INVESTIGATING THE EFFECTS OF CALORIE LABELS, CALORIC CONTENT, AND FOOD DESCRIPTIONS ON CONSUMER EVALUATIONS OF RESTAURANT MENU ITEMS

by

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Abstract

Existing literature has established a strong link between rising obesity rates and increased caloric intake, possibly influenced by the increasing tendency to eat in restaurant settings. Despite government regulations forcing restaurant chains to include calorie information on menu items, there has been little research conducted to see if this nutritional information has an impact on consumer choice. It is possible that consumers ignore the calorie information or are more influenced by the food item descriptions or images when they make their choices from the menu. The current study's aim was to investigate the effects of calorie labels, caloric content, and descriptions on consumer ratings of intent/desire to order, and perceived healthiness of food items featured in a mock restaurant menu. Overall, participants reported higher intent ratings when calorie labels were absent than when they were present. Additionally, participants reported higher desire ratings for high-calorie foods than low-calorie foods, and higher health ratings for low-calorie foods than high-calorie foods. Participants also reported higher health ratings for foods with "healthy" descriptions than for those with "appealing" descriptions. The current study has important implications, which could potentially lead to the development of marketing strategies used to help consumers make healthier, and more informed, choices when dining outside the home.

Keywords: calorie labels, caloric content, food descriptions, consumer evaluations, perceived healthiness, restaurant menus

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Investigating the Effects of Calorie Labels, Caloric Content, and Food Descriptions on Consumer Evaluations of Restaurant Menu Items

Chapter One: Introduction

Worldwide, the prevalence and health effects of obesity are on the rise (Ng et al., 2014). Statistics Canada (2018) reported that 34% of Canadians are overweight and 27% are obese; most notably, that 20% of individuals between age 18-39 are obese. Research has demonstrated a strong link between obesity and the development of chronic health conditions, including but not limited to, diabetes, hypertension, high cholesterol, stroke, heart disease, certain cancers, arthritis, skeletomuscular problems, and respiratory illnesses (Malnick & Knobler, 2006; World Health Organization, 2002). Chandon and Wansink (2007a) suggest that a common assumption in today's society is that increasing obesity rates could be explained by a rise in sedentary lifestyles; suggesting that individuals today have become significantly less active than in previous generations (Heini & Weinsier, 1997). Contrarily, the authors show that research has revealed the proportion of sedentary lifestyles has decreased (Talbot, Fleg & Metter, 2003) whereas the high obesity rates may be better explained by an overall increase in caloric intake (Cutler, Glaeser & Shapiro, 2003; Kopelman, 2000), possibly due to dining in restaurant settings. Therefore, the current study sought to investigate how the various elements of a restaurant menu (i.e., calorie labels, caloric content, food descriptions) could influence individuals' nutritional perception of food items, as well as their overall intent and desire to order and consume those items. Although much research has been devoted to the study of food packaging (see Chandon, 2013 for a review), the current study will solely focus on food items featured in a restaurant menu format.

In recent years, there has been an increasing trend for individuals to dine outside the home (Liu, Kasteridis, & Yen, 2013). Nutrition plays an imperative role in attaining and sustaining a healthy lifestyle and body weight (Reale & Flint, 2016), and as such, can be compromised by dining outside the home. Furthermore, a relationship has been found between the ever-increasing number of restaurant establishments and obesity rates (Dumanovsky, Huans, Bassett & Silver, 2010; Rosenheck, 2008). More specifically, it has been shown that the trend to dine in these settings has been linked to the development of obesity, weight gain, and higher levels of body fat (Roberto, Larsen, Agnew, Bail & Brownell, 2010). In an effort to attenuate these negative health consequences, anti-obesity initiatives have focused on the importance of endorsing diminished energy intake, as well as encouraging healthy lifestyles (Valaquez & Pasch, 2014). The mere existence of restaurant establishments cannot be purported as the only causative factor for the rising rates of obesity; therefore, research has attempted to explain this link by examining possible underlying factors. Why do individuals show a tendency to consume more than "normal" when dining outside the home? This question has led to the examination of contributing factors, such as characteristics of restaurant foods, as well as marketing strategies used by these restaurant industries. Therefore, the current research study strived to investigate how the different information presented on restaurant menus could influence people's nutritional perception and overall evaluations to order and consume a menu item.

Studies examining the unique characteristics of restaurant foods, as it pertains to their nutritional content, have found that foods served in these settings tend to be high in fat, sodium, cholesterol, and overall caloric content, as well as lack essential nutrients, such as fibre and calcium (An, 2016; Stran, Knol, Turner, Severt, McCallum & Lawrence, 2015), which are necessary for the maintenance of proper health. Specifically, An (2016) showed that, on average,

meals served in dine-in restaurants contain approximately 200 more calories, and an extra 10 grams of fat, 58 milligrams of cholesterol, and 412 milligrams of sodium, than home-cooked meals. A serious concern is that consumers have been shown to be inaccurate in their estimations of the actual amount of fat, sodium and caloric content of high-calorie meals, such that they significantly underestimate these values (Bates, Burton, Huggins, & Howlett, 2011; Burton, Creyer, Kees, & Huggins, 2006; Chandon & Wansink, 2007a; Wansink & Chandon, 2006), which promotes overconsumption in these settings. It has also been demonstrated that individuals receive inaccurate sensory signals, or indicators of satiation, after consuming foods that are high in fat, which may, in part, explain the overconsumption of restaurant foods (Viskaal-van Dongen, de Graaf, Siebelink, & Kok, 2009). Furthermore, it has been shown that portion sizes of meals served in restaurants have increased over the years (Roberto et al., 2010; Young & Nestle, 2012), which potentially promotes overconsumption and suggests that the portion presented on a plate, or in a single serving, is "acceptable" or "reasonable" to be consumed as part of a regular meal.

It may seem obvious that, if the over-consumption of unhealthy foods in restaurants is to blame for the rising rates of obesity, then the promotion of healthy restaurants or healthy food items in existing restaurants, should solve the problem. However, the solution may not be this simple. Heini & Weinsier (1997) introduced the topic of an "obesity paradox," whereby as the number of "healthy" restaurant establishments increases, so do obesity rates (Chandon & Wansink, 2007a; Heini & Weinsier, 1997). Chandon and Wansink (2007a) provided an explanation for this paradox, by demonstrating that restaurants which advertise themselves as healthier than their competitors (e.g., by using health-related slogans or advertising low-calorie dishes), contribute to a "health halo" effect. A health halo effect refers to a process by which

consumers overestimate the healthiness of a product based on an establishment's inaccurate, fraudulent or deceiving nutrition claims. Consequently, customers are then free to order and consume more liberally, with little fear or concern of indulging in unhealthy foods. With this misinformation, consumers significantly underestimate the caloric content of main dishes served in these settings, and subsequently choose high-calorie side dishes and desserts that result in an increased total number of calories consumed (Chandon & Wansink, 2007a). Interestingly, it has also been shown that individuals with a high BMI tend to significantly underestimate the caloric content of their food compared to individuals of lower BMI, due to the propensity for those with a high BMI to consume larger meals (Chandon & Wansink, 2007b). These researchers further examined the health-halo effect through an experiment where participants were asked to estimate the caloric content of two meals, one from Subway and one from McDonald's (Chandon & Wansink, 2007a). It was demonstrated that, solely based on previous knowledge of the restaurants' advertised health claims, participants estimated that food items from Subway (i.e., a ham sandwich and a turkey sandwich, 330 calories and 600 calories, respectively) contained significantly less calories than food items from McDonald's (i.e., a cheeseburger and a Big Mac, 330 calories and 600 calories, respectively), when in reality, both meals were equal in caloric content. This study showcases how caloric content estimations are inaccurate and can be strongly influenced by the ideas or beliefs a consumer holds about a food item or restaurant establishment, which may then lead to overconsumption in these settings.

Other research exploring the health halo effect showed that by placing a "heart-healthy" claim on a food package or a menu, without any additional nutritional information, customers perceived the food item to reduce the risk of heart disease or stroke, even though the food item (lasagna) was not overly health (Kozup, Creyer, & Burton, 2003). Moreover, it was shown that

when positive nutritional information *was* presented, it resulted in more positive consumer evaluations of the food item with respect to its nutritive value, purchase intention, and again, its perceived ability to reduce risk of heart disease or stroke (Kozup et al., 2003). The failure to identify a company's marketing strategy regarding the use of health-related terminology and marketing tactics speaks to a consumer's impressionability and naïve trust with the company and, essentially, the product itself. Further concerning is that restaurants can easily influence consumer perceptions of food items by using health-related information deceivingly, as it has been shown that one of the most influential factors impacting food ordering decisions is perceived healthiness (Carrillo, Varela, Salvador & Fiszman, 2011). The tendency for restaurant food to be served in large portion sizes, high in calories, and of low nutrient content, coupled with the health-halo effect, make it unsurprising that consumers are often inaccurate in their estimations of perceived healthiness of restaurant food items.

Research thus far has examined the influence of calorie labels and caloric content of food, and food descriptions on individuals' evaluations of food items; however, to date, research has mostly examined these variables independently. Therefore, the purpose of this study was to examine the combined effects of menu elements (i.e., calorie labels, caloric content, food descriptions) on consumer evaluations of food items. Specifically, the current study focused on food items that would typically be served at dine-in, sit-down, or full-service restaurants with a tangible menu, as meals from these settings have been found to be even unhealthier than those served in fast-food settings (An, 2016). By examining these variables, along with individuals' eye movements, the present study investigated consumer ordering tendencies and nutrition perceptions when choosing food items from a mock restaurant menu. The identification of factors and/or characteristics of food items, on which individuals base their ordering decisions,

could potentially inform and help individuals choose healthier food options when dining outside the home.

1 Calorie Labels and Caloric Content

Calorie labels are a relatively new addition to fast-food and dine-in restaurants. As of January 1st, 2017, the government of Ontario enforced the *Healthy Menu Choices Act, 2015*, which states that caloric information for all food and drink items featured in restaurants, with more than 20 locations in Ontario, must be posted publicly on menu boards and in menus (Healthy Menu Choices Act, 2015). The Act also mandates that the recommended daily caloric intake be posted, which reads: "Adults and youth (ages 13 and older) need an average of 2,000 calories a day, and children (ages 4 to 12) need an average of 1,500 calories a day. However, individual needs vary" (Healthy Menu Choices Act, 2015). As previously identified, due to health-halo effects, individuals are often inaccurate in their estimations when evaluating high-calorie meals, and tend to significantly underestimate the caloric content of foods when dining outside the home (Bates et al., 2011; Burton et al., 2006; Chandon & Wansink, 2007a; Wansink & Chandon, 2006). The *Healthy Menu Choices Act* was implemented in an attempt to help individuals in Ontario make healthier and more informed decisions when dining out.

Calorie labels are a popular topic of study in the field of food research, and studies on the effects of calorie labels in restaurant menus have yielded mixed findings. Harnack and French (2008) conducted one of the leading literature reviews on the effectiveness of calorie labels and concluded that there was partial evidence to support that providing calorie labels at the point of purchase reduced subsequent calories ordered/consumed. Yet, based on the analysis of the majority of the studies included in their review, the authors indicated that calorie labels' effectiveness was, at most, weak, sometimes not observed at all, and often inconsistent (Harnack

& French, 2008). More recent reviews have demonstrated the somewhat limited effectiveness of calorie labels on reducing calories ordered (Bleich, Economos, Spiker, Vercammen, VanEpps, Block, Elbel, Story, & Roberto, 2017; Long, Tobias, Cradock, Batchelder, & Gortmaker, 2015). Despite these varied findings, many studies have demonstrated that calorie labels added to restaurant menus consequently decrease the number of calories ordered (Bassett, Dumanovsky, Huang, Silver, Young, Nonas, Matte, Chideya, & Frieden, 2008; Bollinger, Leslie & Sorensen, 2010; Krieger, Chan, Saelens, Ta, Solet and Fleming, 2013; Prins, Gonzales, Crook & Hakkak, 2012; Pulos & Leng, 2010; Tandon, Wright, Zhou, Rogers & Christakis, 2010). For example, a study by Krieger et al. (2013) examined the utility of calorie labels in 50 locations of 10 different chain restaurants with a total of 7325 participants, across King County, Washington. The researchers observed ordering tendencies by examining customer receipts and by performing exit surveys. It was found that, only after 18 months of calorie label usage, was there a significant decrease in mean calories purchased across restaurants (Krieger et al., 2013). Interestingly, this decrease was found to be most prominent in taco and coffee chains and was observed only among women. Moreover, it was also determined that consumer awareness of calorie information increased after 6 months of use and, consequently, those who reported seeing the labels, purchased fewer calories than those who reported not seeing the labels. The results of the study suggest that calorie labels not only elicit consumer attention, but also make the consumer more aware of the relative healthiness of their food choice (Krieger et al., 2013).

Notwithstanding the value of calorie labels in reducing consumption in restaurant settings, there exists a significant level of controversy and reluctance with the requirement for such labels to be posted in restaurant settings. Policy makers argue that the inclusion of calorie labels at the point of purchase, when they are most salient, reaches a large number of people and

provides customers with accessible information, thus helping them to make more informed choices when dining out (Girz, Polivy, Hermaan & Lee, 2011). On the other hand, the restaurant industry strongly opposes menu labeling legislation with the counterargument that the nutritional information already available to consumers before- or after the point of purchase (i.e., online or in pamphlets) is sufficient (Roberto et al., 2010). The restaurant industry further holds its position by arguing that the added cost of altering their menus, along with the added clutter of more information to their menus, is not justified by any effects observed on consumer ordering behaviours (Roberto et al., 2010).

Despite this controversy, studies report that most consumers are, actually, in support of having this information readily available to them (Roberto et al., 2010). Additionally, it has been shown that calorie information is simply not as effective when presented before- or after the point of purchase. Roberto, Agnew & Brownell (2009) purported that nutritional information is difficult to obtain and understand by the average consumer, and is rarely sought out unless showcased at the point of purchase (e.g., in a menu or an ordering board). A study was done with multiple fast-food chain restaurants (i.e., McDonald's, Burger King, Au Bon Pain and Starbucks) in cities across the United States where mandated calorie labeling had not yet been implemented (Roberto et al., 2009). The goal of the study was to assess the effectiveness of caloric information that was presented before the point of purchase (i.e., on a poster on the wall, or in a nutritional pamphlet). Of the 4311 participants across all the selected restaurants, only eight individuals were observed to note the caloric information either before purchasing their food, or after having made their purchase. These results highlight the importance of having nutritional information available *at the point of purchase*, as nutritional information is most salient when presented at this time, because the customer's attention is already focused on the menu/ordering

board when browsing their options (Bassett et al., 2008; Girz et al., 2011). In a similar study, Roberto et al. (2010) assessed the effects of calorie labels by monitoring participants' eating habits later in the day. The authors found that individuals ate approximately 250 fewer calories when the restaurant provided calorie labels along with a daily recommended calorie recommendation, in comparison to those individuals not provided with this information.

Other studies have examined the effects of alternative methods of nutritional labeling, such as traffic light icons (Hawley, Roberto, Bragg, Liu, Schwartz & Brownell, 2012), physical activity calorie equivalents (Dowray, Swartz, Braxton & Viera, 2013), and healthy logos (Vanderlee & Hammond, 2013). These various methods of calorie presentation were studied by Liu, Roberto, Liu & Brownell (2012), who presented participants with menus containing either no calorie labels, regular calorie labels, rank-ordered calorie labels (ordered from lowest to highest caloric content), or colour-coded calorie labels (red/green circles representing either "high" or "low" caloric content). Findings revealed that, although certain methods were more effective than others, irrespective of the calorie label method used, all forms of labels resulted in lowered calories ordered when compared to those who saw no calorie labels. Although rank-ordered and colour-coded calorie labels were found to be more effective than other formats, the simple numeric format most often appears in traditional restaurant menus and was therefore used in the current study.

In spite of mixed findings from calorie label research, the overall effectiveness of calorie labels has been demonstrated in their ability to reduce calories ordered, and to reduce eating later in the day. Additionally, calorie labelling in restaurants acts as an educational tool for individuals who may be unaware of the caloric content of their foods, and also allows for this information to be more easily accessed by individuals who are attuned to caloric content (Fernandes, de

Oliveira, Rodrigues, Fiates & da Costaa Proença, 2015). An area of research which has not been extensively studied is how calorie labels affect consumers' attitudes about restaurant menu food items. The current study will attempt to gain insight into the effects of calorie labels (present or absent) and caloric content (low- and high-calorie food items) on consumer perceptions (i.e., intent, desire, healthiness) of food items viewed in a mock restaurant menu.

2 Food Descriptions

Similar to research on calorie labels, research in the field of food descriptions varies in scope, and spans from marketing to public health. Most often, consumers are not presented with an image of each food item on a menu, nor are they offered samples of every item before ordering (Wansink, van Ittersum & Painter, 2004). This stresses the importance of food item descriptions in restaurant menus, as the consumer has very little information on which to base their decision. Due to the limited space available to showcase food items, restaurants must carefully choose the words they use to influence consumer decisions and attitudes (Wansink, Painter & van Ittersum, 2001). Descriptions can, therefore, be considered the "first impression" of a food item and can greatly influence a consumer's expectations of that food item (Wansink et al., 2004). With the goal of increasing purchase intentions and sales of their foods and imparting positive attitudes about the food items onto their customers, restaurants use descriptive words to appeal to their customers.

According to Wansink et al. (2001), descriptive labels can be categorized into groups, including but not limited to, geographic labels (which remind consumers of flavours from a certain area, e.g., "Southwestern Tex-Mex Salad"), affective labels (which provoke pleasant memories, nostalgia, or nationalism, e.g., "Legendary Chocolate Mousse Pie"), sensory labels

(which describe the sensation of a food item, e.g., "Buttery Plump Pasta"), and brand labels (which cite a well-known brand, e.g., "Jack Daniels ® BBQ Ribs"). Wansink and colleagues (2001) conducted a study at a university, where two food items in the cafeteria menu were accompanied by a basic label (e.g., "grilled chicken") and two food items were accompanied by a descriptive label (e.g., "tender grilled chicken"). Upon exiting the cafeteria, consumers who purchased the items being studied were asked to complete a questionnaire. Results revealed that sales of the descriptively labeled products increased by 27% and, based on the exit questionnaire, consumers were found to endorse higher ratings of quality and value towards these food items when compared to the customers who ordered and rated the foods with a regular label, despite having bought the same food item (Wansink et al., 2001). Additionally, it was found that descriptive labels increased the likelihood that participants would repurchase the food item, demonstrating the significant impact that words, alone, have on consumer attitudes and purchase intentions (Wansink et al., 2001).

As demonstrated by Wansink et al. (2001), descriptive words have the ability to increase sales of a food item. Furthermore, it has also been shown that descriptive words can greatly impact consumer expectations of a food item, which, in turn, can significantly influence the actual sensory experience of that food (Wansink et al., 2004). It has been suggested that, when consumers evaluate food items (before consumption), their expectations of these food items establish an emotional mindset, or an "affect state" that may further influence their perception of the food's taste (Wansink et al., 2004). In other words, if an individual *believes* that a food item will be pleasurable to consume, they will be more likely to rate the item as enjoyable (unless there is a dramatic discrepancy between their expectation and the food's actual taste) (Wansink et al., 2004). As such, the name and description of a food provides a cue or a prime for what to

expect from the taste (Wansink et al., 2004). Not only does this influence one's perception of the food's taste and appearance, but it can also influence estimations of its caloric content. Wansink et al. (2004) also demonstrated that participants who ate foods with descriptive names (e.g., "Succulent Italian Seafood Filet") provided more positive comments about the food items and rated them as more appealing, tastier, and higher in calories, than participants who ate the same foods with generic names (e.g., "Seafood Filet").

Pleasant descriptors of food items can increase positive attitudes and sensory experiences of a food; however, the effects of descriptive words can also have physiological outcomes. An applied aspect of this theory was examined by Crum, Corbin, Brownell & Salovey (2011) when participants who consumed a milkshake of equal caloric content (380 calorie) were either informed that they were given a 620-calorie "indulgent" milkshake or a 140-calorie "sensible" milkshake. The researchers measured participants' endogenous levels of ghrelin, a hormone that signals hunger, in both groups and found that, those who were told that they drank the "indulgent" high-calorie milkshake showed a sharper decrease in their ghrelin levels than those who were told that they drank the "sensible" low-calorie milkshake, when in fact, both groups drank the same milkshake. Comparatively, those who were told they drank the "sensible" low-calorie milkshake showed generally unchanged ghrelin levels, indicating that their hunger did not decrease after consuming the milkshake (Crum et al., 2011). These results have important implications when marketing low-calorie or healthy foods, as these descriptors may not always result in advantageous outcomes for the consumer, which could potentially lead to unnecessary overconsumption.

In response to critiques from public health initiatives that obesity rates are strongly linked to high-calorie and low-nutrient options served in dining establishments, many restaurants have

responded by including "healthy" food options on their menus. However, whether these foods are truly healthy, is up for debate, as evidenced by the health-halo effect (Chandon & Wansink, 2007a). Nevertheless, there has been an increasing trend to showcase healthy menu options using health-related language in an attempt to make these items stand out as healthier than others. By doing so, restaurants attempt to *convince* the consumer that they are making a healthy choice. Though it may seem obvious to highlight the healthiest options on the menu in this manner, some research suggests that emphasizing health could have negative effects and actually deter consumers from purchasing certain products. Turnwald, Jurafsky, Conner & Crum (2017b) studied this promotional strategy by examining menus from American chain restaurants that featured "healthy" items in their menus and by studying the vocabulary used in their descriptions. By comparing the words used to describe regular menu items and those used to describe healthy menu items, the analyses revealed that, when describing healthy items, restaurants used descriptive words that focused strongly on health-related topics (e.g., foreign, simple, macronutrient, deprivation, thinness, and other nutritious words), and less on appealing topics (e.g., exciting, fun, traditional, American regional, textured, provocative, spicy, artisanal, tasty, and other indulgent words) (Turnwald et al., 2017b). This suggests that, despite efforts to showcase healthy food items, health-related descriptors could possibly dissuade customers from purchasing these seemingly "less appealing" foods.

This raises the question of whether we can effectively promote healthier options in restaurant settings without making these choices seem undesirable. Turnwald, Bertoldo, Perry, Policastro, Timmons, Bosso, Connors, Valgenti, Pine, Challamel, Gardner, & Crum (2019) suggest that when making ordering decisions, a food's tastiness is more influential than its perceived healthiness and that incorporating more appealing words into descriptions of healthy

food items may entice individuals to order and consume them. Similarly, Turnwald, Boles & Crum (2017a) found that, among university students dining in a cafeteria, the number of individuals choosing vegetables, and their subsequent consumption of vegetables, increased through the use of taste-related descriptions compared to health-related or basic descriptions. In another set of studies, Turnwald and Crum (2019) showed that sales of healthy food items increased when they were described using taste-related labels compared to when those labels heavily featured health-related elements. For example, a healthy food item's sales increased by almost two-fold on a day that it was described using a tasty label (i.e., "Crispy veggie straws with decadent miso dip") than when it was described using a healthy label (i.e., "Fiber-packed vegetables with nutritious miso sauce") (Turnwald & Crum, 2019). Turnwald et al. (2019) not only showed that healthy items' sales increased with the use of tasty labels, but also that participants' perceived tastiness of these healthy items were enhanced with the use of tasty descriptions. These previous studies shine a light on the notion that describing healthy food items using healthy words and themes may not be the most effective way to promote healthier options in dining settings. An important aspect of the current study is that it presented consumers with "consistent" descriptions (e.g., high-calorie foods described using appealing words) and "inconsistent" descriptions (e.g., high-calorie foods described using health-related words) to examine the influence that descriptions have on consumer attitudes and perceptions of food items. It was a goal of the current study to see if participants' health evaluations of high-calorie food items could be swayed or influenced by the use of health-related words, to make them appear healthier than they actually are.

