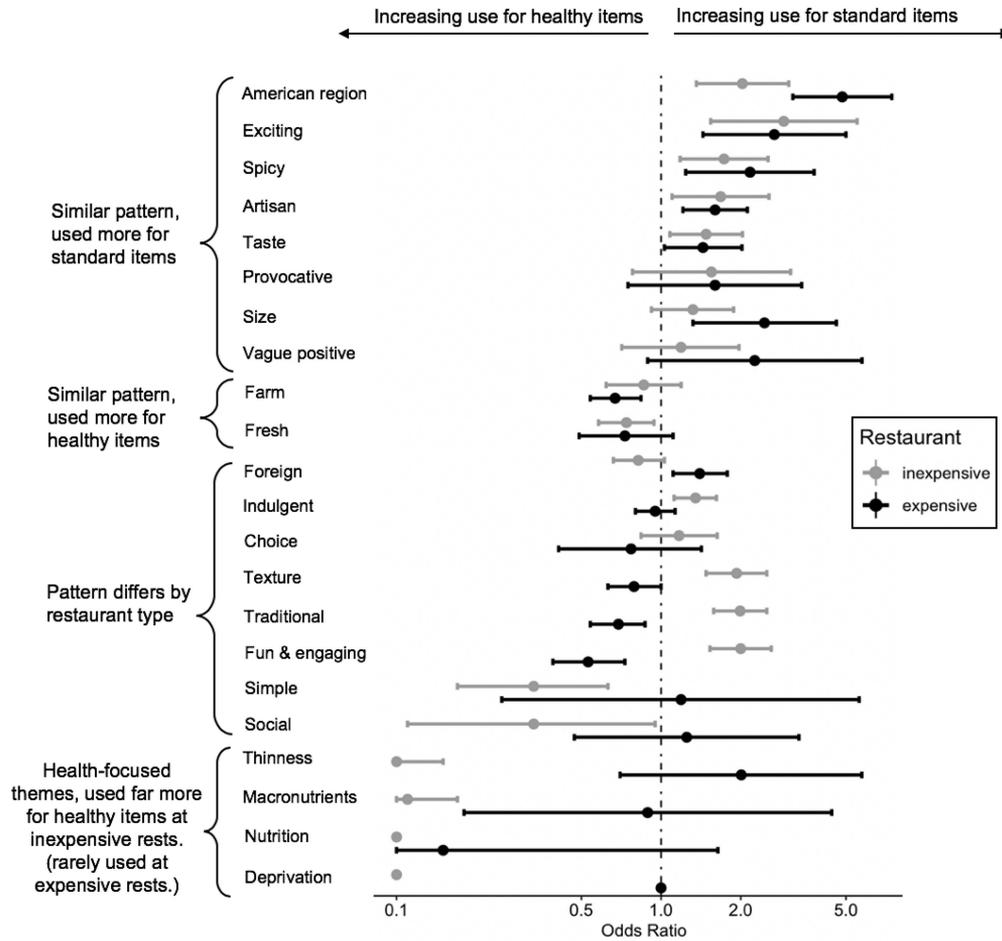


Figure 2. Comparison of odds ratio by theme at expensive and inexpensive restaurants. Values indicate odds ratios with 95% confidence intervals. Odds ratios less than 0.1 are displayed as a point estimate at 0.1 to enhance readability. For full results by theme, see Table 2 for expensive restaurants and Table S3 for inexpensive restaurants.

themes than standard items. Expensive restaurants used significantly fewer references to excitement, portion size, American and foreign regions, artisanal preparation, and tastiness when describing healthy items compared with standard items. Sensitivity analyses supported the interpretation that healthier menu items were described with fewer appealing themes, though the exact themes for which the comparison reached statistical significance varied depending upon the comparison groups. This suggests that, regardless of restaurant price, American restaurants tend to describe healthier items as less appealing.

In contrast to prior findings from inexpensive chain restaurants, however, expensive restaurants did not emphasize health attributes of their healthy items, rarely using health-focused themes to describe any item. Furthermore, expensive restaurants rarely contained a separate “healthy” section of the menu or health-focused logos (only 0.6% of restaurants), a practice that was far more common at top-selling inexpensive restaurants. Also in contrast to inexpensive restaurants, expensive restaurants did describe their healthy items as more fun and engaging and more traditional than standard items, whereas inexpensive restaurants overrepresented these appealing themes in standard

item descriptions. This represents a slightly smaller bias toward some appealing themes for standard items at expensive restaurants compared to inexpensive restaurants, especially given that expensive restaurants also did not use indulgent or texture themes more for standard items than healthy items.

Although the primary aim of this study focused on differences between healthy and standard item descriptions, there were several general differences between expensive and inexpensive restaurants. Consistent with prior research on menu composition (Jurafsky et al., 2016), expensive restaurants offered far fewer menu items, and used fewer, longer words to describe them compared with inexpensive restaurants. Expensive restaurants also used significantly more artisanal, farm, and provenance words (American region and foreign themes). These patterns reflect expensive restaurants’ tendency to highlight natural authenticity, establish status by using longer words and describing the sourcing of quality products, and reference rare ingredients or preparations that are authentic to foreign cuisines. Inexpensive restaurants used significantly more of the size and choice themes and more appealing themes overall. This also replicates patterns from Jurafsky et al.

(2016), and reflects the increased importance to assure customers at lower status restaurants that they will feel sated for a good value (size theme), satisfy a desire for customization as opposed to deferring to the chef (choice theme), and use more overall descriptive words to potentially compensate for lower quality or authenticity, as compared with high status restaurants.