Related to these past studies, research has shown that consumers tend to perceive foods as either healthy *or* delicious. The belief that "healthy" and "delicious" are mutually exclusive

characteristics of food, is common among consumers, as individuals have been found to consider low-calorie meals to be less tasty than their high-calorie counterparts (Raghunathan, Naylor & Hoyer, 2006). The notion that healthy and delicious are opposites, introduces the Unhealthy = Tasty intuition (Raghunathan et al., 2006). This theory posits that individuals enjoy relatively unhealthy foods *because* of their perceived detriments, not in spite of them (Raghunathan et al., 2006). Essentially, individuals take pleasure in the consumption of unhealthy foods *because* they are "bad." The authors theorize that there are two underlying mechanisms for this intuition: 1) internal sources, such as personal experience or self-observation, and 2) external sources, such as media representations of food. Simply, the theory suggests that, due to a deep-rooted and implicit belief, and through cues from the environment, we believe that unhealthy foods taste better, and are thus more indulgent than healthy foods. This has been suggested to cause individuals to gravitate towards those items when seeking foods to eat (Raghunathan et al., 2006). In their study, participants described less healthy food items to be tastier, more enjoyable during consumption, and more preferred than healthier items during a choice task (Raghunathan et al., 2006). As consumers are exposed to these internal and external cues, they unconsciously form an association between "unhealthy = tasty" and "healthy = not tasty", which consequently impacts the way they choose their food in daily life.

Collectively, it is clear that there are both positive and negative effects of descriptive words on consumer food evaluations. The current study aimed to examine the effects of food descriptions (i.e., "healthy" or "appealing") on participants' ratings of intent and desire to consume a food item, as well as perceived healthiness of the food item. Additionally, the current study examined the effects of the Unhealthy = Tasty intuition by selecting foods in different categories (i.e., entrées, appetizers, salads, sandwiches) with equal representations from both

low-calorie and high-calorie items. Furthermore, by counterbalancing the description type (i.e., healthy/appealing) for each level of caloric content (i.e., low-calorie/high-calorie), this ensured that participants were exposed to stimuli consistent with the Unhealthy = Tasty intuition (i.e., low-calorie foods with "healthy" descriptions, and high-calorie foods with "appealing" description), and stimuli inconsistent with the Unhealthy = Tasty intuition (i.e., low-calorie foods with "appealing" descriptions, and high-calorie foods with "healthy" descriptions).

3 The Use of Eye Tracking in Nutrition Research

A growing trend in research is the use of eye tracking technology. Eye tracking involves the measurement of a participant's visual attention, by capturing their eye movements while taking part in a given task (Biel, 1993; LaBerge, 1995; Rizzolatti, Riggio & Sheligo, 1994). The primary advantage of this measure is its objectivity, which allows for an unbiased recording of visual attention, and minimizes the influence of demand characteristics on responding to maintain social desirability (Graham, Orquin & Visschers, 2012). Simply put, compared to self-report data, where participants may feel more pressured to provide socially desirable responses in an attempt to appear more health conscious than they truly are, this measure allows for more accurate and reflexive information to be collected (Graham et al., 2012). Through their study, Graham and Jeffery (2011) demonstrated the advantage of eye tracking as a measure of visual attention. Specifically, they found that participants reported that the amount of time they viewed a nutrition label was significantly higher than the objectively measured time, as measured by the eye tracker (Graham & Jeffery, 2011).

Eye tracking has most prominently been used in the field of marketing, where participant eye movements have been examined with respect to visual attention of advertisements (Wedel &

Pieters, 2008). Despite its prominent use in marketing-related research, it is less commonly used in food-related health research, and *even less* in research regarding dine-in restaurant menus (Kim, Tang, Meusel & Gupta, 2018). That being said, in food-related health research, eye tracking has most commonly been used to identify the importance and effectiveness of nutrition labels on food packaging (i.e., Nutritional Facts Tables). The use of eye tracking in product label research has allowed for a wide range of subject matter to be investigated, including the limitations that may enhance the effectiveness of nutrition labels (Graham et al., 2012), the effects of nutrition information placement on a label (Graham & Jeffery, 2011), and the effects of different label formats on healthy food choices (Fenko, Nicolaas & Galetzka, 2018).

In a review of eye-tracking literature, Graham et al. (2012) found that certain nutrition label characteristics enhance their effectiveness, whereby consumers are able to use such labels more efficiently. The researchers revealed that nutritional labels positioned centrally on a food package with minimal visual clutter are most effective in relaying health information to consumers (Graham et al., 2012). Additionally, characteristics pertaining to the labels' content, such as making the label more prominent or salient (e.g., bold texts and colours), increasing its surface size, and listing the nutritional information in order of relevance and importance, further enhances the label's effectiveness (Graham et al., 2012). Likewise, Graham and Jeffery (2011) found that information placed near the top of a nutrition label was viewed more than information placed near the bottom, and similar to Graham et al. (2012), that labels featured centrally on a screen were viewed more than labels located toward the periphery. Fenko et al. (2018) conducted a study in a university cafeteria using a mobile eye-tracker, where participants were asked to choose from different yoghurts, whose labels varied in format, fat content information, and brand. Although the researchers found that participants' awareness towards unfamiliar items was

increased by the presence of a health label, the labels alone, were not sufficient in persuading participants to make a healthier choice (Fenko et al., 2018).

It could be the case that consumers require more persuasion to make healthier food choices. A study by van der Laan, Papies, Hooge & Smeets (2017) showcased the effects of health priming on visual attention. In this experiment, participants were instructed to choose between a low- or high-calorie food item in a simulated grocery shopping choice task. The study found that, when exposed to a health prime (i.e., banners on the top of the computer screen featuring health- and dieting-related words), the proportion of low-calorie food choices was significantly higher than the proportion of high-calorie food choices, when compared to individuals who saw a neutral prime, or no prime at all (van der Laan et al., 2017). Furthermore, the mean total dwell time (amount of time spent) on low-calorie foods was significantly higher for individuals who were health-primed than for those in the other conditions (van der Laan et al., 2017). These findings propose that subconscious processes are at work when consumers choose the foods they wish to purchase or consume, and that even a seemingly insignificant prime can sway their tendencies toward a healthier food choice. This also highlights the importance of advertising and marketing healthier products as external cues, or primers, as the majority of foods advertised in mainstream media are “indulgent” and unhealthy foods (van der Laan et al., 2017). With respect to restaurant menus, Yang (2011) employed eye-tracking to examine the specific design elements of a menu that make it more readable. Participants were asked to view a series of three menus (i.e., two wine lists, one dinner menu) and order, while their eye movements were being tracked. The results showed that the “sweet spot”, or the area where the participants looked first, was the upper left corner of the first page of the menu (Yang, 2011). Additionally, although there were few “sour spots” on the menu, the bottom areas of each

menu page were viewed significantly less than other areas of the menu (Yang, 2011). Overall, these eye-tracking studies provide valuable information with respect to the marketing of food.

As it pertains to the use of eye-tracking in calorie label research, Kim et al. (2018) conducted a study on calorie labels in restaurant menus. As previously mentioned, there exist various formats for calorie labeling in menus, and some studies have examined each method's effectiveness (Liu et al., 2012). Kim et al. (2018) examined visual attention to various calorie label methods while choosing food items and beverages from a fast food restaurant menu. The study used three methods of calorie presentation: numeric labeling, colour-coded labeling (i.e., traffic light labeling), and physical activity-based labeling (i.e., amount of physical activity needed to burn the given number of calories for each menu choice) (Kim et al., 2018). Findings revealed that physical activity-based labeling was most effective at increasing participants' visual attention and increasing their healthy choices. Additionally, customers reported that they preferred seeing the physical activity-based labels over both the numeric and colour-coded labels (Kim et al., 2018). Related to this study, Motoki, Saito, Nouchi, Kawashima and Sugiura (2018) examined how visual attention could be stimulated by the tastiness and healthiness of food items. The authors purported that attention, to food specifically, can be elicited according to the saliency of the food item, as it pertains to tastiness and healthiness (Motoki et al., 2018). As part of their study, participants initially rated 200 food items on a 5-point rating scale regarding tastiness ("How tasty is this food?"), healthiness ("How healthy is this food?") and overall preference ("How much, overall, do you like this food?"), which allowed for "tasty" and "healthy" foods to be chosen (Motoki et al., 2018). For the main experiment, participants were asked to take part in a choice task, where they were presented with four images (two houses and two food items) and were asked to indicate whether the two houses were "the same" or

"different". Although the participants assumed that the food items were distractor images, their attention to the food items was of specific interest to the researchers. Because participants were instructed to focus their attention on the houses, their "automatic attention" was defined as the total time spent viewing the food items (Motoki et al., 2018). A benefit of this methodology was that participants' behaviour towards the food stimuli was less influenced by social desirability and more so on desire to perform the "house task". The study found that it was the tastiness of the food, and not its healthiness that was more effective in capturing participants' attention, which suggests that humans are drawn to hedonic (pleasurable) food information more than health-related information (Motoki et al., 2018).

As a final example, Reale & Flint (2016) conducted an eye tracking study where participants were exposed to one of three different menus that included nondirective calorie labels (i.e., numeric calorie labels), directive calorie labels (i.e., "Under 500") or semi-directive labels (i.e., numeric calorie labels coloured either red, yellow, or green). The researchers found there was no significant difference in any of the formats' effectiveness to elicit participant attention; however, participants ordered meals of significantly fewer calories when they were presented with colour-coded nutritional information compared to when they were presented with nutritional information in black text (Reale & Flint, 2016). These findings demonstrated similar results to Liu et al. (2012), such that colour-coded calorie labels were more effective than other formats in influencing participants to make healthier choices (Reale & Flint, 2016).

A large body of research supports the claim that calorie labels are an effective method to promote healthy choices when dining out. However, few studies have examined the effects of calorie labels on visual attention, and thus, this warrants further investigation (Reale & Flint, 2016). One concern is that it is unknown whether consumers see and *use* the nutrition

information when making their food decisions. It is unknown where consumers are looking, and what elements of the restaurant menu they pay most attention to. As such, the use of eye tracking in the current study allowed for objective measurements of visual attention while viewing the restaurant menu items. Specifically, the method was used to examine whether dwell time/proportion of dwell time on specific characteristics of the stimulus influenced participants' perceptions of the food items, as well as determine which aspects of the restaurant menu attract participants' attention the most. The current study was unique of its kind, as it presented participants with individual stimuli (See Appendix A) such that the food items could be examined independently, and would allow for the proportion of dwell time to be computed for each individual element (i.e., image, description, calorie label), for each food item, to ensure that each element was being viewed.

4 Overview of the Current Study

The current study examined how calorie labels, caloric content, and food descriptions influenced individuals' evaluations of food items. Previous research has shown that each of the aforementioned factors have the ability to impact consumption and preference for food items, but the current study is the first, to the author's knowledge, to look at the effects of these variables *together* on participants' evaluations of intent, desire, and perceived healthiness, while using eye tracking technology. The importance of the present study is to investigate what makes each individual menu item desirable/appealing or undesirable/unappealing to a consumer in the absence of other menu items. Moreover, the use of eye-tracking technology allowed for an objective measurement of participants' visual attention regarding the various elements of the restaurant menu stimuli (i.e., calorie labels, image, food descriptions). Through the collection of eye-tracking data, the current study was able to verify that participants viewed each element of

the stimulus, which allowed the results to be interpreted without the concern that certain elements of the menu were ignored.

As it pertains to descriptions, the current study sought to identify whether the use of certain words could influence participant evaluations of food items. A goal of the study was to determine whether different descriptions (i.e., "healthy" or "appealing") could be used to make food items seem healthier or less healthy/more "appealing." Additionally, the study sought to identify whether these descriptors would, in turn, impact evaluations of the participants' intent/desire to order these items. Identifying characteristics of food descriptions that make healthy food items seem more appealing, could possibly provide strategies for restaurants to use in order to better market their healthier dishes, as this has been shown to be a difficult task, and is often detrimental to sales and consumer attitudes (Crum et al., 2011; Turnwald et al., 2017b).

Furthermore, the current study has important implications for obesity prevention initiatives. As previously mentioned, the global rate of overweight and obese individuals is on the rise and at a level that could negatively impact health (Ng et al., 2014), most notably among younger adults (Statistics Canada, 2018). Obesity has been linked to the development of many chronic health conditions and has been shown to be related to the increasing trend to dine outside the home. In an attempt to explain the link between dining outside the home and obesity, a large amount of research has been devoted to studying the mechanisms underlying consumer ordering tendencies and food preferences in such settings. Overall, it has been suggested that the most likely cause for this link is not simply eating outside the home, but rather the consumer's desire to engage in overconsumption in restaurant-prepared food that is higher in caloric content and lower in nutrient content, because those foods are perceived to be more palatable.

5 Hypotheses

Although the current study did not directly analyze participant consumption, the measure of intent to order/consume the food item was chosen to assess the likelihood that a participant would order/consume the food item if dining in a restaurant. Regarding intent to order/consume the food item, it was hypothesized that individuals in the no-calorie group (who are not shown calorie labels), would report higher intent ratings overall, in comparison to individuals in the calorie group (who are shown calorie labels). As seen in other calorie label research, individuals who are aware of caloric information, through the use of calorie labels, subsequently purchase and consume foods of lower mean caloric content compared to when no caloric information is made available (e.g., Krieger et al., 2013). Additionally, it was hypothesized that individuals would report higher intent ratings for high-calorie foods than for low-calorie foods. This was based on previous research, which shows that individuals find high-calorie foods more satisfying than low-calorie foods (Crum et al., 2011). Although individuals in the no-calorie group were not made aware of the caloric content of the foods, food items were chosen according to their actual caloric content (i.e., high calorie foods > 1000 calories; low-calorie foods < 600 calories) based on their posted calorie information from the restaurant menus or websites. Finally, it was hypothesized that individuals would report higher intent ratings for foods with appealing descriptions than for foods with healthy descriptions. This hypothesis was based on previous research showing that individuals prefer foods that are accompanied by descriptions using appealing words than those using health-related words (Chandon & Wansink, 2007a; Turnwald et al., 2017a, Turnwald et al., 2017b).

As intent and desire have not previously been examined separately in a study of this nature, there is a lack of research on which to base the hypotheses related to desire to

order/consume a food item. Therefore, the hypotheses will be similar to those for the measure of intent. Regarding desire, it was hypothesized that individuals in the no-calorie label group would report higher desire ratings than individuals in the calorie group. As with the measure of intent, this hypothesis was justified by research showing that, when individuals are aware of caloric information, they order less than individuals who are not made aware of this information. It was also hypothesized that individuals would report higher desire ratings for high-calorie foods than for low-calorie foods. Furthermore, it was hypothesized that individuals would report higher desire ratings for foods with appealing descriptions than for foods with healthy descriptions, which was based on research supporting the Unhealthy = Tasty intuition (Raghunathan et al., 2006). It should be noted that for the measure of desire, individuals were asked to rate foods as though there were no negative consequences of eating unhealthy foods, thus results were likely to differ from those for the measure of intent.

Regarding perceived healthiness, given that individuals have been shown to underestimate the caloric content of foods when caloric information is not provided, it was hypothesized that individuals in the no-calorie group would report higher health ratings than individuals in the calorie group (who were provided with explicit caloric information). It was believed that, since individuals in the no-calorie group would perceive fewer calories than the calorie group (who were explicitly provided with calorie information), they would report higher health ratings, overall. It was also hypothesized that individuals would report higher healthiness ratings for low-calorie food items than for high-calorie food items. Finally, it was hypothesized that individuals would report higher healthiness ratings for foods with healthy descriptions than for foods with appealing descriptions, which was based on research showing that descriptions

with health-related words lead to consumer perceptions of increased healthiness, as explained by the health-halo effect (Chandon & Wansink, 2007a).

Regarding mean total dwell time, it was hypothesized that individuals in the calorie group would exhibit higher mean total dwell time than individuals in the no-calorie group due to the presence of calorie labels (i.e., more information to read and interpret on the screen). Although this is not particularly an insightful hypothesis, it was important to mention, due to the inability to control for this added time needed to view the stimulus in the calorie group. Additionally, it was hypothesized that individuals would exhibit higher mean total dwell time for high-calorie foods than for low-calorie foods due to the tendency for people to prefer high-calorie foods over low-calorie foods (Motoki et al., 2018), suggesting that they may devote more attention to the foods that are more appealing to them. Finally, it was hypothesized that individuals would exhibit higher mean total dwell time for foods with appealing descriptions than for foods with healthy descriptions, due to the tendency for individuals to prefer foods described using appealing words rather than health-related words.

Due to the numerous interactions that could possibly occur between the variables in the current study (i.e., calorie labels, caloric content, descriptions), only main effects, as hypothesized above will be mentioned. To summarize, as it pertains to the measure of intent, *H1a:* Individuals in the no-calorie group will report higher intent ratings than individuals in the calorie group; *H1b*: Individuals will report higher intent ratings for high-calorie foods than low-calorie foods; *H1c:* Individuals will report higher intent ratings for foods with appealing descriptions than for foods with healthy descriptions. With respect to the measure of desire, *H2a:* Individuals in the no-calorie group will report higher desire ratings than individuals in the calorie group; *H2b:* Individuals will report higher desire ratings for high-calorie foods than low-calorie

foods; *H2c:* Individuals will report higher desire ratings for foods with appealing descriptions than for foods with healthy descriptions. Regarding the measure of perceived healthiness, *H3a*: Individuals in the no-calorie group will report higher health ratings than those in the calorie group; *H3b;* Individuals will report higher healthiness ratings for low-calorie foods than high-calorie foods; *H3c:* Individuals will perceive foods with healthy descriptions as healthier than foods with appealing descriptions. Regarding total dwell time, *H4a:* Individuals in the calorie group will exhibit higher mean total dwell time than individuals in the no-calorie group; *H4b:* Individuals will exhibit higher mean total dwell time for high-calorie foods than for low-calorie foods; *H4c:* Individuals will exhibit higher mean total dwell time for foods with appealing descriptions than for foods with healthy descriptions.

Therefore, by recruiting young adults, it is hoped that the current study will examine the effects of calorie labels, caloric content, and food descriptions on participants' evaluations (i.e., intent/desire to order and consume, and perceived healthiness) of restaurant menu food items and use eye tracking to verify that the stimuli are properly attended to. This would allow for a better understanding of the mechanisms underlying consumer decision-making processes when ordering food in restaurant settings, which could help develop more advantageous and effective marketing strategies to help consumers make more informed choices when dining outside the home.

Chapter Two: Methodology

1 Participants

In total, 82 participants were recruited for the current study, however, two participants were eliminated due to missing data as a result of complications with the eye tracker. Participants

were recruited from Laurentian University undergraduate courses, each with normal or corrected-to-normal vision. The mean age of participants was 21.18 years with a range of 17 – 41 years. 24 participants were male and 56 were female.

2 Materials

2.1 Body Measurements. The current study measured participants' height and weight in order to calculate Body Mass Index (BMI). Participants' height was measured using a measuring tape and their weight was measured using a digital scale. BMI was calculated using the equation $BMI = kg / m^2$.

2.2 Information Questionnaire. Participants completed an information questionnaire, which asked various questions about their lifestyle, eating habits, and decision-making processes when dining outside the home. Questions about participants' lifestyle and eating habits were asked in order to examine the frequency at which they dine outside the home, in order to determine that our sample consisted of individuals who, at least somewhat, frequented restaurant settings. In addition, questions about their ordering tendencies were also posed in order to gain a better understanding of their decision-making processes when dining outside the home (e.g., what information/characteristics of food items they pay attention to or find important). The information questionnaire can be found in Appendix C.

2.3 Eye-Tracking Software and Apparatus. The experiment was developed using the eye-tracking programming software, Experiment Builder, and participants' eye movements were recorded using the Eyelink 1000 eye-tracking system, both from SR Research Ltd. The eye-tracking apparatus includes a camera and an infrared sensor, which are both located at the base of a computer monitor (a 27" Asus 3-D monitor). The computer monitor was located in front of

the participant, upon which they viewed the stimuli. The participants' right pupil was tracked throughout the experiment. Although the experiment was non-invasive, in order to stabilize the participants' heads and prevent recalibrating the eye tracker, each participant was asked to place their head on a chin rest mounted to a desk, upon which the computer monitor sat. The experimenter viewed the participants' eye movements on a display computer and recalibrated the eye tracker if necessary.

2.4 Stimuli. The images and caloric information for stimuli were adapted from various restaurant websites (e.g., Perkins, the Cheesecake Factory) and from online food websites (e.g., My Fitness Pal, Eating Well). It was decided that the food items would not be chosen from one single restaurant chain or website due to the specific categories that were required for the experiment (i.e., 12 appetizers, 12 entrées, 12 sandwiches, and 12 salads, for a total of 48 stimuli). Websites or restaurants were not identifiable from viewing the stimuli, as any defining names or establishment catchphrases/slogans were removed. Instead, the food item was given a generic name (e.g., "Chicken Salad Sandwich") to maintain restaurant anonymity and to prevent participant bias when providing their ratings. The experimental variables making up each stimulus will be briefly explained here and will be elaborated on in greater detail below (see Methodology - Section 4).

Regarding calorie labels, participants were randomized into one of two groups, the "calorie group" (in which all stimuli contained numeric calorie labels), or the "no-calorie group" (in which stimuli did not include any numeric calorie labels). Whereas participants in the calorie group saw stimuli composed of an image, a food description, and a calorie label, those in the no-calorie group saw stimuli composed of only an image and a food description, and thus, were not

made aware of the actual caloric content of the foods they were viewing/rating. See Appendix A for sample stimuli for both the calorie and no-calorie groups.

As previously stated, participants were presented with 48 stimuli, consisting of 12 appetizers, 12 entrées, 12 sandwiches, and 12 salads. As it pertains to the caloric content of the food items, of the 12 foods featured in each category, 6 were "low-calorie" food items (which had a caloric value less than 600 calories) and 6 were "high-calorie" food items (which had a caloric value greater than 1000 calories).

Regarding food descriptions, the content of the food item (what main ingredients they included) were based on the descriptions provided by the source from which they were acquired (i.e., restaurant/website description). However, specific descriptor words were chosen to be included alongside generic content descriptions, which allowed for the manipulation of "healthy" and "appealing" food descriptions. A pilot study was conducted, where participants were presented with a list of words, and were asked to rate each word on two scales, according to its level of healthiness and its level of indulgence [i.e., "Healthy Scale" 1(Unhealthy) to 5(Healthy); "Indulgence Scale" 1(Neutral) to 5(Indulgent]. Paired samples t-tests were conducted between each word's mean rating on the "Healthy Scale" and its mean rating on the "Indulgence Scale". Results of the pilot study can be found in Table 1 (Appendix G). Words were subsequently classified into one of two groups, "healthy descriptors" or "appealing descriptors" if their scores on the two scales differed significantly ($p < .05$). This allowed for the creation of the two food descriptions used in the current study, "healthy" and "appealing" descriptions. Whereas "healthy" descriptions included a general description of the food item along with a nutritive fact (e.g., low in fat, low in carbohydrates, high in protein) and featured one health-related word (e.g., healthy, nutritious), "appealing" descriptions also included a general description of the food item

along with two appealing descriptor words (e.g., delicious, indulgent). See Appendix H for a complete list of food descriptions used in the current study. For a complete outline of all the stimuli used in the current experiment, see Figure 1.

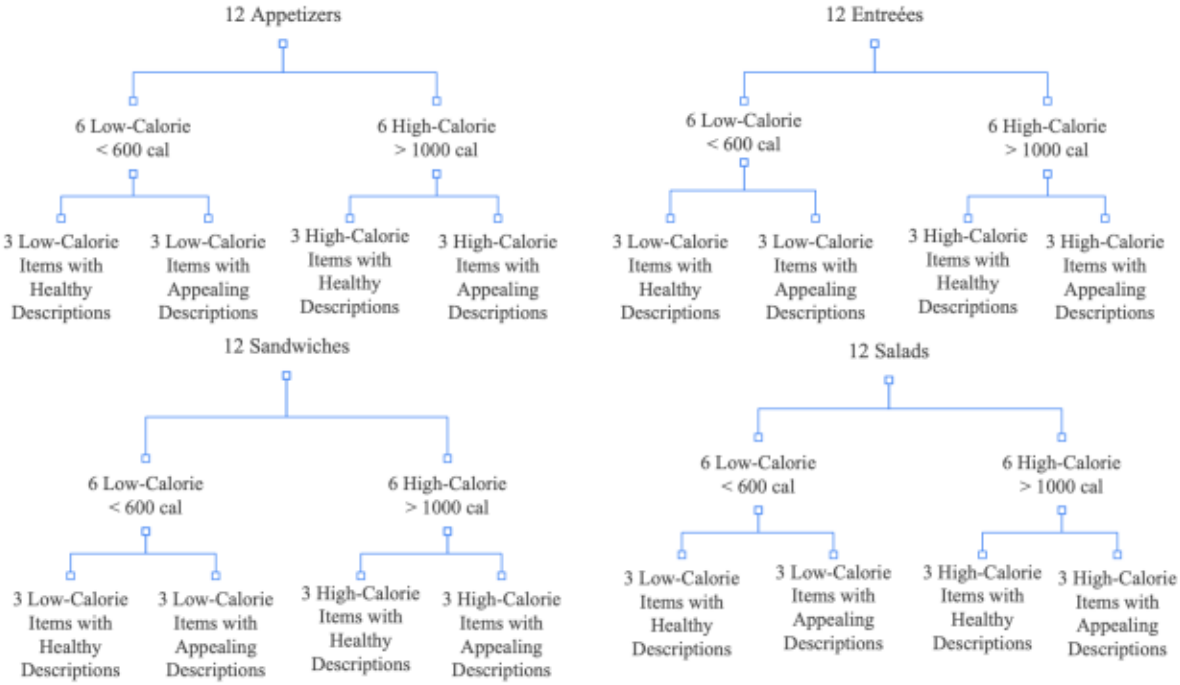

Figure 1. Outline of all stimuli viewed by each participant. Each participant viewed 12 appetizers, 12 entrées, 12 sandwiches, and 12 salads, for a total of 48 food items. Of those 12 food types, 6 food items were "low-calorie" and 6 were "high-calorie". Of those 6 food items, 3 were presented with a healthy description, and 3 were presented with an appealing description.

3 Procedure

Participants were recruited by the researcher using a recruitment script (See Appendix D), which was read aloud by the experimenter, to undergraduate courses at Laurentian University, with permission of the course instructor. Additionally, social media (i.e., Laurentian University Psychology Facebook group) was used as a method for recruiting participants. Participants were informed on the recruitment script that the study would be looking at how

consumers interpret food-related information as presented in a restaurant menu, using eye tracking technology. It was also stated that participants would be asked to provide their age, height, and weight on an information questionnaire. The recruitment script asked that participants refrain from consuming food for at least 3 hours prior to their participation in the study, consistent with related studies (Motoki et al., 2018). A question was included on the information questionnaire, which asked the participant to indicate whether they ate within the last three hours, to verify that they had followed this instruction; however, it did not ask participants to indicate what or when they last ate, or their level of hunger. Nevertheless, the inclusion of this question helped to somewhat control for the effects of hunger across participants, which could possibly have impacted their ratings of the food items presented. Even though participants did not consume food as part of the current study, it was important for them to rate the food items while somewhat hungry, which partially simulated a real-life experience of ordering food at a restaurant. Furthermore, testing times were scheduled between 11:00 and 19:00, such that testing sessions fell within standard lunch/dinner hours, as the stimuli presented consisted mainly of items that would be consumed at these meals. Thus, testing in the morning, or around breakfast time, would have been incongruent with the food items being presented.

The study took place in the Laurentian University Cognitive Health Sciences Laboratory located in the Alphonse Raymond Pavilion. After entering the laboratory, participants were brought into the main room and were provided with an informed consent form, which they reviewed with the experimenter and, subsequently, completed (See Appendix E). The informed consent form was the sole identifying document that linked the participants' names to the study, as they were later assigned an identification number, which was used to label the remaining data (e.g., the information questionnaire and the eye-tracking data on the computer). After their

participation, the informed consent form was locked in a secure filing cabinet in the laboratory to ensure privacy and confidentiality. After providing informed consent, participants were randomly assigned to one of two experimental groups, the "calorie group" (i.e., calorie labels were presented on the stimuli) or the "no-calorie group" (i.e., calorie labels were not presented on the stimuli).

Participants were then asked to take a seat in front of a computer monitor. The eye tracker was then turned on and calibrated, and the experimenter read aloud the experimental procedure. Participants were informed that they would be viewing a series of 48 food items from a restaurant menu and subsequently answering three questions related to the food items. They were urged to take as much time as they needed to read the information presented on the screen, as the stimuli would disappear once the questions began. Participants were given an opportunity to ask questions before the experiment began and were informed that they could withdraw from the experiment at any time, without consequence or penalty. While their eye movements were being recorded, participants viewed each of the 48 stimuli, individually, and in randomized order. After each stimulus was presented, participants were asked to press the spacebar key on a computer keyboard in front of them, which indicated that they were ready to answer the subsequent questions. For all three questions, participants were required to answer by pressing a number between 1 and 9 on the top row of the keyboard. Participants were first asked to rate their intent to order/consume the food item by answering the question "What is the likelihood that you would order and consume this item if you were dining at a restaurant?" Next, participants were asked to rate their desire to order/consume the food item by answering the question "How much would you desire to order this item if you were dining at a restaurant?" Finally, participants were asked to rate the food item according to its healthiness by answering

the question "How healthy do you think this item is?" The ratings scales used to pose questions to the participants can be found in Appendix B. Following the completion of the study, participants were asked to have their weight and height measured to ensure that they provided accurate data on the information questionnaire. Participants were then asked to individually complete the information questionnaire, were thanked for having participated, and were provided with a debriefing form (See Appendix F).

4 Variables

The first independent variable was a between-subjects variable, calorie label, with two levels. The first level of this variable was "calorie label" and the second level was "no calorie label". Whereas individuals in the "calorie label" group viewed stimuli containing an image, a description, and a numeric calorie label, individuals in the "no-calorie label" group viewed stimuli containing only an image and a description, without any calorie labels (i.e., they were not made aware of the actual caloric content of the food items). Calorie information was used because of the recent Healthy Menu Choices Act implemented by the government of Ontario. The range and amounts of calories will subsequently be explained in greater detail in the following paragraph when explaining the second independent variable, caloric content. Refer to Appendix A for sample stimuli for both the calorie and no-calorie groups.

The second independent variable was a within-subjects variable, caloric content, with two levels. The first level of this variable was "low-calorie" (i.e., less than or equal to 600 calories) and the second level was "high-calorie" (i.e., greater than or equal to 1000 calories). Participants viewed 48 stimuli in total, consisting of 12 appetizers, 12 entrées, 12 sandwiches, and 12 salads. Of the 12 stimuli shown in each food category, participants were presented with 6 "high-calorie"

(i.e., > 1000 calories) and 6 "low-calorie" (i.e., < 600 calories) food items. These quantities were chosen according to the government of Ontario's recommended daily calorie consumption guidelines, which suggest that individuals over age 13 should consume, on average, 2000 calories per day. If an individual eats one meal that contains more than 1000 calories, they are already consuming over 50% of their daily recommended intake. If an individual eats three meals per day, each containing approximately 600 calories (600 calories x 3 meals = 1800 calories), they still have 200 calories remaining, allowing for additional calories to be consumed throughout the day as snacks and/or drinks. The four categories (i.e., appetizers, entrées, sandwiches, salads) were chosen in order to replicate the variety of food items found in a typical restaurant menu as well as to minimize the effect that individuals tend to underestimate the caloric content of side dishes (e.g., salads) (Chandon & Wansink, 2007a). The mean caloric content of low-calorie foods was 287.83 calories, ranging from 101-479 calories (SD = 97.51), and the mean caloric content of high-calorie foods was 1533.00 calories, ranging from 1060-2610 calories (SD = 432.49).

The third independent variable was a within-subjects variable, description, with two levels. The first level of this variable was "healthy description". Healthy descriptions consisted of the main ingredients of the food item, one nutritional aspect of the dish, (e.g., low in fat, low in cholesterol, high in potassium, high in vitamin C), and one "healthy" word (e.g., healthy, organic). For example, a healthy description would read "An ***energizing*** center-cut pork chop served with ***reduced-sugar*** apple sauce, mashed potatoes and green beans." The second level of this variable was "appealing description". Appealing descriptions featured the main ingredients of the food item and two "appealing" descriptor words (i.e., mouth-watering, lip-smacking). For example, an appealing description would read "A ***heavenly*** center-cut pork chop served with an

indulgent apple sauce, mashed potatoes and green beans." It is important to note that "appealing" descriptions did not showcase any nutritional aspect of the dish. It is also important to note that descriptions were counterbalanced, whereby half of participants would see a particular food item with its healthy description, and half would see it with its appealing description.

The first dependent variable was intent to order/consume the food item. Intent was measured on a rating scale ranging from 1 (not at all) to 9 (very much), as seen in previous studies of a similar nature (McCall & Lynn, 2008). The participant was asked the question "What is the likelihood that you would order and consume this item if you were dining at a restaurant?" The participants were instructed to answer this question as if they were ordering at a restaurant "right now."

The second dependent variable was desire to order/consume the food item. Desire was measured on a rating scale ranging from 1 (not at all) to 9 (very much) (McCall & Lynn, 2008). The participant was asked the question "How much would you desire to order this item if you were dining at a restaurant?" This measure differs from intent because an individual may *want* to order an item because it seems appealing to them, but for reasons, such as weight management, may choose to order a healthier option. The participants were prompted to answer this question as though they did not have to pay attention to the healthiness of the food and were instructed to order as if they lived in a "perfect world" where they could eat whatever they wanted without any negative consequences (e.g., weight gain).

The third dependent variable was perceived healthiness of the food item. Healthiness was measured on a rating scale ranging from 1 (not at all healthy) to 9 (very healthy). The participant

was asked the question "How healthy do you think this item is?" Although the study by McCall & Lynn (2008) did not assess perceived healthiness, a similar question was used in a study by Provencher, Polivy & Herman (2009), which assessed the perceived healthiness of snack foods (i.e., oatmeal cookies). The question used in this study (i.e., "How healthy is this snack for you?") was adapted for the current study to match the variety of items showcased in the stimulus menu.

The fourth dependent variable was a measure of participants' visual attention to the presented stimuli. Eye movements were measured by observing total dwell time (milliseconds) and proportion of dwell time for each participant. Proportion of dwell time was computed by dividing the amount of time each individual spent in each area of interest (AOI) (e.g., calorie label, image, description) by the total dwell time, or the amount of time spent on the entire stimulus. AOIs were created for each element of the stimulus (i.e., calorie label, image, description) by drawing a rectangular border around the piece of information, which allowed for the individual analysis of each element being viewed by the participant. AOIs were created using the software Data Viewer by SR Research Ltd.

5 Design and Statistical Analyses

The current study investigated the effects of calorie labels, caloric content, and food descriptions on consumer evaluations of food items with the use of a 2(calorie label, no calorie label) by 2(high-calorie, low-calorie) by 2(healthy description, appealing description) mixed design. Four mixed-design ANOVAs were conducted to examine the effects of each independent variable on the four dependent variables (i.e., intent, desire, healthiness, dwell time). The results of these analyses will be discussed in the following section.

Participants viewed four different combinations of stimuli (i.e., low-calorie foods with healthy descriptions, low-calorie foods with appealing descriptions, high-calorie foods with healthy descriptions, high-calorie foods with appealing descriptions). The mean rating of each type of stimulus was used in the statistical analysis. For example, the mean rating of the 12 low-calorie foods with healthy descriptions that the participant viewed was used to represent the participant's overall rating of low-calorie foods with healthy descriptions.

Chapter Three: Results

Sphericity was checked for all analyses, and Greenhouse Geisser values were reported where violations occurred.

1 Demographic Variables

As it pertains to their living situation, 16.25% of participants indicated that they lived by themselves, 38.75% lived with their parents, 33.75% lived with roommates, 8.75% lived with their partner, and 1.25% lived with their children. Collectively, 60% of participants indicated that they resided outside their family home. Assessing participants' living situation was of interest because it has been shown that students living away from home exhibit different eating patterns compared to those established when residing in their family home (Fernandes et al., 2015). After moving away and living on their own, students are required to prepare their own meals in their new homes, whether they live by themselves or with roommates (Blichfeldt & Gram, 2013). Students living on their own have been shown to consume more sugar and fast food, and less nutrient-rich foods, such as fresh fruits, vegetables, meat, and fish (Fernandes et al., 2015).

According to the World Health Organization (2014), a BMI between 25.0 and 29.9 is considered overweight, and a BMI between 18.5 and 24.9 is considered normal. The mean BMI of participants was 25.30 kg/m^2, indicating that the current study's population was mildly overweight. BMI was calculated by dividing the participant's weight (in kilograms), by their height (in metres squared), using the equation BMI = kg / m^2. After they were asked to describe their weight, it was found that 1.25% of participants considered themselves to be "very underweight", 17.5% "slightly underweight", 50% "about the right weight", 28.75% "slightly overweight" and 2.5% "very overweight". Additionally, participants were asked whether they

considered themselves to be at a healthy weight, where 70% indicated "yes" and 30% indicated "no". Furthermore, 11.25% of participants indicated that they were on a diet, and 88.75% indicated that they were not on a diet. Participants were also asked to estimate on average, per week, the number of days that they participated in at least 30-60 minutes of physical activity, yielding an average of 3.44 days per week. With respect to meal preparation, whereas 63.75% of participants indicated that they make most of their meals themselves, 35% indicated that they did not. These findings relate to those reported above, showing that 60% of participants reported that they resided outside of their family home. Furthermore, regarding their eating behaviours, participants reported that the average number of lunches and dinner eaten out, per week, was 2.11 and 1.67, respectively. This demonstrated that, on average, participants from the current study's sample ate at least one meal per week outside the home.

Regarding attention paid to nutritional information, only 15% of participants indicated that they counted their calories, whereas 85% indicated that they did not. In addition, 52.5% of participants indicated that they were aware of the average recommended daily calorie intake, as recommended by the Government of Ontario, and 47.5% did not. Of the 52.5% who indicated they knew the recommendation, the average response specifying this value was 2050 calories (the actual "general" recommendation, irrespective of gender, age, or activity level is 2000 calories). This demonstrates that, although only half of participants reported being aware of the recommended daily caloric intake, their estimated values were accurate, with the average estimated value only 50 calories above the actual value. As it pertains to their intentions when dining out, 11.25% of participants indicated that they "almost always" make healthy choices, 33.75% "usually", 38.75% "sometimes", 11% "rarely" and 1.25% "never". When asked about using nutrition information provided by restaurants, 18.75% of participants indicated that they

"almost always" use this information, 12.5% "usually", 21.25% "sometimes", 33.75% "rarely", and 12.5% "never" used this information. This means that, roughly half of participants reported using nutritional information when dining out, and the other half reported not using such information. Although the current study did not control for the number of participants who paid attention to nutritional information in each group, findings from Ellison, Lusk and Davis (2013) suggest that even the least health conscious people can benefit from the provision of calorie labels. In their study, they found that calorie labels were actually *most effective* in reducing caloric consumption among the least health conscious participants (Ellison et al., 2013). Thus, the current study did not control for this variable, as it aimed to replicate the "general population" that would be expected to frequent restaurant establishments in a real-world setting.

2 Intent Ratings

A 2(calorie label, no calorie label) x 2(high-calorie, low-calorie) x2(healthy description, appealing description) mixed-design ANOVA was conducted. When analyzing intent to order/consume the food items, a main effect of calorie label was found ($F(1, 78) = 4.53$, $p < .05$, $\eta_p^2 = .055$), offering support for H1a, which hypothesized that individuals in the no-calorie group would report higher intent ratings than individuals in the calorie group. Participants who were in the no calorie group reported significantly higher intent ratings (M = 5.18, SD = 1.14) than participants in the calorie group (M = 4.75, SD = .99), (See Figure 2). It is apparent that, when participants were not presented with caloric information, they provided higher intent ratings for food items, suggesting that they may have been less restrained in their choices. As there were no other significant main effects or interactions observed, there were no findings to support hypotheses H1b (which hypothesized that individuals would report higher intent ratings for high-calorie foods than for low-calorie foods), or H1c (which hypothesized that individuals would

report higher intent ratings for foods with appealing descriptions than for foods with healthy descriptions). It was originally hypothesized that individuals would provide higher intent ratings for high-calorie foods and for foods with appealing descriptions because of their greater level of indulgence than low-calorie foods and foods with healthy descriptions. However, it is possible that these hypotheses were not supported due to the fact that individuals answered the question about intent while considering any dietary restrictions that may limit their consumption of these foods. On the contrary, when answering the question related to desire, they were instructed to respond as though they could eat whatever they wanted without experiencing the negative consequences of consuming the food.

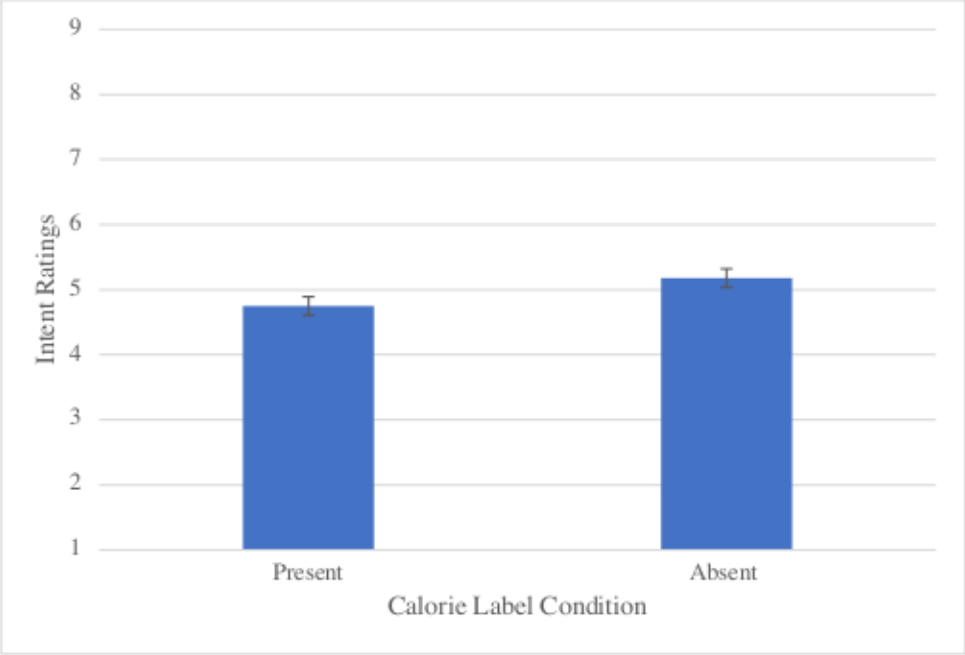

Figure 2. The Effects of Calorie Labels on Intent Ratings (n=80). The errors bars represent the standard error of the mean. A main effect of Calorie Label was found ($F(1, 78) = 4.53$, $p < .05$, $\eta_p^2 = .055$). Participants in the no-calorie group reported significantly higher intent ratings for food items.

3 Desire Ratings

A 2(calorie label, no calorie label) x 2(high-calorie, low-calorie) x2(healthy description, appealing description) mixed-design ANOVA was conducted. When analyzing desire to order/consume the food items, a main effect of caloric content was found ($F(1, 78) = 24.63$, $p < .001$, $\eta_p^2 = .240$), offering support for H2b, which hypothesized that individuals would report higher desire ratings for high-calorie foods than for low-calorie foods. Overall, participants reported significantly higher desire ratings for high-calorie foods (M = 5.65, SD = 1.15) than for low-calorie foods (M = 5.27, SD = 1.16). These results are showcased in Figure 3. It can be suggested that participants reported significantly higher desire ratings for high-calorie foods due to their more "indulgent" qualities than low-calorie foods. High-calorie foods have consistently been found to be considered more satisfying than low-calorie foods (Crum et al., 2011). There were no other significant main effects, or interactions noted. H2a (which hypothesized that individuals in the no-calorie group would report higher desire ratings for high-calorie foods than low-calorie foods) and H2c (which hypothesized that individuals would report higher desire ratings for foods with appealing descriptions than for foods with healthy descriptions) were not supported. In contrast to the previous finding where participants reported significantly higher intent ratings in the no-calorie group, it may be that participants placed less importance on caloric information when basing their decision to order the food on desire, rather than intent. It is also possible that the descriptions, alone, were not as effective as the caloric content of the food items in influencing participants' ordering decisions with respect to desire, explaining the lack of significance for this variable.

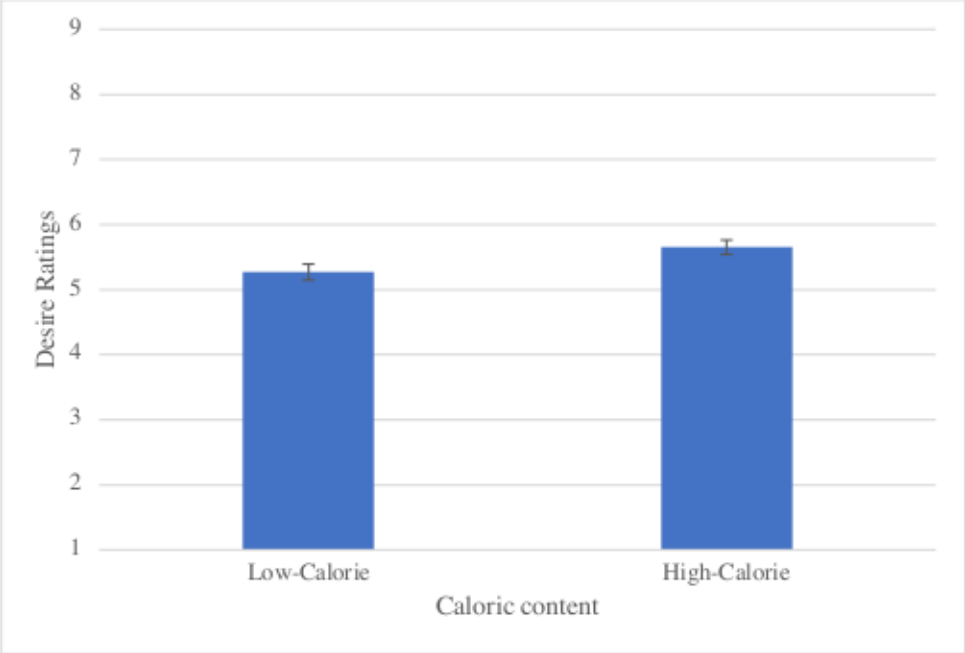

Figure 3. The Effects of Caloric Content on Desire Ratings (n=80). The error bars represent the standard error of the mean. A main effect of Caloric Content was found. (F (1, 78) = 24.63, p < .001, η_p^2 = .240). Participants reported significantly higher desire ratings for high-calorie foods than for low-calorie foods.