Implications and Future Directions

Describing healthy items as less appealing can negatively impact healthy food choices. Healthy dishes, like vegetables, that are described as more exciting, tasty, indulgent, and artisanal are more likely to be chosen by diners in field experiments (Bacon et al., 2018; Turnwald et al., 2019; Turnwald, Boles, & Crum, 2017; Turnwald & Crum, 2019) because they increase diners' expectation of a positive taste experience (Turnwald et al., 2019). Expensive and inexpensive restaurants could both do more to promote healthy options by using just as many appealing descriptors that highlight the mouthwatering, exciting, and irresistible attributes of their healthiest options as they do their standard options. Importantly, when using descriptive language to elevate diners' expectations of a tasty and enjoyable experience, the language must rely on truthful attributes of the dish, including highlighting an interesting ingredient or describing the comfort, pleasure, indulgence or excitement of eating the dish.²

Regarding health-focused language, that expensive restaurants did not use health-focused themes represents a slight improvement compared to inexpensive restaurants, which used more thinness, macronutrient, deprivation, and nutritious themes to describe healthy menu items. Whereas a minority of individuals that prioritize healthiness above all else may prefer dishes that emphasize nutritional qualities (Papies & Veling, 2013), health-focused language decreases appeal and choice for a majority of people (Bacon et al., 2018; Raghunathan et al., 2006; Suher et al., 2016; Turnwald et al., 2019; Turnwald, Boles, & Crum, 2017; Woolley & Fishbach, 2016). A variety of factors may contribute to this differential use in health-focused language by restaurant price. Prior work suggests that inexpensive restaurants may feel a need to assure the customer that a dish or ingredient is high quality or healthy, whereas this is simply implied by the high status of expensive restaurants (Freedman & Jurafsky, 2011; Jurafsky et al., 2016; Orzach, Overgaard, & Tauman, 2002; Ridgeway & Fisk, 2012). Since expensive restaurants are not explicitly priming healthiness with descriptive language, diners at expensive restaurants may be less prone to automatically associating healthier options with being less tasty and less satisfying compared with diners at inexpensive restaurants, where the emphasis on health qualities is more salient.

The consistent underrepresentation of American region words for healthy foods, regardless of restaurant price, is also notable. Presenting healthy options as less American has the potential to not only perpetuate negative stereotypes that Americans eat unhealthy foods (e.g., Guendelman, Cheryan, & Monin, 2011), but also dissuade diners from ordering healthy foods to the extent that they identify strongly with being an American in the moment of food choice, as suggested by research on identity relevance and health behaviors (Berger & Rand, 2008; Oyserman, Fryberg, & Yoder, 2007). Future research could explore whether emphasizing American or local regions in healthy food descriptions increases diner perceptions that Americans do eat healthy foods and that

healthy foods are representative of local or American regional identities.

Much additional research is needed to understand whether different linguistic themes are used to describe healthy foods in settings that are split along SES lines. Future research should explore language outside of restaurant menus. Qualitative interviews reveal that when discussing healthy eating, low SES households emphasize the importance of food price more than high SES households (Fielding-Singh & Wang, 2017). Pitting healthy eating against price, this language may exacerbate SES differences in dietary intake by reducing perceived feasibility of healthy eating in low SES households. Recent improvements in the tools available for analyzing text and the explosion of big data on social media make it possible to explore related research questions on a much larger scale using language from real-world interactions. For example, how do members of higher status networks talk about healthier foods compared with members of lower status networks on social media? Research has already explored differences in food dialogue between healthy versus less healthy American cities on Reddit (Blackburn, Yilmaz, & Boyd, 2018), among zip codes within a region on Twitter (Nguyen et al., 2017), and between food deserts and nondeserts on Instagram (De Choudhury, Sharma, & Kiciman, 2016). Similar methods can elucidate how healthy foods are talked about in high versus low SES contexts at scale to understand potential impacts on and interactions with disparities in dietary intake.

Limitations

The present work had several limitations. Menus from expensive restaurants were collected online from each restaurant's Yelp listing in autumn 2017, whereas menus were collected in person from inexpensive restaurants in summer of 2016. It is unlikely that this difference in timing or source substantially impacted the results, though the possibility cannot be ruled out. The sample of expensive restaurants was limited by focusing on major metropolitan areas, and future research might explore whether these trends generalize to independent restaurants elsewhere. Additionally, based on differences in how menus were organized at expensive and inexpensive restaurants, the definition of healthy foods differed. Because less than 1% of expensive restaurants contained healthy menu sections, the definition of healthier options at expensive restaurants was limited to salads and side vegetables. Although 160 expensive restaurants were used in the present research compared with 26 inexpensive restaurants in prior research, the overall number of menu items and descriptive words were similar in the two data sets, and inexpensive chain restaurants have greater cumulative impact on the nation's diet. Finally, although word frequencies are important, other aspects of language could also make words more or less noticeable, such as along dimensions of word rarity/commonness or familiarity/unfamiliarity.

Conclusion

Expensive restaurants in America use fewer appealing themes to describe their healthier items, like salads and vegetables, compared

² The "Edgy Veggies" labeling tool kit (<https://sparqtools.org/edgyveggies/>) is a freely available resource containing step-by-step instructions for implementing descriptions that boost the appeal of healthy foods.

with the rest of the menu. However, they do not overemphasize health-focused themes to promote healthy items, a slight improvement in making healthy items sound enticing compared to inexpensive restaurants. Overall, the pattern of descriptive language at both expensive and inexpensive American restaurants implies that healthier foods are less appealing, which can negatively impact diners' perceptions of healthy foods and discourage healthy food choices. More changes are needed to describe healthier items using themes that are just as appealing as standard items, regardless of restaurant price.

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