4 Healthiness Ratings

A 2(calorie label, no calorie label) x 2(high-calorie, low-calorie) x2(healthy description, appealing description) mixed-design ANOVA was conducted. When analyzing perceived healthiness of the food items, a main effect of caloric content was found ($F(1, 78) = 263.72$, $p <$ .001, $\eta_p^2 = .772$), offering support for H3b, which hypothesized that individuals would report higher healthiness ratings for low-calorie foods than high-calorie foods. Participants rated low-calorie foods (M = 6.25, SD = 1.18) significantly healthier than high-calorie foods (M = 5.16, SD = 1.49). These findings are illustrated in Figure 4. Additionally, a main effect of description was found ($F(1, 78) = 17.64$, $p < .001$, $\eta_p^2 = .184$), offering support for H3c, which hypothesized that individuals would perceive foods with healthy descriptions as healthier than foods with appealing descriptions. Participants rated foods with healthy descriptions (M = 5.78, SD = 1.47)

significantly healthier than foods with appealing descriptions (M = 5.63, SD = 1.43). Despite the relatively small difference, this suggests that the healthy food descriptors used were effective in increasing participants' perceived healthiness of the food items, regardless of their actual caloric content. However, it was expected that the descriptions would have a more drastic effect than was found. These findings are illustrated in Figure 5.

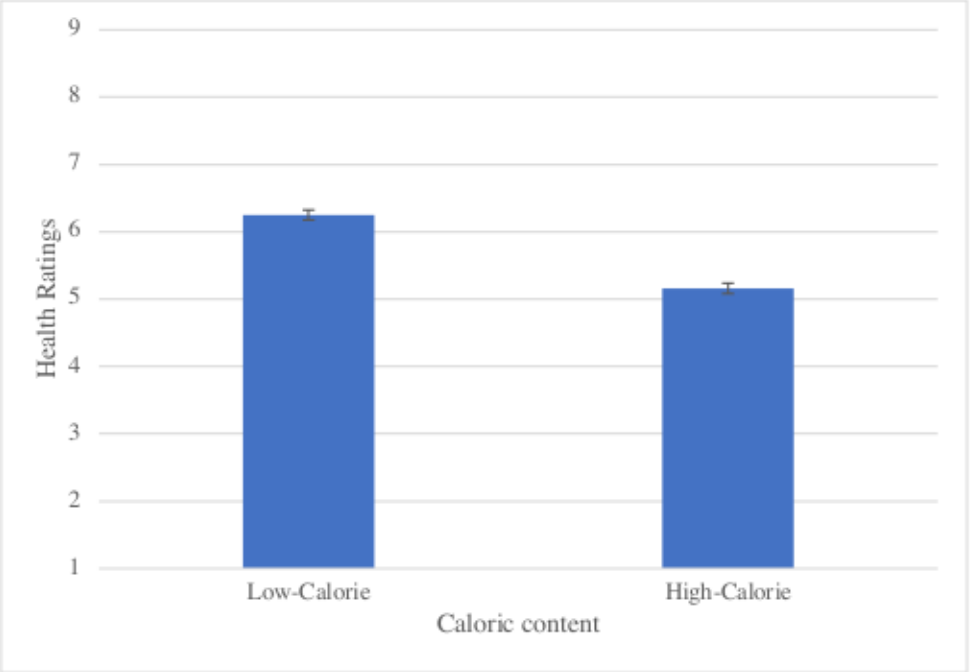

Figure 4. The Effects of Caloric Content on Healthiness Ratings (n=80). The error bars represent the standard error of the mean. A main effect of Caloric Content was found. ($F(1, 78) = 263.72$, $p < .001$, $\eta_p^2 = .772$). Participants reported significantly higher health ratings for low-calorie foods than for high-calorie foods.

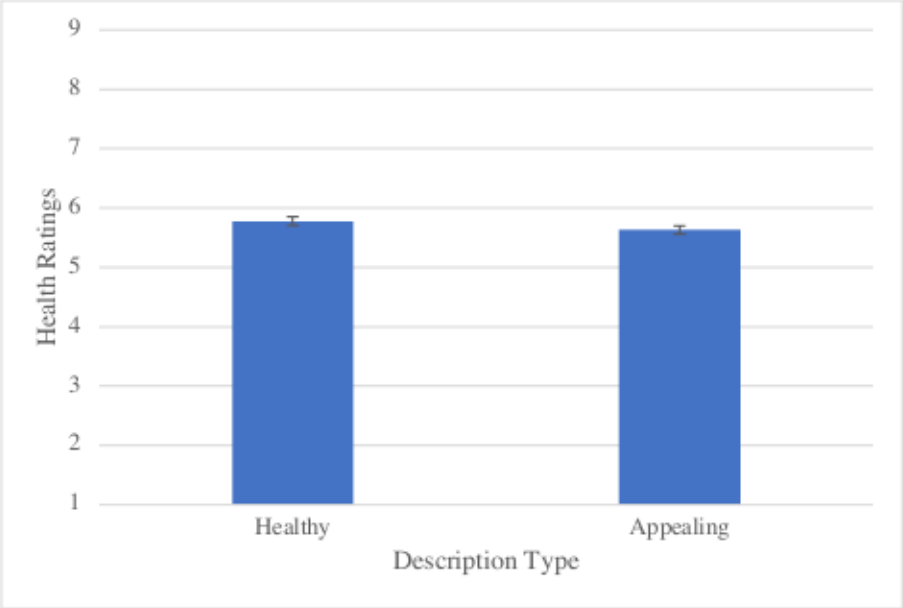

Figure 5. The Effects of Description on Healthiness Ratings (n=80). The error bars represent the standard error of the mean. A main effect of Description was found. (F (1, 78) = 17.64, p < .001, η_p^2 = .184). Participants reported significantly higher health ratings for foods with healthy descriptions than for foods with appealing descriptions.

Furthermore, an interaction was found between caloric content and calorie label (F(1, 78) = 7.77, p = < .01, η_p^2 = .091). A paired samples t-test was conducted to examine the interaction between caloric content and calorie label. Regardless of group, low-calorie foods were rated significantly healthier than high-calorie foods, yet the difference was larger in the calorie group (1.27) than the no-calorie group (.90). For the calorie group, (t(39) = 11.28, p < .001) low-calorie foods (M = 6.31, SD = .72) were rated as significantly healthier than high-calorie foods (M = 5.04, SD = .76). For the no-calorie group, (t(39) = 12.51, p < .001), low-calorie foods (M = 6.19, SD = .62) were also rated as significantly healthier than high-calorie foods (M = 5.29, SD = .63). There were no significant differences between healthiness ratings of high-calorie or low-calorie foods in the calorie-group compared to the no-calorie group. These findings are illustrated in Figure 6. Although there was no support for H3a alone (which hypothesized that individuals in

the no-calorie group would report higher health ratings than those in the calorie group), the variable of calorie label was involved in the interaction between calorie label and caloric content, which suggests that calorie labels, alone, were not sufficient in producing an effect on participants' health ratings of food items. However, when the effects of calorie label and caloric content were examined together, there was a significant effect of the two variables combined.

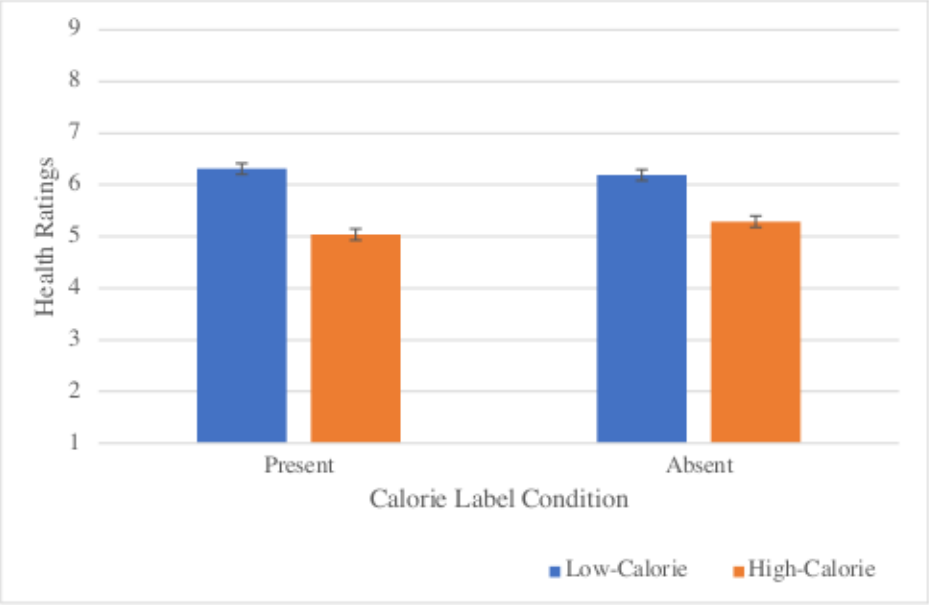

Figure 6. Healthiness Ratings of Low-Calorie and High-Calorie Foods for both Calorie- and No-calorie label Groups (n=80). An interaction was observed between Caloric Content and Calorie Label ($F(1, 78) = 7.77, p = < .01, \eta_p^2 = .091$). The errors bars represent the standard error of the mean. Regardless of group, participants reported significantly higher health ratings for low-calorie foods than for high-calorie foods, yet the difference was greater in the calorie group.

It was surprising to note that there was no significant interaction observed between caloric content and description, ($F(1, 78) = .041, p = .841, \eta_p^2 = .001$). This non-significant finding is showcased in Figure 7. It would seem that the addition of healthy descriptions to low-calorie foods would make them *especially* healthy, or that the addition of appealing descriptions to high-calorie foods would make them *especially* appealing. However, this was found not to be

true, possibly due to the fact that other factors, such as caloric content, had a stronger impact on participants' health ratings than did the descriptions.

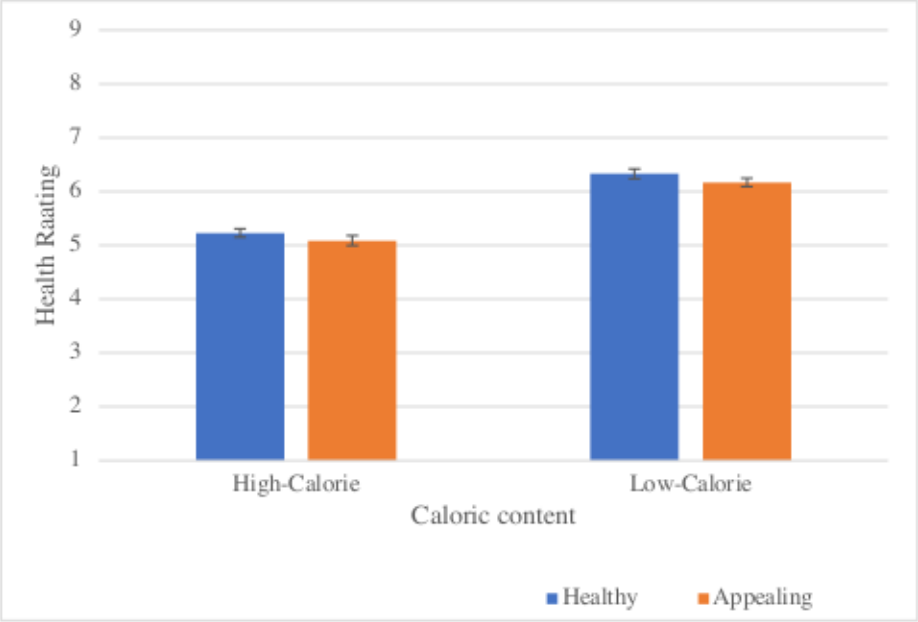

Figure 7. Healthiness Ratings of Low-Calorie and High-Calorie Foods with healthy and appealing descriptions (n=80). No significant interaction between Caloric Content and Description was found ($F(1, 78) = .041, p = .841, \eta_p^2 = .001$). *The errors bars represent the standard error of the mean. It is possible that there was no significant interaction because the impact of caloric content was stronger than that of the food descriptions.*

5 Eye Movements

A 2(calorie label, no calorie label) x 2(high-calorie, low-calorie) x2(healthy description, appealing description) mixed-design ANOVA was conducted. When analyzing total dwell time on the stimuli, a main effect of caloric content was found ($F(1, 78) = 15.75, p < .001, \eta_p^2 = .168$), offering support for H4b, which hypothesized that individuals would exhibit higher total dwell time for high-calorie foods than for low-calorie foods. Participants exhibited significantly longer dwell times for high-calorie foods (M = 8273.01 ms, SD = 3257.77 ms) than on low-calorie foods (M = 7962.13 ms, SD = 3254.45 ms). It is possible that, as a result of the higher desire

ratings found for high-calorie foods, participants thus devoted more attention to these food items, by viewing them longer. These findings are shown in Figure 8.

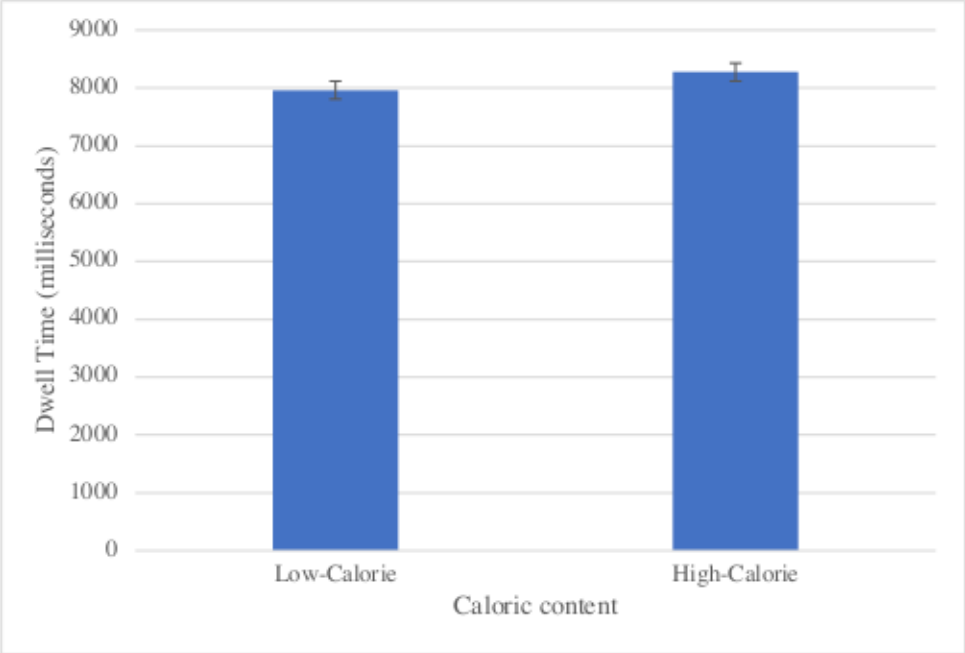

Figure 8. The Effects of Caloric Content on Dwell Time (n=80). The error bars represent the standard error of the mean. A main effect of Caloric Content was found. ($F(1, 78) = 15.75$, $p < .001$, $\eta_p^2 = .168$). Participants exhibited significantly longer dwell time for high-calorie foods than for low-calorie foods.

Furthermore, an interaction was found between calorie label, caloric content and description ($F(1, 78) = 4.33$, $p < .05$, $\eta_p^2 = .053$). To explore the three-way interaction, two separate 2 (high-calorie, low-calorie) x2(healthy description, appealing description) repeated measures ANOVAs were conducted within each level of calorie label (calorie label, no calorie label). Dunn's correction was applied to the alpha level; to be considered significant, $p < .043$. No significant main effects or interactions were observed in the calorie label group; however, a significant two-way interaction was found between caloric content and description in the no-calorie label group, ($F(1, 39) = 5.72$, $p < .043$, $\eta_p^2 = .128$). Post-hoc LSDs revealed that when calorie labels were not present, participants exhibited significantly longer dwell time for high-

calorie foods with appealing descriptions (M = 8456.14 ms, SD = 4092.63 ms) than low-calorie foods with appealing descriptions (M = 7659.27 ms, SD = 3129.48 ms); yet, no significant differences were found between the dwell times for low- or high-calorie foods with healthy descriptions. These trends are illustrated in Figure 9. Although no evidence was found to support H4a (which hypothesized that individuals in the calorie group would exhibit higher total dwell time for high-calorie foods than for low-calorie foods) and H4c (which hypothesized that individuals would exhibit higher total dwell time for foods with appealing descriptions than for foods with healthy descriptions), the variables of calorie label and description were involved in the three-way interaction between calorie label, caloric content, and description.

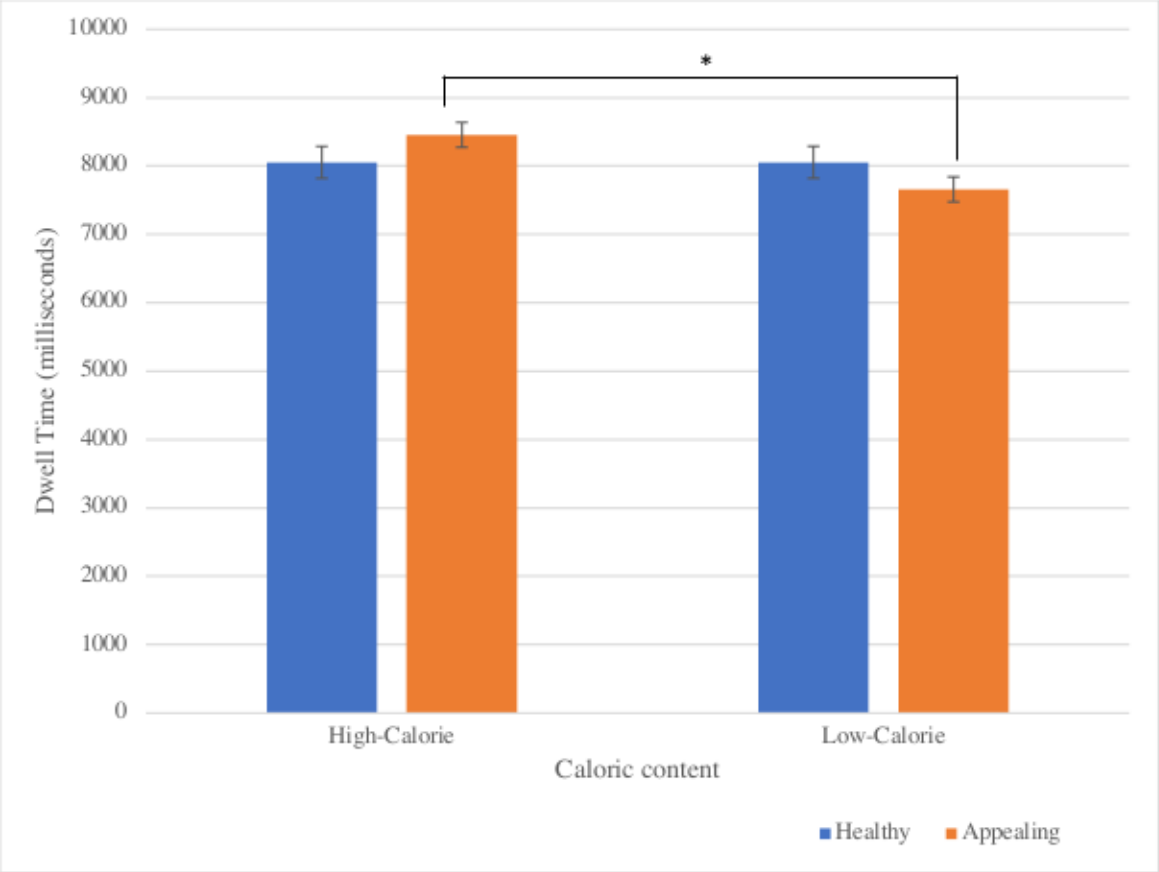

Figure 9. The Effects of Caloric Content and Description on Dwell Time for the No-Calorie label group (n=40). The error bars represent the standard error of the mean. An interaction was found between Caloric Content and Description ($F(1, 39) = 5.72, p < .043, \eta_p^2 = .128$). Participants exhibited significantly longer dwell time for high-calorie foods with appealing descriptions than low-calorie foods with appealing descriptions.

Proportion of time spent on each stimulus component (i.e., image, description, calorie label) was also computed, calculated separately for the calorie- and no-calorie label groups. For the calorie group, the mean proportion of dwell time for the description was 0.6348, mean proportion of dwell time for the image was 0.2582, mean proportion of dwell time for the calorie label was .0361. For the no-calorie label group, the mean proportion of dwell time for the image was 0.2811 and the mean proportion of dwell time for the description was 0.6723. The mean proportion of dwell times for the descriptions for both the calorie and the no-calorie groups indicate that participants did, in fact, read the descriptions provided to them. This suggests that

participants' ratings reflected their exposure to the descriptions presented and showed that they did not ignore components of the stimuli. Proportion of dwell time was not calculated for the calorie label, as participants in the no-calorie label group were not presented with a calorie label. These findings are presented in Figure 10.

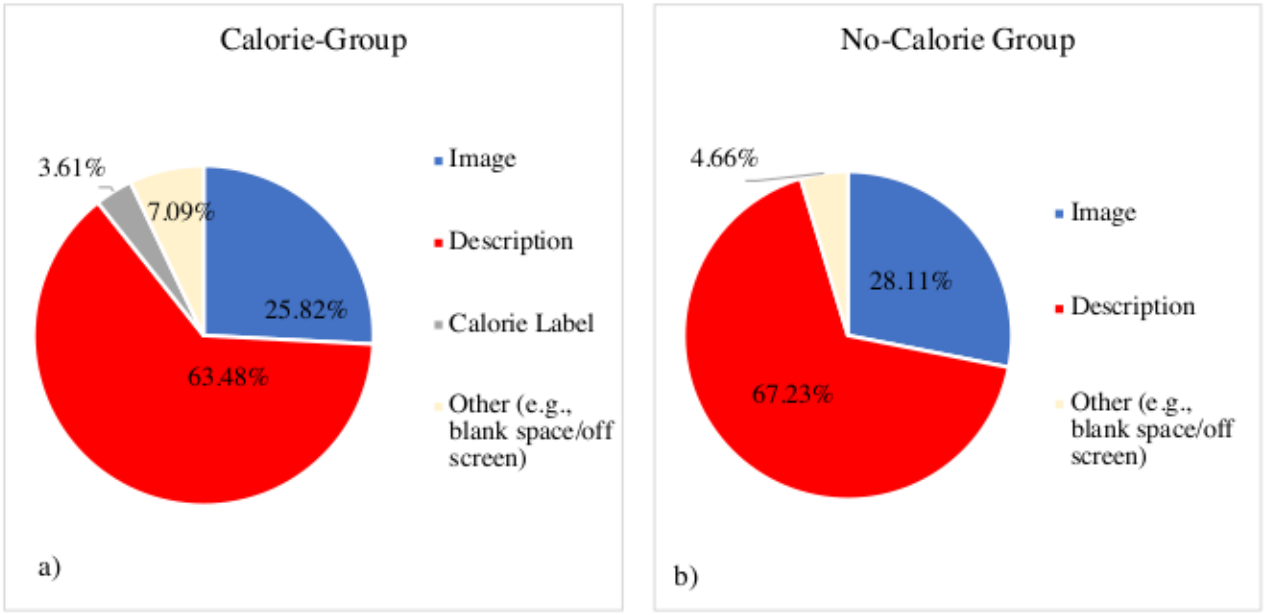

*Figure 10. Proportion of Dwell Time for Each Component of the Stimuli for the **a)** Calorie Group (n=40) and **b)** No-Calorie Label Group (n=40). Participants spent most time on the food description, followed by the image and calorie label (for the calorie group). Participants spent more time on the screen's "blank space" than on the calorie label in the calorie group.*

6 Secondary Findings: Effects of Food Type

Although it was not the main focus of the current study to investigate the effects of food type (i.e., entrée, appetizer, sandwich, salad), a 2(calorie label, no calorie label) x 2(high-calorie, low-calorie) x2(healthy description, appealing description) x4(entrée, appetizer, sandwich, salad) mixed-design ANOVA was conducted for each dependent variable (i.e., intent, desire, healthiness, dwell time) to see if the type of food influenced consumer evaluations.

6.1 Intent Ratings. When analyzing intent to order/consume the food items, a main effect of calorie label was found ($F(1,78) = 4.53$, $p < .05$, $\eta_p^2 = .055$). Participants in the no-calorie label group reported significantly higher intent ratings for food items compared to participants in the calorie label group, as seen in Figure 2. A novel finding was the main effect of food type, ($F(2.54, 197.81) = 20.60$, $p < .001$, $\eta_p^2 = .209$). Post-hoc LSDs revealed that participants reported significantly higher intent ratings for appetizers (M = 5.28, SD = 1.61) than sandwiches (M = 4.44, SD = 1.51, $p < .001$) and salads (M = 4.82, SD = 1.74, $p < .01$), higher intent ratings for entrées (M = 5.33, SD = 1.64) than sandwiches (M = 4.44, SD = 1.51, $p < .001$) and salads (M = 4.82, SD = 1.74, $p < .05$), and higher intent ratings for salads (M = 4.82, SD = 1.74) than sandwiches (M = 4.44, SD = 1.51, $p < .001$) (See Figure 11).

Finally, an interaction was observed between caloric content and food type ($F(2.57, 200.79) = 12.41$, $p < .001$, $\eta_p^2 = .137$). Post-hoc LSDs revealed that participants reported significantly higher intent ratings for high-calorie appetizers (M = 5.58, SD = 1.68) than low-calorie appetizers (M = 4.97, SD = 1.49, $p < .001$). Furthermore, it was found that participants reported significantly higher intent ratings for low-calorie sandwiches (M = 4.78, SD = 1.53) than high-calorie sandwiches (M = 4.11, SD = 1.42, $p < .001$). No significant differences were observed for entrées ($p = .140$) or salads ($p = .410$) (See Figure 12).

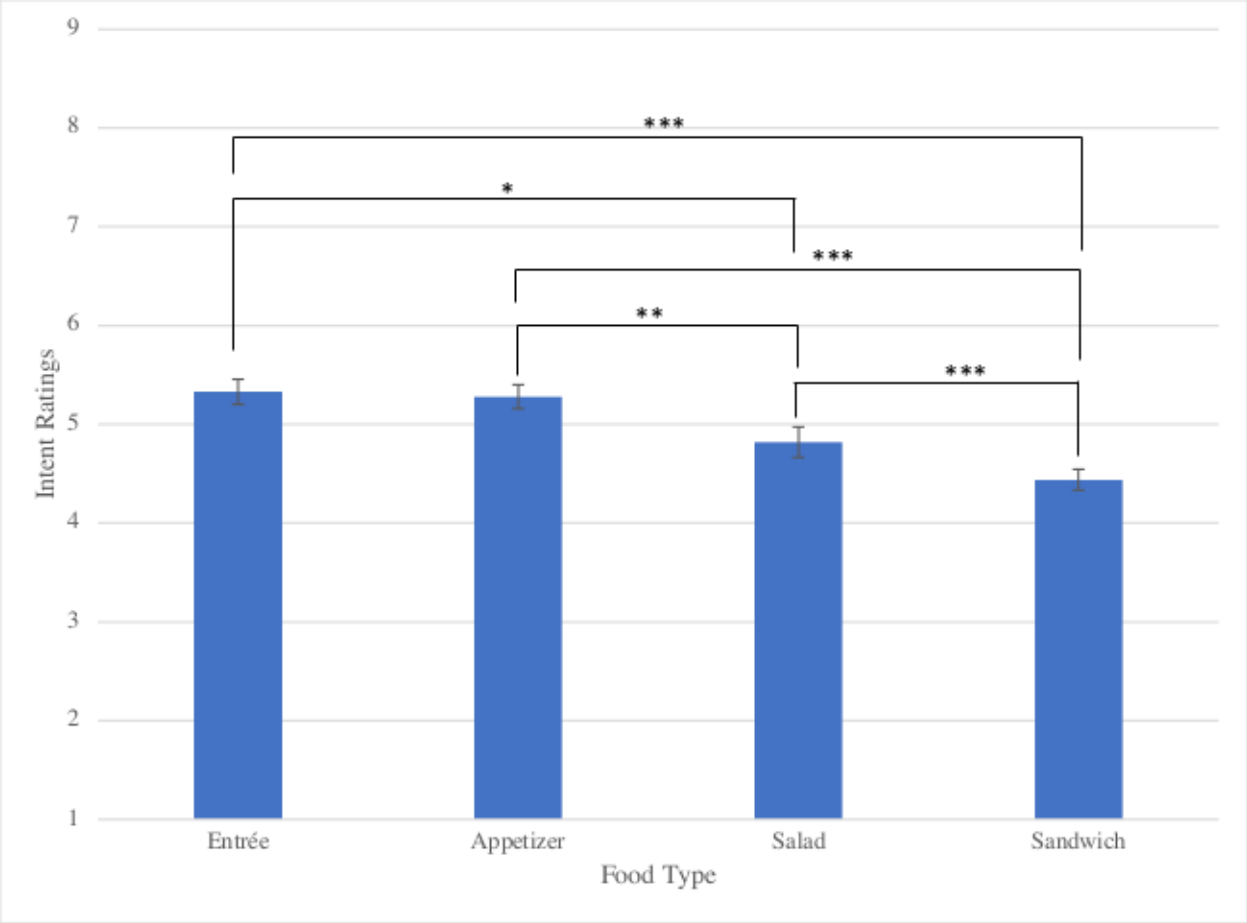

*Figure 11. The Effects of Food Type on Intent Ratings (n=80). The error bars represent the standard error of the mean. A main effect of Food Type was found. ($F(2.54, 197.81) = 20.60$, $p < .001$, $\eta_p^2 = .209$). Participants reported significantly higher intent ratings for salads than for sandwiches, significantly higher intent ratings for appetizers than salads and sandwiches, and significantly higher intent ratings for entrées than sandwiches and salads. No significant differences were observed between entrées and appetizers. * denotes significance at $p < .05$, ** denotes significance at $p = .01$, and *** denotes significance at $p < .001$.*

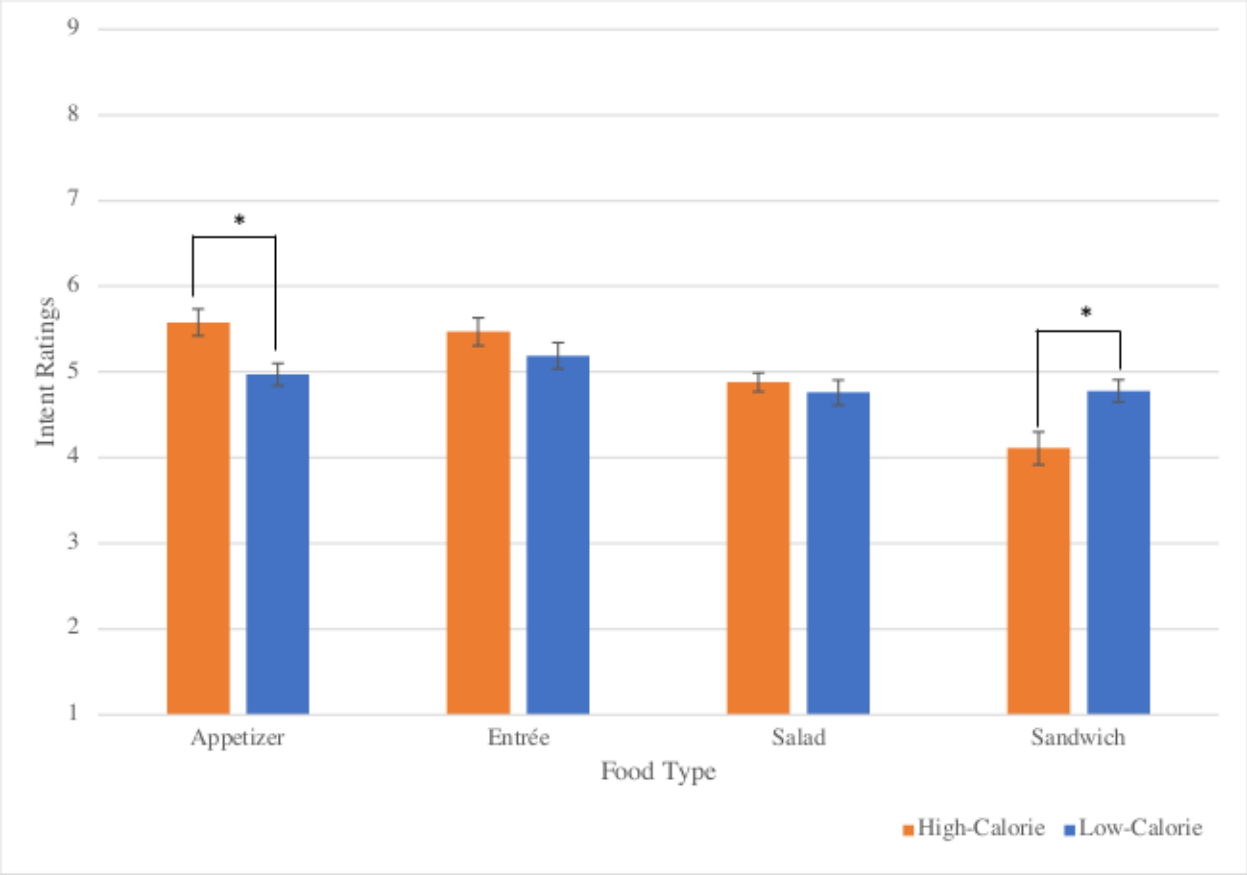

*Figure 12. The Effects of Caloric Content and Food Type on Intent Ratings (n=80). The error bars represent the standard error of the mean. An interaction between Caloric Content and Food Type was found (F (2.57, 200.79) = 12.41, p < .001, η_p^2 = .137). Participants reported significantly higher intent ratings for high-calorie appetizers than for low-calorie appetizers; and significantly higher intent ratings for low-calorie sandwiches than for high-calorie sandwiches. * denotes significance at p < .001.*

6.2 Desire Ratings. When analyzing desire to order/consume the food items, a main effect of caloric content was found ($F(1, 78) = 24.63$, $p = .000$, $\eta_p^2 = .240$). Participants exhibited significantly higher desire ratings for high-calorie foods than for low-calorie foods. These results are the same as seen in Figure 3. In addition, a novel finding of this secondary analysis was the main effect of food type ($F(3, 234) = 51.70$, $p < .001$, $\eta_p^2 = .399$). Post-hoc LSDs revealed that participants reported significantly higher desire for appetizers (M = 6.09, SD = 1.75) than sandwiches (M = 4.84, SD = 1.65) ($p < .001$) and salads (M = 5.01, SD = 1.82) ($p < .001$), and

higher desire for entrées (M = 5.90, SD = 1.71) than sandwiches ($p < .001$) and salads ($p < .001$). These findings are illustrated in Figure 13.

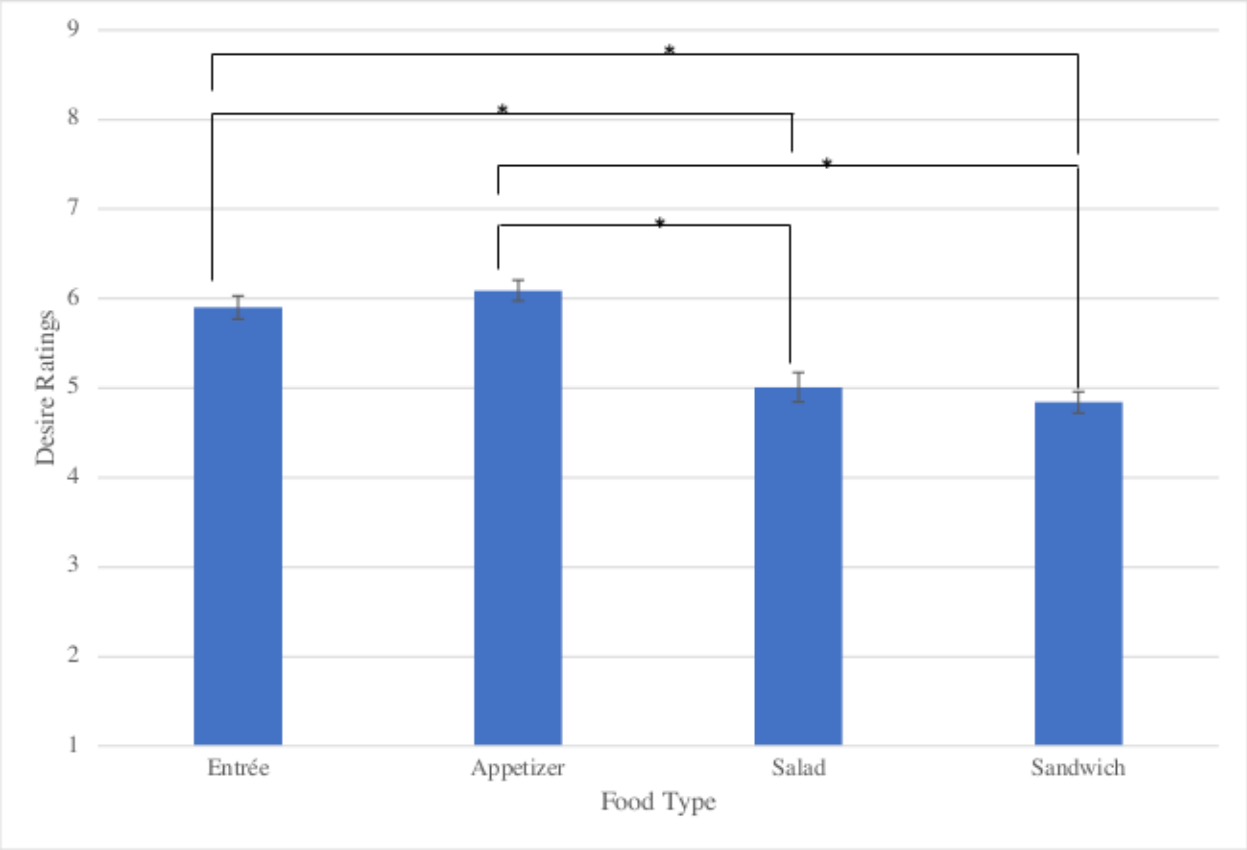

*Figure 13. The Effects of Food Type on Desire Ratings (n=80). The error bars represent the standard error of the mean. A main effect of Food Type was found ($F(3, 234) = 51.70, p < .001, \eta_p^2 = .399$). Participants reported significantly higher desire ratings for appetizers than salads and sandwiches, and significantly higher desire ratings for entrées than salads and sandwiches. No significant differences were observed between entrées and appetizers, or between salads and sandwiches. * denotes $p < .001$.*

Furthermore, an interaction was observed between caloric content and food type ($F(2.68, 208.79) = 23.34, p < .001, \eta_p^2 = .230$). Post-hoc LSDs revealed that participants reported significantly higher desire ratings for high-calorie appetizers (M = 6.63, SD = 1.66) than low-calorie appetizers (M = 5.54, SD = 1.69) ($p < .001$), significantly higher desire ratings for high-calorie entrées (M = 6.31, SD = 1.67) than low-calorie entrées (M = 5.46, SD = 1.65) ($p < .001$),

and significantly higher desire ratings for high-calorie salads (M = 5.17, SD = 1.62) than low-calorie salads (M = 4.85, SD = 1.73) ($p < .05$). However, it was found that participants reported significantly higher desire ratings for low-calorie sandwiches (M = 5.20, SD = 1.61) than high-calorie sandwiches (M = 4.49, SD = 1.62) ($p < .001$). These findings are shown in Figure 14. It is possible that the use of a high-calorie sandwich with the ingredient tempeh, which may have been unfamiliar to participants, resulted in lower desire ratings for high-calorie sandwiches, as a result of unfamiliarity with the ingredient.

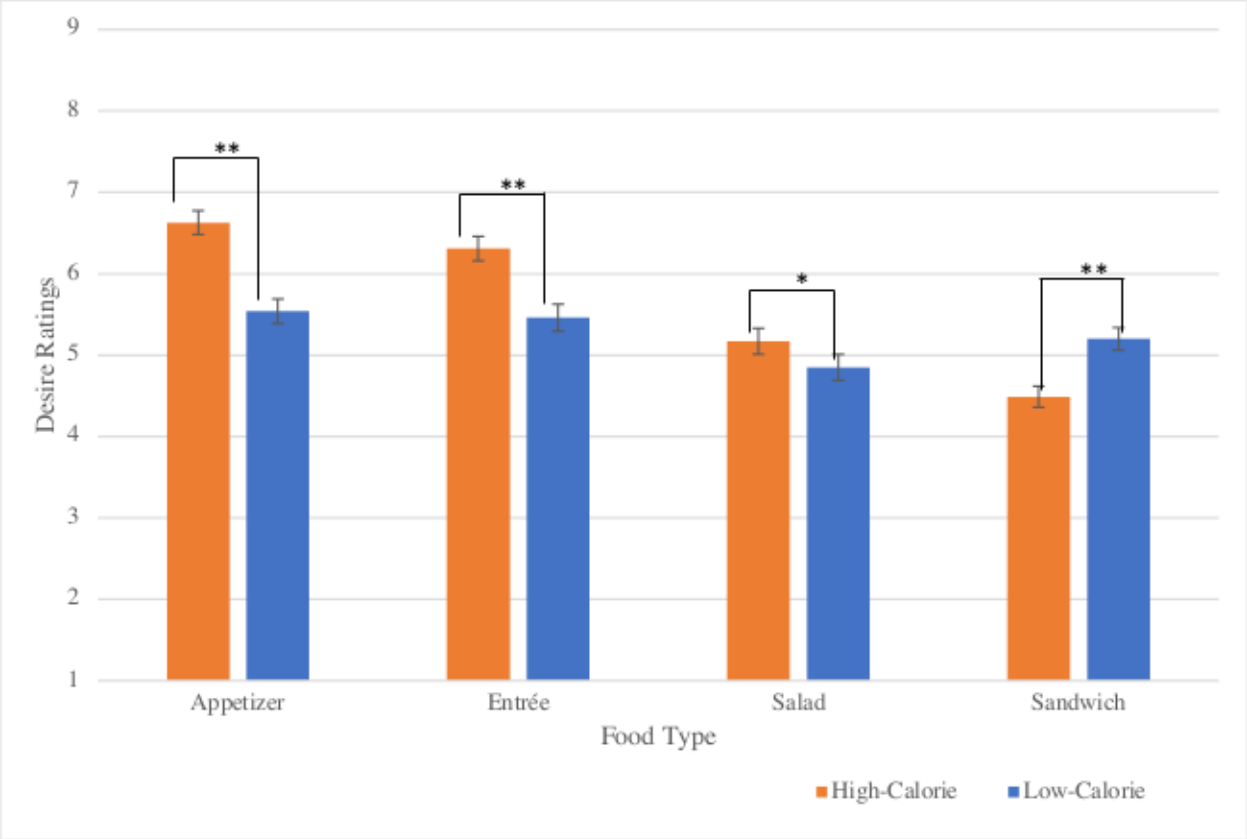

*Figure 14. The Effects of Caloric Content and Food Type on Desire Ratings (n=80). The error bars represent the standard error of the mean. An interaction between Caloric Content and Food Type was found ($F(2.68, 208.79) = 23.34$, $p < .001$, $\eta_p^2 = .230$). Whereas participants reported higher desire ratings for high-calorie appetizers, entrées and salads than their low-calorie counterparts, the opposite was found to be true for salads. * denotes significance at $p < .05$ and ** denotes significance at $p < .001$.*

6.3 Healthiness Ratings. When analyzing perceived healthiness of the food items, a main effect of caloric content was found ($F(1, 78) = 263.72$, $p < .001$, $\eta_p^2 = .772$). Participants reported significantly higher healthiness ratings for low-calorie foods (M = 6.25, SD = 1.18) than for high-calorie foods (M = 5.16, SD = 1.49), as seen in Figure 4. These results are the same as previously found in the main analysis. Furthermore, a main effect of description was found, ($F(1, 78) = 17.64$, $p < .011$, $\eta_p^2 = .184$). Participants reported significantly higher health ratings for foods with healthy descriptions (M = 5.78, SD = 1.47) than foods with appealing descriptions (M = 5.63, SD = 1.43). These results are the same as shown in Figure 5. An interaction was also found between caloric content and calorie label ($F(1, 78) = 7.77$, $p < .01$, $\eta_p^2 = .091$). These findings are as shown in Figure 6 and the results are the same as the aforementioned interaction in the main analysis. Overall, participants reported higher health ratings for low-calorie foods than for high-calorie foods.

A novel finding was that of a main effect of food type ($F(2.58, 200.98) = 217.43$, $p < .001$, $\eta_p^2 = .736$). Post-hoc LSDs revealed that participants reported significantly higher healthiness ratings for entrées (M = 5.73, SD = 1.38) than appetizers (M = 4.80, SD = 1.42) ($p < .001$) and sandwiches (M = 5.55, SD = 1.26) ($p < .01$), significantly higher healthiness for sandwiches than appetizers ($p < .001$), and significantly higher healthiness for salads (M = 6.74, SD = 1.02) than appetizers ($p < .001$), entrées ($p < .001$), and sandwiches ($p < .001$). These findings are illustrated in Figure 15.

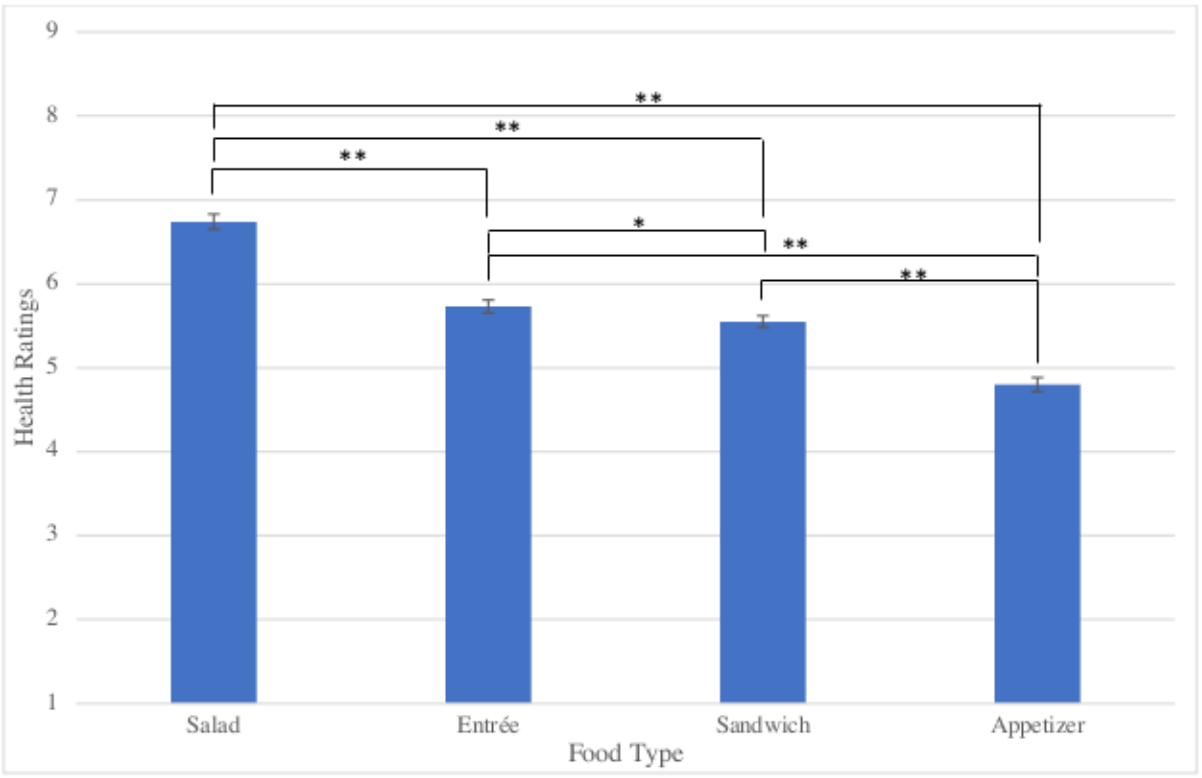

*Figure 15. The Effects of Food Type on Healthiness Ratings (n=80). The error bars represent the standard error of the mean. A main effect of Food Type was found ($F(2.58, 200.98) = 217.43$, $p < .001$, $\eta_p^2 = .736$). Participants reported significantly higher healthiness ratings for entrées than sandwiches and appetizers, significantly higher healthiness for sandwiches than appetizers, and significantly higher healthiness for salads than entrées, sandwiches, and appetizers. * denotes significance at $p < .01$, ** denotes significance at $p < .001$.*

Furthermore, an interaction was observed between caloric content and food type. ($F(2.93, 228.29) = 85.08$, $p < .001$, $\eta_p^2 = .522$. Post-hoc LSDs revealed that participants reported significantly higher health ratings for low calorie appetizers (M = 5.73, SD = 1.11) than high-calorie appetizers (M = 3.87, SD = 1.02) ($p < .001$), significantly higher health ratings for low-calorie entrées (M = 6.58, SD = 0.94) than high-calorie entrées (M = 4.89, SD = 1.23) ($p < .001$), and significantly higher health ratings for low-calorie sandwiches (M = 5.94, SD = 1.32) than high-calorie sandwiches (M = 5.17, SD = 1.07) ($p < .001$). However, no significant differences were observed between low-calorie (M = 6.75, SD = 1.02) and high-calorie (M = 6.72, SD = 1.03) salads ($p = .707$). These trends are illustrated in Figure 16.

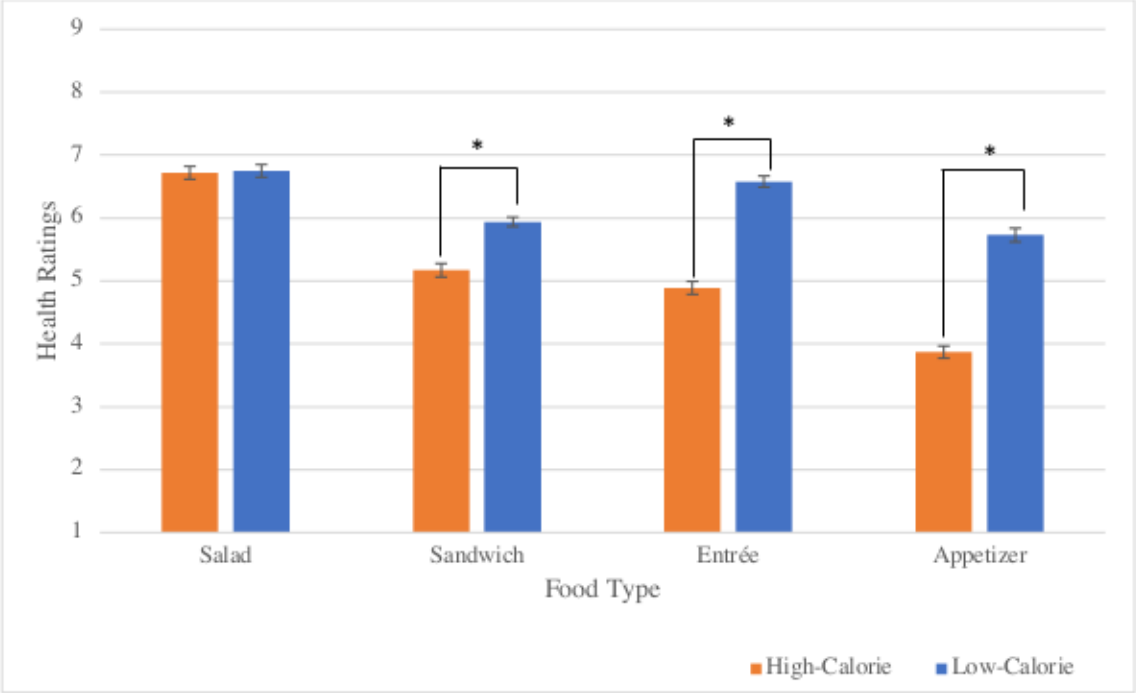

*Figure 16. The Effects of Caloric Content and Food Type on Health Ratings (n=80). The error bars represent the standard error of the mean. An interaction between Caloric Content and Food Type was found ($F(2.93, 228.29) = 85.08, p < .001, \eta_p^2 = .522$). Whereas participants reported higher desire ratings for high-calorie appetizers, entrées and sandwiches than their low-calorie counterparts, there was no significant difference found for salads. * denotes significance at $p < .001$*

6.4. Eye Movements. When analyzing total dwell time, a main effect of caloric content was found ($F(1, 78) = 24.04, p < .001, \eta_p^2 = .236$). Participants exhibited significantly longer dwell time for high-calorie foods (M = 8273.01 ms, SD = 3257.77 ms) than low-calorie foods (M = 7962.13 ms, SD = 3254.45 ms), as found in the main analysis and shown in Figure 8. Additionally, a main effect of food type was found ($F(3, 234) = 24.26, p < .001, \eta_p^2 = .237$). Post-hoc LSDs revealed that participants exhibited significantly longer total dwell time for sandwiches (M = 8129.87, SD = 3645.45) than appetizers (M = 7830.10 ms, SD = 3407.23 ms) ($p < .05$) and entrées (M = 7840.93 ms, SD = 3624.73 ms) ($p < .05$), and significantly longer total dwell time for salads (M = 8811.39 ms, SD = 3765.56 ms) than appetizers ($p < .001$), entrées ($p < .001$), and sandwiches ($p < .001$).

Finally, an interaction was observed between caloric content and food type ($F(3, 234) = 8.54$, $p < .001$, $\eta_p^2 = .099$). Post-hoc LSDs revealed that participants exhibited significantly longer total dwell time for high-calorie sandwiches (M = 8660.79 ms, SD = 3895.40 ms) than low-calorie sandwiches (M = 7598.94 ms, SD = 3305.13 ms). Furthermore, it was found that participants exhibited significantly longer total dwell time for high-calorie salads (M = 9078.25 ms, SD = 3822.62 ms) than low-calorie salads (M = 8544.55 ms, SD = 3700.31 ms). No significant differences were observed for appetizers ($p = .381$) or entrées ($p = .223$). These results are presented in Figure 17.

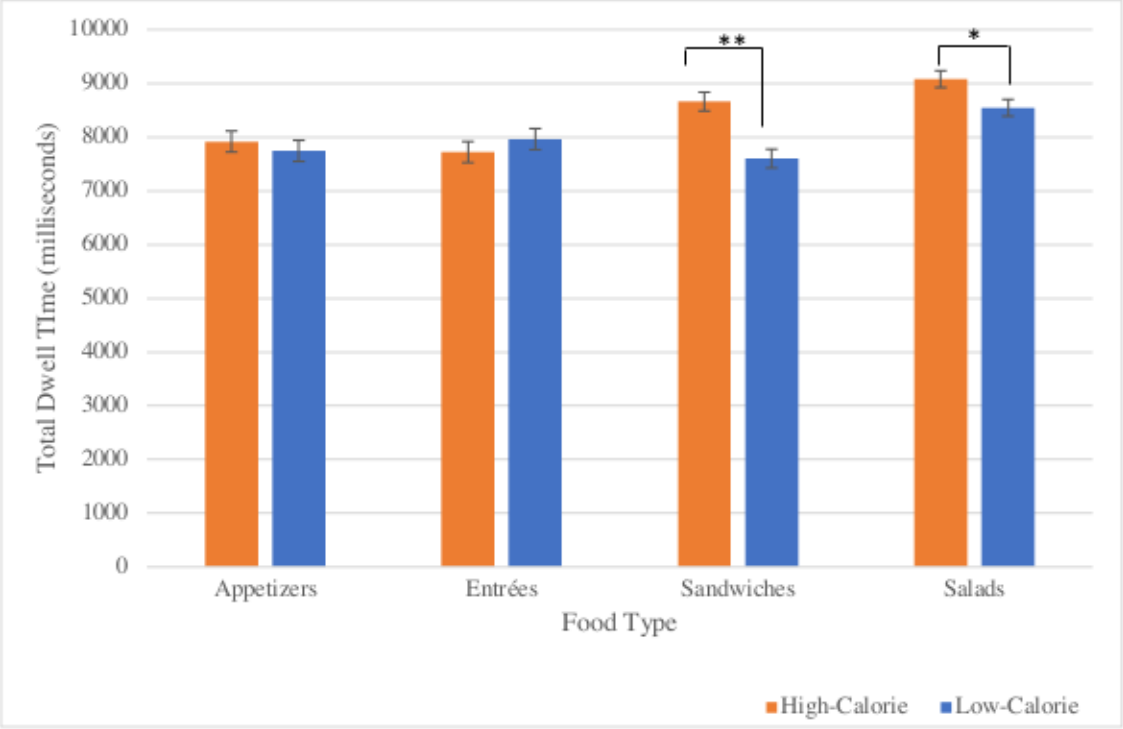

*Figure 17. The Effects of Caloric Content and Food Type on Total Dwell Time (n=80). The error bars represent the standard error of the mean. An interaction between Caloric Content and Food Type was found ($F(3, 234) = 8.54$, $p < .001$, $\eta_p^2 = .099$). Participants exhibited significantly longer dwell time for high-calorie sandwiches than low-calorie sandwiches. The same effect was seen in salads; however, no significant differences were observed for appetizers or entrées. * denotes significance at $p = .001$ and ** denotes significance at $p < .001$.*

It is important to note that certain independent variables had a stronger effect than others. For example, although statistically significant, calorie label had a relatively small effect on participants' ratings of intent ($\eta_p^2 = .055$), caloric content had a relatively small effect on participants' mean total dwell time ($\eta_p^2 = .168$), and description had a relatively small effect on participants' ratings of perceived healthiness ($\eta_p^2 = .184$). Therefore, results examined in the discussion section should be interpreted with the awareness that other factors were also influencing participant ratings. It is possible that, given a larger sample size, these variables would have had a larger effect.

With respect to the secondary analyses featuring the effects of food type, whereas the current study did not choose food type as a main independent variable, it was important to analyze the effects of this variable on the various measures. Although the current study sought to develop stimuli that were most realistic to those that would be found in a typical restaurant menu, this did present the need to evaluate the effects that the different food types had on participants' evaluations of the food items. Across ratings of intent, desire, and perceived healthiness, food type had a mild-moderate effect, with the strongest being seen for ratings of healthiness ($\eta_p^2 = .736$). These findings showcased that participants were, in fact, influenced by food type when providing ratings on preference and, most notably, on perceived healthiness of food items. These findings will be elaborated on in more detail in the discussion section.

Furthermore, intercorrelations between variables were examined. Although there was a tendency for intent and desire to be correlated, Pearson correlation coefficients ranged from .230 - .769, suggesting that the measures of intent and desire were distinct measures. In addition, there were very few significant correlations found between measures of intent/desire and perceived healthiness, of only mild strength.

Chapter Four: Discussion

1 Ratings

1.1 Calorie Labels. The first set of hypotheses regarding the effects of calorie labels was supported only with respect to the measure of intent. Participants in the no-calorie group (who viewed stimuli without calorie labels) reported significantly higher overall intent ratings than participants in the calorie group (who viewed stimuli with calorie labels), as seen in Figure 2. As in previous calorie label research, individuals who are made aware of caloric information, through the use of calorie labels, subsequently purchase and consume foods of lower mean caloric content compared to those who are not shown calorie labels (e.g., Bassett et al., 2008; Krieger et al., 2013). Although the current study did not examine participants consuming or ordering food items in a realistic setting, the findings of the current study can partially relate to the findings of these studies, whereby individuals who were exposed to calorie labels at the "point of purchase" provided lower intent ratings for food items overall. It is possible that due to an increased awareness of the caloric content of the food, participants in the calorie group were led to be more mindful of the calorie count than those ordering without being presented with any calorie information. There has been little research devoted to assessing the difference in participants' intent ratings compared to their desire ratings, with respect to food ordering/ consumption. Although there is consistent evidence to demonstrate that calories are an effective strategy to reduce overall caloric consumption (Harnack & French, 2008; Krieger et al., 2013), it was relatively unknown what effect calorie labels would have on the measure of desire. The fact that there was a main effect of calorie label for the measure of intent and not for the measure of desire suggests that participants may have been less restrained in their ordering choices when indicating their desire to order/consume the food item than when indicating their intent to do so.

Perhaps participants in the calorie group were more strongly influenced by the presence of calorie labels when indicating their intent to order/consume the food item, and less so when indicating desire. This may be because participants were asked to answer the question relating to desire as though there were no negative consequences to consuming "indulgent" food (e.g., no dietary restrictions or negative health consequences) and were, therefore, less interested in explicit caloric information.

1.2 Caloric Content. The second set of hypotheses regarding the effects of caloric content were supported for the measures of desire and perceived healthiness but not for intent, evidenced by the main effect of caloric content found for the first two measures. With respect to desire, participants reported significantly higher desire ratings overall for high-calorie foods than for low-calorie foods, as shown in Figure 3. It was interesting to see that, regardless of group, there was a main effect of caloric content, even though participants in the no-calorie group were not overtly informed of the caloric content of the food items. Although participants in the no-calorie group were only provided with a photo and description of the food item (and were unaware of the exact caloric content), there was still a significant effect of caloric content on their responses, whereby participants indicated higher desire ratings for high-calorie foods overall. Based on the Unhealthy = Tasty Intuition, which suggests that individuals possess an innate tendency to regard unhealthy foods as tasty, and healthy foods as not tasty (Raghunathan et al., 2006), it can be suggested that based on this belief, individuals did not have to be informed of the caloric content of food items in order to indicate significantly higher desire for high-calorie (unhealthy) foods than low-calorie (healthy) foods. Although healthy/unhealthy and low-calorie/high-calorie do not always go hand-in-hand, it can be suggested that caloric information

did play a significant role, in the current study, on influencing individuals' desire ratings for food items.

Regarding perceived healthiness, Figure 4 showed that, across both groups, participants reported significantly higher health ratings for low-calorie foods than for high-calorie foods. These results show that whereas individuals showed a greater desire to order high-calorie foods, they report higher health ratings for low-calorie foods. Together, these results can be related to the Unhealthy=Tasty Intuition (Raghunathan et al., 2006). As discussed, this theory posits that individuals possess an implicit belief that unhealthy foods taste better than healthy foods (Raghunathan et al., 2006). In Raghunathan and colleague's (2006) study, participants preferred less healthy food items during a choice task and described them as being better tasting and more enjoyable, which can similarly be seen in the current study. In addition, a finding which was not hypothesized, was the interaction between calorie label and caloric content for perceived healthiness ratings, illustrated in Figure 6. Regardless of group, low-calorie foods were rated significantly healthier than high-calorie foods. This offers further support for the idea that participants do not require explicit information regarding the caloric content of food items in order to make an inference on its healthiness. These results also coincide with findings from Fernandes et al. (2015), which showed that participants relied on other pieces of information (i.e., ingredients, nutrients) beyond caloric information, when indicating a food's relative healthiness. Despite a slightly greater effect in the calorie group, there were no significant differences between high- or low-calorie foods between both groups, which suggests that including the caloric information did not help individuals in identifying whether a food was healthy or not, as both groups reported healthier food ratings for low-calorie items. Even though the caloric content of a food item is perhaps not the most indicative characteristic of a food's

healthiness, it is what most restaurants currently present as nutritional information, as most restaurants do not include a complete nutrition facts table for each food item featured in their menus.

1.3 Food Descriptions. Out of the third set of hypotheses regarding the food descriptions, only the hypothesis regarding perceived healthiness was supported, which hypothesized that individuals would perceive foods with healthy descriptions as healthier than foods with appealing descriptions. Although the manipulation of descriptions was ineffective for the measures of intent and desire, it was somewhat effective for the measure of healthiness. Participants reported higher health ratings for foods with healthy descriptions than for foods with appealing descriptions, as shown in Figure 5. Turnwald et al. (2017b) found that, when describing healthy menu items, restaurants tend to focus more on health-related themes and less on appealing themes. Whereas this can be considered a "consistent" description, whereby a healthy menu item is described in the context of its nutritive components, the current study examined how "inconsistent" descriptions can affect individuals' evaluations of food items. For example, in the current study, participants were presented with consistent pairings (i.e., low-calorie food item with a healthy description; or high-calorie food item with an appealing description), but they were also presented with inconsistent pairings (i.e., low-calorie food item with an appealing description; or high-calorie food item with a healthy description). An example of this from the literature can be found in the previously mentioned study by Kozup et al. (2003), where it was found that the placement of a health claim beside an unhealthy food item resulted in participants indicating lower perceived risk of heart disease toward that food item. Therefore, an inconsistent, or deceiving presentation of the unhealthy food item (i.e., lasagna) led participants to believe that the food item was healthier than it truly was, consistent with findings of the

current study. It was a goal of the current study to determine whether a change in words, alone, could influence participants' perceptions of the healthiness of a food item, irrespective of the food's actual caloric content. Even though participants viewed an equal number of high-calorie food items with healthy descriptions as they viewed low-calorie food items with healthy descriptions, there was still a main effect of description found. This showed that, regardless of the actual caloric content of the food items, participants were influenced by the descriptor words when asked to rate the healthiness of the food items. Thus, the study effectively manipulated descriptions of the food items, such that participants provided higher health ratings for foods with healthy descriptions than for foods with appealing descriptions, irrespective of actual caloric content. These findings offer support for the health-halo effect (Chandon & Wansink, 2007a); when participants were provided with deceiving health-related information (i.e., using a healthy description to describe a high-calorie food item), they were able to form a belief about the food item being presented (i.e., that the food item was healthy), and consequently rated the item's healthiness based on this belief. Due to the effectiveness of the study's manipulation of food descriptions, these findings shine light on how easily individuals are swayed to believe that a food item is healthy. Chandon and Wansink (2007a) showed that, although individuals with a higher nutritional awareness were more accurate in their caloric estimations of food items, they still fell prey to health-halo effects. Moreover, participants in the current study seemed to recognize which food items were truly "healthy", despite the descriptors, when asked to report their desire to order/consume the food item, but were more strongly influenced by the descriptors when asked to rate the foods' healthiness. It is possible that participants relied more strongly on aspects of the stimulus that would reveal the food's caloric content (i.e., image) when indicating their desire to consume the food, and relied more on the description when indicating their

perceived healthiness of the food item. Notwithstanding the previous findings, it was believed that the descriptions would have had a greater effect on participants' perceived healthiness ratings than the current study showed. Given the aforementioned literature showing the dramatic effects of words on sales and evaluations of food products, it was interesting to see that, although the main effect of description *was* significant in the current study, it was not as obvious as previously reported. This could potentially have been due to other factors, such as caloric content, having a stronger effect on this measure.

2 Eye Movements

It was hypothesized that participants would exhibit higher total dwell time for high-calorie foods than for low-calorie foods, which was supported by the main effect of caloric content for total dwell time, whereby participants exhibited significantly longer dwell time for high-calorie foods than for low-calorie foods, as shown in Figure 8. This supports previous findings by Motoki et al. (2018), which showed that individuals' attention was captured more by hedonic or pleasurable food information, rather than health-related information. It can be suggested that participants spent more time on high-calorie foods because of their higher level of indulgence compared to low-calorie foods, which may appear less appealing. These findings can be related to the main effect of caloric content found for the measure of desire (Figure 3), where it was shown that participants reported higher desire ratings for high-calorie foods than for low-calorie foods. It is likely that individuals exhibited higher total dwell time for these food items because of their subconscious higher desire to order/consume them. In the aforementioned study by van der Laan et al. (2017), participants who were health-primed (provided with a health-related advertisement) exhibited significantly higher mean total dwell time on low-calorie foods than individuals in other conditions. Whereas the current study demonstrated that, overall,

individuals devoted more attention to high-calorie food items, the findings from van der Laan et al. (2017) suggest that, through the use of a health-related prime, participants could be swayed to spend more time viewing low-calorie food items, thus potentially influencing their choice to pick a healthier food item off of a menu.

In addition to the main effect of caloric content, there was a three-way interaction observed between calorie label, caloric content, and description, showing that caloric content was not the sole influence on total dwell time. No significant differences were observed in the calorie label group; however, when examining the interaction, it was found that when calorie labels were not present (in the no-calorie group), participants exhibited significantly longer dwell time for high-calorie foods with appealing description than for low-calorie foods with appealing descriptions, illustrated in Figure 9. This coincides with the main effect demonstrating longer dwell time for high-calorie foods (Figure 8), but further expands on the result by showing that it was only significant for appealing descriptions. This suggests that participants did not devote as much attention to the low-calorie foods, despite the use of appealing descriptions used in an attempt to make the food appear more appealing than if they featured a healthy description. Perhaps individuals exhibited longer dwell time for high-calorie foods with appealing descriptions when no calorie labels were present, because this was the most "indulgent" combination of food item and description. It was a "consistent" stimulus pairing, whereby the high-calorie food item was accompanied by a consistent appealing description, without explicit calorie information and perhaps, for this reason, it appealed most to the participants' desire for hedonic or pleasurable foods.

In addition, one of the main reasons for using eye-tracking technology as part of the current study, was to ensure that participants read the featured descriptions, such that results

pertaining to the effectiveness of these descriptions could be interpreted under the assumption that participants based their ratings on this information. Likewise, it provided valuable insight regarding the proportion of time spent viewing other elements of the stimulus. For example, it was found that, on average, only 3.61% of the time spent viewing the entire stimulus was devoted to looking at the calorie label. Graham and Jeffery (2011) showed that participants significantly over-report their usage of nutrition labels when compared to the objective measure obtained through the use of eye tracking. Although only calorie information, not nutrition labels, were provided in the current study, these findings can be compared given the minute percentage of time spent viewing the calorie labels by participants in the calorie-label group. In a study by Bowen and Morris (1995), researchers attempted to popularize salads in a restaurant's menu by giving salad items a "special treatment", which consisted of changing its location, drawing a double-lined box around the item, and increasing the font size. Although the researchers were unsuccessful in their attempt to draw more consumer attention to the salads, it is possible that such techniques could be used on a smaller scale. Rather than attempting to popularize an entire menu item, it may be more beneficial to attempt to showcase caloric information more prominently on restaurant menus, such that they are more visible and salient to consumers. Other studies have demonstrated that certain formats of calorie presentation are more effective than others (Liu & Brownell, 2012), thus it may be important to devote more efforts toward changing the manner in which caloric information is presented in restaurant menus, as the majority of restaurants currently implement basic numeric calorie labels, as used in the current study, which were shown to elicit minimal attention relative to other menu components (e.g., image, food description).

3 The Effects of Food Type

For all three measures of interest in the current study (i.e., intent, desire, and perceived healthiness) there was a main effect of food type found (Figures 11, 13, and 15, respectively). As it pertains to the measures of intent and desire, there were similar findings whereby participants reported highest ratings for appetizers for both measures; however, participants reported lowest intent ratings for salads and lowest desire ratings for both sandwiches and salads. In turn, the findings for perceived healthiness ratings demonstrated that participants provided highest health ratings for salads, and lowest health ratings for appetizers. These findings can potentially offer support for the Unhealthy = Tasty Intuition, which suggests that individuals believe the traits "unhealthy" and "tasty" to be mutually exclusive qualities of food; such that foods that are healthy are not believed to be tasty, and foods which are unhealthy are perceived as tasty (Raghunathan et al., 2006). It can be seen that appetizers, which were rated as the unhealthiest food type, were also rated highest on the measures of intent and desire. This suggests that, whereas participants perceived this food type to be least healthy, they also perceived it to be the most appealing, and thus reported higher ratings in their intent and desire to order/consume it. These results can also be flipped, whereby participants believed salads to be the healthiest food type and, consequently, were less likely to order or desire that food type.

There was also an interaction between caloric content and food type observed for each measure. With respect to intent ratings, participants reported significantly higher intent ratings for high-calorie appetizers than for low-calorie appetizers (Figure 12). With respect to desire ratings, participants reported significantly higher desire ratings for high-calorie appetizers, entrées, and salads compared to their low-calorie counterparts (Figure 14). This supports previous findings in the main analyses, where main effects of caloric content demonstrated

increased desire ratings for high-calorie versus low-calorie foods. An unexpected finding in the secondary analyses was that participants reported significantly higher intent and desire ratings for low-calorie sandwiches compared to high-calorie sandwiches. It remains unclear why such an unexpected finding occurred for only one food type, however, upon examination of stimuli chosen for this food type, a possible explanation was found. For high-calorie sandwiches, one stimulus included a sandwich that featured a relatively unfamiliar ingredient, tempeh, a product made from fermented soybeans. The inclusion of this sandwich (i.e., "Tempeh Sub") may have influenced the results, whereby participants may have reported lower intent and desire ratings for this food item due to unfamiliarity with the specific ingredient used. Finally, the interaction between caloric content and food type for perceived healthiness ratings revealed that participants reported significantly higher healthiness ratings for all low-calorie food types (i.e., appetizers, entrées, sandwiches), except salads, where no significant difference was observed between healthiness ratings of low-calorie and high-calorie salads (Figure 16). It can be suggested that, perhaps individuals believe all salads to be healthy, irrespective of caloric content. Salads are often perceived as a healthy food type (Vidal, Ares & Giménez, 2013), despite the fact that many served in restaurant settings are high in caloric content and contain relatively unhealthy ingredients, such as creamy dressings. For example, Dumanovsky, Nonas, Huang, Silver & Bassett (2009) reported that dressings of certain salads on restaurant menus can range from 40 calories up to 270 calories, depending on their fat content. In addition to this, 50% of the salads in the current study had a caloric content greater than 1000 calories, yet participants did not report a significant difference in health ratings between low- and high-calorie salads.

4 Limitations

The results of the current study shed light on how consumers use calorie labels, caloric content, and food descriptions to guide their ordering behaviours. Notwithstanding the value of these findings, the current study was not without limitations. The current experiment's setting was not an ideal replica of a real-world restaurant setting, which took place in a laboratory where participants made their ordering decisions while set up on the eye-tracking apparatus. Thus, this artificial setting may have impacted participants' ratings of food items, as it has been shown that a restaurant's environment can significantly impact consumers' evaluations of food items (Sobal & Wansink, 2007). Moreover, participants were only asked to rate food items based on visual stimuli and presented to the experiment knowing that they would not be consuming food as part of their participation; consequently, their ratings for intent/desire may be considered less realistic in that respect.

Furthermore, a notable limitation of the experiment was its use of mainly caloric information to influence participants' evaluations of food items, despite findings suggesting that caloric information should not be the sole factor considered when encouraging healthier lifestyles (Benton & Young, 2017). Fernandes et al. (2015) even found that their sample of university students considered a food items' nutritive value, ingredients, and processing technique to be significantly more important than its caloric content, when determining healthiness. The healthiness of a food item may not go hand in hand with its caloric content, especially considering the other information available on a nutrition facts label (e.g., saturated fat, trans fat, fibre, sugar, protein, cholesterol, sodium, etc.), which may suggest that caloric content is less indicative of a food's healthiness than previously thought. Without the provision of nutritional information on a menu or ordering board, consumers must rely on the information

provided by servers at restaurant establishments (Stastny, Evenson & Mozumdar, 2011). Consumers may even consider servers as "experts" regarding the food they serve, when in reality, such servers may be ill-informed, or completely unaware, of the nutritional value and of the ingredients used in the food items they showcase (Edwards & Meiselman, 2005). This proposes the idea that restaurants should include more information pertaining to their food's nutritive qualities, in addition to the caloric value, such that consumers may be aware of the nutritional value and relative healthiness of the food they choose. In consideration of the foregoing, displaying food's caloric content is more beneficial than not displaying any nutritional information, whatsoever. Research has shown that overconsumption is one of the leading contributors to rising rates of obesity, which is essentially the consumption of a surplus of calories (Kopelman, 2000; Talbot, Fleg & Metter, 2003). Therefore, regardless of caloric information accurately representing the healthiness of a food item, it is nevertheless a critical and necessary addition to restaurant menus, as it has been repeatedly shown that the provision of such information at the point of purchase results in overall lowered consumption, and in the current study, decreased intent ratings, which suggests that calorie labels are an effective tool in efforts to combat rising levels of obesity. In addition, Graham and Jeffery (2011) found that information placed near the top of a nutrition facts label (i.e., calorie information) was viewed more than the information placed near the bottom. Given that caloric information is the first piece of information listed on such labels, it is evident why the current study focused so greatly on the influence of this variable. In addition, the Healthy Menu Choices Act only requires restaurant establishments to feature caloric information, as well as the recommended daily intake statement, on their menus.

Another limitation of the study was its inability to control for participant food preferences, a factor which may have impacted responses. For example, it is possible that a participant may have rated a food item lower in intent/desire if it contained an ingredient that they did not like; thus, this response would have been motivated by their dislike of the ingredient, and not by its caloric content or description. It would have been a near impossible feat to curate a collection of food items specifically tailored to each participants' food preferences, such that their ratings would be based solely on the variables of interest (i.e., presence of calorie labels, caloric content, food descriptions). In the secondary analyses, it was found that participants reported significantly higher desire ratings for high-calorie appetizers, entrées, and salads, than for their low-calorie counterparts; however, the opposite was found to be true for sandwiches. It was suggested that, in this instance, the inclusion of a sandwich (i.e., Tempeh Sub), in the high-calorie sandwich category, may have influenced participants' ratings of high-calorie sandwiches, due in part to the unfamiliarity and unconventionality of the ingredient, tempeh. Perhaps, if another high-calorie sandwich had been chosen with a generic or common ingredient, this would not have occurred. Despite this limitation, it is important to note that measures were put into place in an attempt to mitigate the effects of food preference on participants' food ratings. Firstly, of the 48 food items presented, 24 were vegetarian and 24 were meat-containing, which was done in an attempt to counteract the notion that vegetarian items are healthier than meat-containing items (De Backer & Hudders, 2014). Secondly, the selection of food items featured an equal number (12) of appetizers, entrées, sandwiches, and salads, of which there were equal representations of vegetarian and meat-containing items. The "menu" was organized in this fashion to replicate one that would be seen in a real-life restaurant setting, where menus consist of a variety of food items to cater to the masses. Moreover, the

study included only participants who self-reported as eaters of an omnivorous diet (i.e., including both meat and vegetables) to ensure that those who participated would not discount half of the menu according to their dietary restrictions.

Finally, in terms of generalizability, the findings and conclusions of the current study can only be applied to the sample studied (i.e., undergraduate students aged 17-41), and to the particular food items featured in the current study's mock menu. Although it is likely that different results would have been obtained if other food items were to have been used as stimuli, it was the hope of the experimenter that with the inclusion of a variety of food types (i.e., appetizers, entrées, sandwiches and salads) and both vegetarian and meat-containing dishes, results could potentially be generalized to other real-life menus featuring a similar layout of items.

5 Future Directions

As the current study was relatively exploratory in nature, it would be beneficial to conduct smaller-scale studies in order to better understand the mechanisms behind some of the current findings. Despite the aforementioned limitation that the current study focused heavily on caloric information as a potential influencer of consumer evaluations of food healthiness, descriptions were also a variable of interest. These food descriptions, however, were not the main focus of the study, and were not standardized to directly reflect the information found on a nutrition facts table. Results of the information questionnaire showed that, collectively, 83.75% of participants make, at least, some effort to make healthy choices when dining out, yet, only 31.25% of participants indicated that they "almost always" or "usually" rely on nutrition information (i.e., caloric information) when taking into consideration the healthiness of their

food, suggesting that there are other factors that participants take into account when attempting to make healthy choices (Fernandes et al., 2015). Therefore, it would be beneficial for future studies to examine how the use of additional nutritional information (i.e., through the use of a nutrition facts label) influences consumer evaluations of food items as they pertain to intent, desire and perceived healthiness. Therefore, it would be advantageous to examine the influence of other components of a nutrition facts label (e.g., sodium, fat, carbohydrates) on consumer evaluations of food items by incorporating this information into the current study's stimuli.

Likewise, it would be beneficial to conduct future studies that focus solely on food descriptions to gain a better understanding of how food descriptions that contain both health-related and appealing words influence consumer evaluations of food items. The current study used strictly healthy descriptions (e.g., "Organic roasted and paprika-spiced sweet potatoes served with a low-fat sauce made of chopped tomatoes, garlic and crushed red peppers") or appealing descriptions (e.g., "A heavenly center-cut pork chop served with an indulgent apple sauce, mashed potatoes and green beans") and found that individuals reported significantly higher health ratings for foods with healthy descriptions than for foods with appealing descriptions. However, according to the Unhealthy = Tasty intuition, and other research examining the use of tasty and healthy food labels (Turnwald et al., 2017b), foods perceived as healthy are, in turn, not considered to be tasty. Therefore, it would be interesting to examine the effects of food descriptions, that contain both elements of healthy and appealing descriptions, on consumer evaluations (e.g., "An indulgent center-cut, lean pork chop served with a mouth-watering apple sauce, fresh mashed potatoes and green beans, high in vitamin C").

Furthermore, the current study classified caloric content according to only two, relatively broad categories, high-calorie (valued > 1000 calories), and low-calorie (valued < 600 calories).

The cut-offs were determined according to the general recommendation of 2000 calories per day, as well as by examination of popular restaurant menus. Although the current study found that participants reported significantly higher desire ratings for high-calorie foods than for low-calorie foods, it would be of interest to conduct a similar study in which narrower categories of caloric content were used (e.g., 100-399 calories, 400-699 calories, 700-999 calories, etc.). Thus, more light would be shed on the particular values at which individuals consider a food item to be healthy/unhealthy. Likewise, it would be useful to conduct a similar study in which participants are provided with the recommended caloric intake statement. Just over half of participants reported that they were aware of the recommended calorie intake proposed by Health Canada, meaning that the remaining half of participants were completely unaware of this information. Perhaps if individuals were "primed" with this information, their responses regarding intent and perceived healthiness would be influenced, such that they would report lower ratings for high-calorie foods. Half of the food items presented in the current study contained more than 1000 calories per serving, and many contained more than 2000 calories, 100% of the recommended daily intake. It is possible that, by being made aware of this information before providing their ratings, participants' responses towards high-calorie food items would differ.

6 Conclusion

The current study showcased several key findings. It was shown that calorie labels, alone, significantly impacted intent but not desire ratings, whereby participants in the no-calorie group reported significantly higher overall intent ratings than participants in the calorie group. This was in line with previous research showing that participants who were presented with calorie information, before or at the point of purchase, subsequently ordered meals of lower caloric content due to an awareness of the caloric value of their food. Furthermore, findings revealed an

effect of caloric content for desire and perceived healthiness ratings. With respect to desire, participants reported significantly higher desire ratings overall for high-calorie foods than for low-calorie foods. As it pertains to perceived healthiness, participants gave higher health ratings for low-calorie foods than for high-calorie foods. It was also shown that participants exhibited significantly longer dwell time for high-calorie foods than for low-calorie foods. Together, these results relate to the Unhealthy = Tasty Intuition, which theorizes that individuals possess an innate belief than unhealthy foods taste better than healthy foods. Thus, the fact that individuals reported lower desire ratings and higher health ratings for low-calorie foods suggests that this effect played a role in participants' responses in the current study. Regarding the effect of food descriptions, it was found that participants reported higher health ratings for foods accompanied by healthy descriptions than for those with appealing descriptions, which showed that, regardless of the actual caloric content of the food item, participants were clearly influenced by the descriptor words used to describe the food item. These findings offer support for the health-halo effect, as the provision of misleading nutritional information led participants to believe that a food item was healthier than it actually was.

It was also observed that food type had a significant effect on all three measures (i.e., intent, desire, perceived healthiness). In addition, an interaction was also observed between caloric content and food type for each measure. As it pertains to intent ratings, participants reported significantly higher intent ratings for high-calorie appetizers than for low-calorie appetizers; likewise, for desire ratings, participants reported significantly higher intent ratings for high-calorie appetizers, entrées, and salads compared to their low-calorie counterparts. Regarding perceived healthiness, participants reported significantly higher healthiness ratings for

all low-calorie food types, except salads, potentially due to a belief that all salads are healthy, regardless of actual caloric value.

Together, the findings of the current study have important implications for use in restaurant establishments. It was demonstrated that participants generally reported higher desire ratings for high-calorie foods than for low-calorie foods. Although there were no significant effects observed for food descriptions on participants' intent and desire ratings, the current study effectively manipulated participants' perceptions of food healthiness, using words alone, irrespective of the food's actual caloric content. This suggests that there is a need to develop better marketing strategies to showcase food items while concurrently helping individuals make more health-informed selections when dining out. This could perhaps lead to the development of food descriptions using both health-related and appealing words together, which simultaneously showcase nutritional value and promote food tastiness (e.g., promoting healthier foods without making them seem *too healthy* and, consequently, unappealing). This could potentially contribute to research supporting obesity prevention initiates attempting to understand and prevent the overconsumption of non-nutritious foods in restaurant settings. In conclusion, the current study demonstrated that individuals are easily influenced by information provided in a restaurant menu. Thus, it is important to continue experimenting in this critical area of research, as it is necessary to understand and develop better marketing strategies that can be used to both showcase food tastiness and help individuals make healthier selections when dining outside the home.

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Appendices

Appendix A – Sample Stimuli

High-Calorie Item with Healthy Description

Calorie Group

Quesedillas

A vegetarian dish of grilled tortillas filled with melted cheese, green onions, high in vitamin A, and chiles. Garnished with guacamole, salsa and sour cream.

1060 calories

No-Calorie Group

Quesedillas

A vegetarian dish of grilled tortillas filled with melted cheese, green onions, high in vitamin A, and chiles. Garnished with guacamole, salsa and sour cream.

High-Calorie Item with Appealing Description (Calorie Group)

Calorie Group

Macaroni and Cheese Balls

Crumb-coated macaroni and cheese balls with an indulgent marinara sauce makes for a heavenly meal. Sprinkled with shredded Parmesan.

1460 calories/serving

No-Calorie Group

Macaroni and Cheese Balls

Crumb-coated macaroni and cheese balls with an indulgent marinara sauce makes for a heavenly meal. Sprinkled with shredded Parmesan.

Low-Calorie Item with Healthy Description (Calorie Group)

Calorie Group

Pancetta Crostinis

An appetizer composed of fresh peas, high in magnesium, pancetta, goat cheese, lemon zest and tarragon. Stacked on a sliced baguette.

154 calories/serving

No-Calorie Group

Pancetta Crostinis

An appetizer composed of fresh peas, high in magnesium, pancetta, goat cheese, lemon zest and tarragon. Stacked on a sliced baguette.

Low-Calorie Item with Appealing Description (Calorie Group)

Calorie Group

Avocado Fries

Heavenly baked avocado slices coated in panko breadcrumbs. Served with a rich mayonnaise and hot sauce dipping sauce.

221 calories/serving

No-Calorie Group

Avocado Fries

Heavenly baked avocado slices coated in panko breadcrumbs. Served with a rich mayonnaise and hot sauce dipping sauce.

Appendix B – Questions and Rating Scales

Question Participants Answered for Each Stimulus Presented

Intent: "What is the likelihood that you would order and consume this item if you were dining at a restaurant?" 1-9

Desire: "How much would you desire to order this item if you were dining at a restaurant?" 1-9

Healthiness: "How healthy do you think this item is?" 1-9

Appendix C – Information Questionnaire

Please answer the following questions to the best of your abilities. Leave the answer blank if you prefer not to answer a particular question.

Participant ID: _____

Gender: _____

Do you have normal vision? YES NO

If no, do you wear corrective lenses? YES NO

Are you wearing them today? YES NO

Year of birth _____

Height (Measured) _____

Weight (Measured) _____

BMI (Calculated): (kg/m^2) _____

1. Have you eaten in the last three hours? YES NO

2. Do you live… (circle more than one if more than one apply)
   (a) By yourself
   (b) With your parents
   (c) With roommates
   (d) With your partner (e.g., spouse)
   (e) With your children
   (f) Other _____

3. What is your household income?
   (a) Less than $10,000
   (b) $10,000-29,000
   (c) $30,000-$49,000
   (d) $50,000-$69,000
   (e) $70,000-$89,000
   (f) $90,000-$99,000
   (f) $100,000 or more
   (g) Prefer not to answer

4. How do you describe your weight?
   (a) Very underweight
   (b) Slightly underweight
   (c) About the right weight
   (d) Slightly overweight
   (e) Very overweight

5. Would you consider yourself at a healthy weight? YES NO

6. On average, per week, how many days do you get at least 30-60 minutes of physical activity?
Specify the type of physical activity_____

_____

7. Are you on a diet? YES NO
   If so, for what reason (i.e., health-related, personal choice)? _____

---

8. Please indicate any notable food dislikes that may have affected your responding in this study

_____

9. Do you count your calories? YES NO

10. Do you know the average recommended daily calorie intake, as recommended by Health Canada? YES NO
    If so, what do you think it is? _____

11. Based on your average week, how many times do you eat… (Indicating 7 implies everyday)
    i. Breakfast
       (a) At Home (e.g., prepared by yourself, family member, friend, etc.) _____
       (b) Out (e.g., restaurant, cafeteria, kiosk) _____
       (c) I do not eat this meal _____
    ii. Lunches prepared?
       (a) At Home (e.g., prepared by yourself, family member, friend, etc.) _____
       (b) Out (e.g., restaurant, cafeteria, kiosk) _____
       (c) I do not eat this meal _____
    iii. Dinners prepared?
       (a) At Home (e.g., prepared by yourself, family member, friend, etc.) _____
       (b) Out (e.g., restaurant, cafeteria, kiosk) _____
       (c) I do not eat this meal _____

12. Do you make most of your meals yourself? YES NO

13. Do you try to make healthy choices when eating out?
    (a) Almost always
    (b) Usually
    (c) Sometimes
    (d) Rarely
    (e) Never

14. Do you read nutrition information materials provided by restaurants?
    (a) Almost always
    (b) Usually
    (c) Sometimes
    (d) Rarely
    (e) Never

15. How important are healthy choices to you?
    (a) Very important
    (b) Somewhat important
    (c) Neutral
    (d) Somewhat unimportant
    (e) Very unimportant

16. How do you rate your healthiness?
    (a) Very healthy
    (b) Somewhat healthy
    (c) Neutral
    (d) Somewhat unhealthy
    (e) Very unhealthy

17. What does healthy eating mean to you? Circle all that apply
    (a) Low calorie
    (b) Low carbohydrates
    (c) Low fat
    (d) Low sodium
    (e) Low sugar
    (f) Fresh foods
    (g) Organic/natural foods
    (h) Whole grains
    (i) High vitamins
    (j) High nutrients
    (k) Other _____

_____

Appendix D – Recruitment Script
Recruitment Script

Hello, my name is Dominika Pakula. I am a masters student in the Applied Psychology M.A. program here at Laurentian University. My supervisor is Dr. Michael Emond. The purpose of our research is to understand how consumers interpret food-related information as presented in a restaurant menu, using eye tracking technology. We would like to know if you would be interested in volunteering to participate in this study.

You would be asked to attend one session that would last approximately 45 minutes to 1 hour. Taking part in the study requires you to speak English and to have normal or corrected-to-normal vision, as you will be required to view stimuli from a computer monitor from a distance of about two feet. The study also requires that you consume an omnivorous diet, including most meats, vegetables, and animal by-products (i.e., cheese, milk). Three hours prior to the session, you would be asked to avoid eating any food. If, for medical or other reasons, you are unable to refrain from eating for this time period, you will still be able to participate in the study, but will have to indicate that you have eaten within the last three hours on a questionnaire.

During the session you would be asked to view a series of food images on a monitor while we track and measure your eye movements using the Eyelink 1000 system, located in Room E-228 of Alphonse Raymond. This involves placing your head on a chin rest while a camera located below the monitor tracks your eye movement. This procedure is completely non-invasive. While viewing the images, you will be asked to answer questions related to the caloric content of the food, your intent to order the food (if you were ordering at a restaurant), its desirability and how healthy you perceive it to be. Following the completion of this portion of the experiment, you will be asked to complete an information questionnaire and have your weight and height measured in the lab, in order to compute body mass index (BMI).

Your participation in this study is strictly voluntary and you may withdraw at any time of the experiment without consequence. If you agree to participate, or if you would like to receive more information pertaining to this study, please feel free to contact me by email (dpakula@laurentian.ca).

Thank you, have a great day!

Appendix E – Informed Consent

LaurentianUniversity
UniversitéLaurentienne

Informed Consent for Participation in a Research Study

Project Title: Investigating the effects of calorie labels, item descriptions and item healthfulness on consumer evaluations of restaurant menu items: An eye-tracking study

Researcher: Dominika Pakula

I, _____ *(Please Print)* consent to participate in this study.

I understand that:

1. This research project is interested in gaining valuable information regarding consumer ordering behaviours and consumer perceptions of items featured in a restaurant menu
2. I have been clearly informed of the general conditions of this study, which will take place in the Cognitive Health Research Laboratory, located in room E-228 of Alphonse Raymond. The task that I will perform consists of viewing items presented in a slideshow format and subsequently answering questions (regarding the food's desirability, my intent to order the food, as well as its perceived healthiness) while wearing an eye-tracking device. During this task, my eye movements will be recorded by a camera that sits below the monitor I will complete the activity on. At the end of the testing session I will be asked to complete a questionnaire and have my height and weight measured in the laboratory.
3. Participation in this study requires only one session lasting approximately 45 minutes to 1 hour. I will receive bonus toward my final grade.
4. I know that it is possible to feel tired or uncomfortable while participating in the study. I am aware that I am able to take a break if I feel tired.
5. I may remove myself from the study at any time without being penalized. I will receive my bonus points even if I choose to withdraw from the study prematurely.
6. All information gathered during the study will be kept confidential following the completion of the study. An identification number will be assigned to my name such that it does not appear on the data collected. All data will be stored in locked cabinets behind a locked door in the Cognitive Health Research Laboratory (room E-228) in Alphonse Raymond, and will only be accessible to the researcher. Dr. Emond, the supervisor, will only be given access to the de-identified data recorded during the study. The page linking my identification number and my name will be stored in a separate cabinet from the de-identified data, in the lab, accessible only to the researcher, Dominika Pakula. The researcher's best efforts will be made to ensure that confidentiality is maintained.

Please check the boxes to consent to the following aspects of the study:

- ☐ I have not eaten for three hours prior to participating
- ☐ I consent to the eye-tracking portion of the experiment
- ☐ I consent to having my height measured
- ☐ I consent to having my weight measured

I understand the above information pertaining to the study, and that I may ask questions if necessary. I also understand that I may stop the experiment at any time without justification. I therefore consent to participate in the study within the specified conditions.

_____ _____
Participant Signature Date

I, Dominika Pakula, have explained in detail the terms of the present study, the consent form, and objectives. I have answered all questions and have assured the participant that he or she may end the experiment at any time without justification.

_____ _____
Researcher Signature Date

I certify that I have explained to the signatory the terms presented in this form, and the objectives and implications of this research project, to have clearly answered any questions and to have explained that he or she remains free at any moment to withdraw his or her participation in the study without any justification or penalty.

*Would you like to receive the results of this study once they become available? YES NO

If so, please leave your contact information so that this information can be provided to you.

(email or phone #) _____

If you have experienced any distress as a result of your participation in this study or as a consequence of the content of the questions asked, please reach out to Laurentian counselling and support services. To set up your first visit or in a case of a personal crisis, simply drop in at P-230 (2nd floor of the Parker Building) or make an appointment by calling (705) 673-6506 during office hours, or send an email at counsellingservices@laurentian.ca.

If these services are unavailable to you, please reach out to Crisis Intervention Services, a 24-hour crisis hotline, by calling (705)-675-4760 or 1-877-841-1101 (toll-free) or in-person (open 8:30am-10:00pm seven days per week) at 127 Cedar Street.

If you have any questions, comments or complaints concerning the ethics of this research project, you can contact:

Laurentian University Research, Development and Creativity Office,
L-350,
Parker Building
Laurentian University
ethics@laurentian.ca
Telephone: (705) 675-1151, ext. 3213, 2436
Toll free: 1-800-461-4030

Dominika Pakula
Laurentian University
dpakula@laurentian.ca

Michael Emond, PhD.
Department of Psychology
Laurentian University
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(705) 675-1151, ext. 4246
1-800-263-4188, ext. 4246

Appendix F – Debriefing Form

Dear Participant,

Thank you for your participation in this study. For this study you were asked to view a series of food-related stimuli and to answer questions related to the caloric content of the food, your intent to order it, its desirability, as well as its healthiness. You were told that the purpose of the study was to see how consumers interpret these food items as if ordering from a restaurant menu, however, you were not told the entire purpose of the experiment. Participants are randomly assigned to either an experimental group or a control group. In the experimental group, participants view the stimuli with calorie labels and answer the three questions, while in the control group, participants view the stimuli without the calorie labels, are asked the same questions, and are asked to estimate the caloric content of some of the food items presented. You were also not informed that certain words were used as either "healthy" or "non-healthy" descriptors to describe the food items that you saw. Some of the food items were accompanied by health-related words and nutritional facts, while more appealing descriptive words accompanied others.

This procedure was chosen to simulate how consumers would rate foods when dining in both restaurants that feature calorie information on their menus, and in those that do not. Currently, the Healthy Menu Choices Act mandates that all restaurants with 20 or more locations in Ontario must present calorie information on their menus. Although this is a requirement for larger chain restaurants, it means that many independent or small-scale restaurants still do not have to feature this information on their menus. Two types of descriptions (e.g., healthy and non-healthy) were chosen to see if words could be used as a way to make food items seem healthier than they actually are (e.g., using words like organic and natural to describe high-calorie foods), or to make healthier foods sound more appealing (e.g., using words like mouth-watering and lip-smacking to describe low-calorie foods). Leaving out certain parts of the experiment was necessary to assure unbiased participant performance throughout the experiment.

If you have any questions about your participation in the study, or if you would like to receive the results of the study once they become available, please contact the principal researcher, Dominika Pakula (dpakula@laurentian.ca). To contact the researcher's supervisor, you may reach Dr. Michael Emond by email (memond@laurentian.ca), or by phone (705-675-1151, ext 4246; or 1-800-263-4188, ext. 4246).

If you have experienced any distress as a result of your participation in this study or as a consequence of the content of the questions asked, please reach out to Laurentian counselling and support services. To set up your first visit or in a case of a personal crisis, simply drop in at P-230 (2nd floor of the Parker Building) or make an appointment by calling (705) 673-6506 during office hours, or send an email at counsellingservices@laurentian.ca.

If these services are unavailable to you, please reach out to Crisis Intervention Services, a 24-hour crisis hotline, by calling (705)-675-4760 or 1-877-841-1101 (toll-free) or in-person (open 8:30 am-10:00 pm Monday-Sunday) at 127 Cedar Street, Sudbury.

Appendix G – Results of Pilot Study to Determine Descriptor Words

Table 1. Results of Pilot Study to Develop Descriptor Words

Word	Mean Healthy Scale Rating	Mean Indulgent Scale Rating	*t*-statement
Healthy***	4.87	2.60	$t(14) = 5.72, p < .001$
Heavenly***	2.07	4.67	$t(14) = -9.54, p < .001$
Invigorating	3.71	3.00	$t(14) = 1.22, p = .246$
Delectable**	2.40	4.07	$t(14) = -4.18, p < .01$
Refreshing*	4.20	2.73	$t(14) = 2.96, p < .05$
Divine**	2.47	4.20	$t(14) = -4.38, p < .01$
Energy-Rich**	4.20	2.40	$t(14) = 4.32, p < .01$
Tasty	3.00	3.47	$t(14) = -1.16, p = .264$
Uplifting	3.40	2.53	$t(14) = 1.71, p = .109$
Flavourful	3.20	3.53	$t(14) = -.837, p = .417$
Fresh***	4.67	2.80	$t(14) = 5.33, p < .001$
Lip-Smacking***	1.93	4.20	$t(14) = -5.56, p < 001$
Healthful***	4.73	2.20	$t(14) = 5.68, p < .001$
Tempting***	1.60	4.27	$t(14) = -6.50, p < .001$
Appetizing	2.80	3.60	$t(14) = -1.74\ p = .104$
Luscious*	2.53	3.73	$t(14) = -2.81, p < .05$
Natural***	4.87	2.27	$t(14) = 6.93, p < .001$
Organic***	4.93	2.40	$t(14) = 6.73, p < .001$
Raw***	4.40	1.93	$t(14) = 7.34, p < .001$
Unprocessed***	4.33	2.00	$t(14) = 6.72\ p < .001$
Vegetarian***	4.27	1.87	$t(14) = 6.62, p < .001$
Scrumptious**	2.40	4.40	$t(14) = -4.10, p < .01$
Delightful	2.87	3.67	$t(14) = -1.82, p = .90$
Decadent***	1.53	4.60	$t(14) = -8.26, p < .001$
Energizing**	4.00	2.47	$t(14) = 3.62, p < .01$
Enticing***	2.13	4.07	$t(14) = -4.74, p < .001$
Exquisite	2.93	3.67	$t(14) = -1.75, p = .102$
Restoring***	4.20	1.93	$t(14) = 6.58, p < .001$
Inviting	2.40	3.20	$t(14) = -1.49, p = .158$
Delicious*	3.00	3.87	$t(14) = -2.69, p < .05$
Marvellous	2.79	3.21	$t(14) = -.921, p = .374$
Rejuvenating***	4.33	2.33	$t(14) = 5.68, p < .001$
Revitalizing***	4.13	2.07	$t(14) = 6.88, p < .001$
Rich***	2.00	4.27	$t(14) = -5.01, p < .001$
Hearty	3.53	3.07	$t(14) = .923, p = .372$
Aromatic	3.13	2.80	$t(14) = .892, p = .388$
Indulgent***	1.53	4.53	$t(14) = -7.46, p < .001$
Mouth-Watering***	2.00	4.20	$t(14) = -6.74, p < .001$
Juicy	3.07	3.21	$t(14) = -.458, p = .655$
Comforting**	2.13	3.67	$t(14) = -3.36, p < .01$
Wholesome**	4.40	2.47	$t(14) = 4.49, p < .01$
Yummy*	2.87	3.73	$t(14) = -2.30, p < .05$

* denotes significance at $p < .05$, ** denotes significance at $p < .01$, *** denotes significance at $p < .001$

Appendix H – Descriptors used in "Healthy" and "Appealing" Descriptions

Table 2. All food descriptions used in the current study

Food Item	Healthy Description	Appealing Description
Chicken Burrito Bowl	A healthy mix of tomatoes, avocado, pinto beans and chicken. Tossed with romaine lettuce and protein-filled quinoa.	A heavenly mix of tomatoes, avocado, pinto beans and delectable chicken. Tossed with romaine lettuce and quinoa.
Beef Broccoli Stir Fry	A refreshing dish made with stir-fried beef, broccoli and carrots, served over a bed of spaghetti squash. Cooked with sodium-reduced beef broth.	A lip-smacking dish of stir-fried beef, broccoli and carrots, served over a divine bed of spaghetti squash. Cooked in beef broth.
Salmon Alfredo	Energy-rich salmon and broccoli prepared in a low-fat Alfredo sauce and served over rotini pasta noodles.	Tempting salmon and broccoli prepared in a rich Alfredo sauce and served over rotini pasta noodles.
Sweet Potato Carbonara	A fresh mix of sweet potato noodles with iron-abundant spinach and sliced mushrooms in a garlic sauce.	A scrumptious mix of sweet potato noodles with spinach and sliced mushrooms in a mouth-watering garlic sauce.
Cauliflower Frittata	Cauliflower, kale, egg and onion are combined to make this healthful creation, which is also low in carbohydrates.	Delicious cauliflower, kale, egg and onion are combined to make this enticing creation.
Black Bean Quinoa Bowl	Black beans, shredded cheese and sliced cabbage with a touch of natural tomato salsa. Served over quinoa, a good source of calcium.	Black beans, indulgent shredded cheese and sliced cabbage with a touch of tempting tomato salsa. Served over quinoa.
Rack of Ribs with Fries	A full rack of barbeque glazed pork ribs served with potato fries and a restoring cinnamon apple sauce, which is high in antioxidants.	A full rack of comforting barbeque glazed pork ribs served with potato fries and an enticing cinnamon apple sauce.
Salmon Filet	A herb-crusted salmon fillet, high in omega 3 fatty acids, with lemon sauce. Served with unprocessed mashed potatoes and asparagus.	A herb-crusted salmon filet with a luscious lemon sauce. Served with comforting mashed potatoes and asparagus.
Pork Chops	An energizing center-cut pork chop served with reduced-sugar apple sauce, mashed potatoes and green beans.	A heavenly center-cut pork chop served with an indulgent apple sauce, mashed potatoes and green beans.
Sweet Corn Patties	Vegetarian sweet corn patties topped with sour cream, tomatoes, and fibrous avocado. Sprinkled with a tangy cream sauce.	Delicious sweet corn patties topped with sour cream, tomatoes, and avocado. Sprinkled with a rich and tangy cream sauce.

Fried Macaroni and Cheese	Crumb-coated macaroni and cheese balls with marinara sauce, high in vitamin K, makes for a restoring meal. Sprinkled with shredded Parmesan.	Crumb-coated macaroni and cheese balls with an indulgent marinara sauce makes for a heavenly meal. Sprinkled with shredded Parmesan.
Fettucine Alfredo	This revitalizing pasta dish is made with chicken, a good source of protein, fettucine noodles and a Parmesan cream sauce.	This enticing pasta dish is made with chicken, fettucine noodles and a mouth-watering Parmesan cream sauce.
Baked Potato Soup	This healthy soup is made with baked potatoes, cheddar cheese, reduced-fat sour cream and chives.	This mouth-watering soup is made with baked potatoes, rich cheddar cheese, sour cream and chives.
Pancetta Crostinis	An appetizer composed of fresh peas, high in magnesium, pancetta, goat cheese, lemon zest and tarragon. Stacked on a sliced baguette.	A delectable appetizer composed of peas, pancetta, goat cheese, lemon zest and tarragon. Stacked on a scrumptious sliced baguette.
Buffalo Chicken Meatballs	These energizing meatballs are packed with ground chicken, nutrient-rich onions, carrots and mushrooms. Served with a blue cheese dipping sauce.	These lip-smacking meatballs are packed with ground chicken, onions, carrots and mushrooms. Served with a luscious blue cheese dipping sauce.
Sweet Potato Bites	Organic roasted and paprika-spiced sweet potatoes served with a low-fat sauce made of chopped tomatoes, garlic and crushed red peppers.	Enticing roasted and paprika-spiced, sweet potatoes served with a divine spicy sauce made of chopped tomatoes, garlic and crushed red peppers.
Edamame	A bowlful of healthful edamame beans sprinkled with Aleppo pepper makes for a great gluten free appetizer.	A bowlful of yummy edamame beans sprinkled with Aleppo pepper makes for a delicious appetizer.
Avocado Fries	Healthy baked avocado slices coated in whole-wheat panko breadcrumbs. Served with a mayonnaise and hot sauce dipping sauce.	Heavenly baked avocado slices coated in panko breadcrumbs. Served with a rich mayonnaise and hot sauce dipping sauce.
Cheeseburger Fries	French fries topped with fried pickles, ground beef high in zinc, red onion, refreshing lettuce and tomato. Drizzled with a cheese sauce.	French fries topped with delectable fried pickles, ground beef, red onion, lettuce and tomato. Drizzled with a luscious cheese sauce.
Appetizer Sampler	An assortment of onion rings, mozzarella sticks, fried pickles, and chicken strips, high in protein. Paired with four revitalizing dipping sauces.	A mouth-watering assortment of onion rings, mozzarella sticks, fried pickles and chicken strips. Paired with four delicious dipping sauces.

Eggroll Sampler	A variety of eggrolls including rejuvenating avocado and tomato, chicken and corn, as well as salmon and spinach, a great source of vitamin B. Served with four dipping sauces.	A variety of scrumptious eggrolls including avocado and tomato, chicken and corn, as well as indulgent salmon and spinach. Served with four dipping sauces.
Quesadilla	A vegetarian dish of grilled tortillas filled with melted cheese, green onions, high in vitamin A, and chiles. Garnished with guacamole, salsa and sour cream.	An enticing dish of grilled tortillas filled with melted cheese, green onions and chiles. Garnished with rich guacamole, salsa and sour cream.
Spinach and Cheese Dip	A dip made of organic spinach, artichoke hearts, high in fiber, shallots, garlic and a mixture of cheeses. Served hot with a side of chips.	A comforting dip made of spinach, artichoke hearts, shallots, garlic and a mixture of divine cheeses. Served hot with a side of chips.
Nachos	Chips topped with melted cheese, energy-rich guacamole, red chile sauce, sour cream, jalapeños, a good source of vitamin C, green onions and salsa.	Chips topped with heavenly melted cheese, guacamole, red chile sauce, sour cream, yummy jalapeños, green onions and salsa.
Meatball Sandwich	A pork meatball sandwich served on a bun with a variety of melted cheeses and a fresh tomato marinara sauce, high in antioxidants.	A delectable pork meatball sandwich served on a bun with a variety of melted cheeses and a divine tomato marinara sauce.
Grilled Chicken Caesar Wrap	Healthy, seasoned grilled chicken with romaine lettuce, tomatoes and a Caesar dressing. Wrapped up in a tortilla, low in carbohydrates.	Lip-smacking seasoned grilled chicken with romaine lettuce, tomatoes and a Caesar dressing. Wrapped in a yummy tortilla.
Classic Burger	A lean beef burger topped with slow-cooked onions, lettuce, tomato and a natural sauce made of mayonnaise, ketchup and relish.	A tempting beef burger topped with slow-cooked onions, lettuce, tomato and a comforting sauce made of mayonnaise, ketchup and relish.
Veggie Wrap	Raw avocado, carrots, cucumbers, bean sprouts and hummus are packed into a tortilla to make this wrap, which is low in sodium.	Scrumptious avocado, carrots, cucumbers and bean sprouts are packed into a tortilla to make this delicious wrap.
Edamame Quinoa Burger	This rejuvenating edamame and quinoa burger is served on a tomato and topped with a dollop of yogurt sauce, which is high in calcium.	This delicious edamame and quinoa burger is served on a tomato and topped with a dollop of luscious yogurt sauce.
Avocado and White Bean Wrap	This vegetarian wrap is made of mashed white beans and avocado blended with cheddar cheese, onion	This tempting wrap is made of mashed white beans and avocado blended with comforting cheddar cheese, onion and a cabbage slaw.

	and a cabbage slaw, a good source of magnesium.	
Ham Sandwich	Slow-roasted pork and protein-packed ham, swiss cheese and refreshing pickles. Dressed with mustard and mayonnaise on a pressed roll.	Comforting slow-roasted pork, ham, swiss cheese, and pickles. Dressed with mustard and mayonnaise on an indulgent pressed roll.
Chicken Salad Sandwich	A blend of pulled chicken, naturally sweet red grapes, celery and walnuts on a bed of leaf lettuce. Served open face on a roll with French fries.	A blend of mouth-watering pulled chicken, divine red grapes, celery and walnuts, on a bed of leaf lettuce. Served open face on a roll with French fries.
Turkey Club	Unprocessed bacon, turkey, avocado, tomato, red onion, provolone cheese, lettuce, and cilantro-pesto mayo. Served on fibrous brown toast.	Lip-smacking bacon, turkey, avocado, tomato, red onion, scrumptious provolone cheese, lettuce and cilantro-pesto mayo. Served on brown toast.
Tempeh Sub	This soy-based tempeh and parmesan sub served on a bun makes for an energizing meal and a great source of probiotics.	This rich, soy-based tempeh and parmesan sub served on a bun makes for a delectable meal.
Vegetable Sub	A vegetable patty topped with provolone cheese, organic tomatoes and iceberg lettuce, high in calcium. Drizzled with a cream dressing.	A tempting vegetable patty topped with provolone cheese, tomatoes and iceberg lettuce. Drizzled with an enticing cream dressing.
Veggie Burger	A blend of vegetables is used to make this healthful and low in fat veggie burger. Topped with onions, lettuce, tomato and served with a side of fries.	A blend of scrumptious vegetables is used to make this lip-smacking veggie burger. Topped with onions, lettuce, tomato and served with a side of fries.
Orzo Chicken Salad	Orzo pasta, chicken, unprocessed corn, tomatoes and cilantro tossed in an avocado-lime dressing, a great source of vitamin B.	Orzo pasta, chicken, yummy corn, tomatoes and cilantro tossed in a lip-smacking avocado-lime dressing.
Peach, Berry and Bacon Salad	Peaches and raspberries, high in antioxidants, combined with bacon and watercress in a maple-syrup dressing make up this healthful salad.	Peaches and raspberries combined with indulgent bacon and watercress in a maple-syrup dressing make up this comforting salad.
Shrimp Caesar Salad	This rejuvenating salad is made of shrimp, romaine lettuce, croutons and asiago cheese tossed in a low-fat lemon-Caesar dressing.	This delicious salad is made of shrimp, romaine lettuce, croutons and rich asiago cheese tossed in a lemon Caesar dressing.
Potato Salad	Tossing potatoes, capers, gherkins, red peppers and celery in a Greek-	Tossing potatoes, capers, gherkins, red peppers and celery in a

	yogurt dressing, high in vitamin B12, gives this salad a revitalizing taste.	delectable Greek-yogurt dressing gives this salad a heavenly taste.
Green Salad with Pita and Hummus	Fresh grated carrots, rich in vitamin A, and sliced cucumbers piled on a bed of mixed greens. Served with a side of hummus and pita bread.	Yummy grated carrots and sliced cucumbers piled on a bed of mixed greens. Served with a side of mouth-watering hummus and pita bread.
Chicken Broccoli Salad	Broccoli and carrot slaw with red onions and celery mixed with energy-rich chicken breast. Topped with fiber-filled dried cherries.	A delectable broccoli and carrot slaw with red onions and celery mixed with chicken breast. Topped with divine dried cherries.
Chicken Taco Salad	Lime-marinated chicken, corn, black beans, tortilla strips, tomato and raw mixed greens with a low-fat peanut-cilantro vinaigrette.	Scrumptious lime-marinated chicken, corn, black beans, tortilla strips, tomato and mixed greens with a luscious peanut-cilantro vinaigrette.
Quesadilla Salad	Grilled chicken, high in protein, cheese, tomatoes, corn, a restoring black bean salsa, and tortilla strips with a citrus dressing. Served with cheese quesadillas.	Divine grilled chicken, cheese, tomatoes, corn, black bean salsa, and tortilla strips with a citrus dressing. Served with lip-smacking cheese quesadillas.
Salmon Salad	Salmon served over energizing kale, shaved brussels sprouts, arugula, avocado, quinoa, cranberries and radishes. Tossed in a low fat vinaigrette.	Salmon served over yummy kale, shaved brussels sprouts, arugula, avocado, quinoa, cranberries and radishes. Tossed in a heavenly vinaigrette.
Cobb Salad	An energy-rich salad with asparagus, sunflower seeds, roasted beets, avocado, garbanzo beans, quinoa and farro. Drizzled with a low in sugar vinaigrette.	A tempting salad with asparagus, sunflower seeds, roasted beets, avocado, garbanzo beans, quinoa and farro. Drizzled with a luscious vinaigrette.
Thai Salad	A blend of raw vegetables, low in saturated fat, including avocado, edamame, and red cabbage served over a bed of noodles. Drizzled with a spicy dressing.	A blend of vegetables, including avocado, edamame, and red cabbage served over a bed of indulgent noodles. Drizzled with an enticing spicy dressing.
Quinoa and Arugula Salad	A refreshing salad with asparagus, sun-dried tomatoes, red onions, toasted pine nuts and feta cheese. Tossed in a champagne vinaigrette, low in carbohydrates.	A mouth-watering salad with asparagus, sun-dried tomatoes, red onions, toasted pine nuts and tempting feta cheese. Tossed in a champagne vinaigrette.