



Discussion paper

Optimization of menu-labeling formats to drive healthy dining: An eye tracking study



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ABSTRACT

This study examines customers' visual attention when choosing food and beverage items of a fast-food menu. Three formats on menu labeling were examined, including numeric, color-coded, and physical activity-based formats. An experimental choice paradigm combined with eye tracking technology explored customers' visual attention, preferences for format, and menu choices. The study revealed that customers increased visual attention and chose healthier selections when viewing physical activity-based labeling, and customers preferred physical activity-based formats over numeric or color-coded labeling. Overall, the physical activity-based labeling on calorie information app to be the most effective format for inducing healthy choices. This study provides important implications for industry practitioners to effectively utilize menu labeling to improve customers' awareness of healthy eating options.

1. Introduction

Healthy eating is important to customers who are conscious of physical well-being and is a concern that reflects a fundamental human need. Dining-out has increasingly gained importance in the U.S. due to frequency of food consumed outside the home, accounting for over 45% of total food expenditures annually since 1997, up from 27 percent in 1962 and rising to 50.1 percent in 2014 (US Department of Agriculture Economic Research Service, 2016). Such a substantial and continuous increase in restaurant dining will likely accelerate the occurrence of obesity by promoting unhealthy dietary behaviors and habits (Kant et al., 2015; Zick et al., 2010). Compared to home prepared food, the cuisine consumed at restaurants is mostly higher in total fat and saturated fat or lower in dietary fiber, calcium, and iron on a per-calorie basis (Guthrie et al., 2002), and is often served in larger portions (Ello-Martin et al., 2005; Young and Nestle, 2007), all of which promote overconsumption. Customers' growing health consciousness stimulates a need for effectively presented information about food options to help them make informed decisions at restaurants (DiPietro et al., 2016; National Restaurant Association, 2015a,b). Consequently, menu labeling serves as a direct, accessible, and consistent manner to encourage informed food choices at the point of purchase (U.S. Food and Drug Administration, 2014). In the U.S., according to the Patient

Protection and Affordable Care Act of 2010 (PPACA, Section 4205), menu labeling requires chain restaurants with 20 or more locations, as of May 2018, to post calorie information for menu items. According to the Center for Science in the Public Interest (2015), of 579,000 restaurants in the U.S., approximately 40% (231,000 outlets and 1069 chains) will be subject to the federal menu labeling law. Furthermore, the menu labeling initiative has spread worldwide: The European Union, Australia, Korea, and many other countries have established policies similar to those of the U.S. (Kim and Ham, 2016).

Although the importance of menu labeling has wide recognition by government and industry (National Restaurant Association, 2015a,b; U.S. Food and Drug Administration, 2017), Bialkova et al. (2014) argued that simple presence of menu labeling cannot guarantee meeting healthy eating goals, since information presentation is not a sufficient condition to insure successful communication (Qiang et al., 2004). Cecchini and Warin (2016) further suggested that effective formats in menu labeling might assist customers to process food information, which help them to select healthy items. Recent menu labeling studies focused on the effect of a stimulus (different menu formats) on customers' selections, especially the widely investigated technique of labeling using a numeric format (i.e., providing nutrient amount in numeric format) (e.g., Ellison et al., 2013; Morley et al., 2013). However, Dowray et al. (2013) argued that numerical nutritional information

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might not be a sufficient stimulus for customers' healthy choices, since visual symbols can reduce cognitive effort and allow customers' faster information processing (Schwarz and Clore, 1996). Visual features increase the easiness of individuals' information processing when compared to numerical information only (Kahn, 2017), and thereby facilitating customers to make the choice of a specific item (Lam et al., 2007). However, previous studies have investigated the impact of visual labeling formats in menus (e.g. color-coded/traffic light label or physical activity-based label) on customers' behaviors in the context of restaurants. The present study enriches the current, yet sparse, research body in this field. Particularly, we investigated physical activity-based labels with the eye tracking technique, which is an innovative approach. The present study aims to explore visual attention, preferences for formats, and choices for items in response to three different formats of menu labeling.

Customers' attention can be assessed by observing customers' eye movements, which leads to informed product choices (Meißner et al., 2016). In marketing, the eye tracking technique, which captures individual eye movements, has had use for evaluating customers' attention to advertising (Wedel and Pieters, 2008), but scant applications appear in hospitality literature (e.g., Li et al., 2016; Yang, 2012). Furthermore, customers' visual attention to physical activity-based menu labeling in a restaurant setting has not been an employed technique. Previous studies of menu labeling formats have mainly employed retrospective, self-reported methodology (e.g. Dowray et al., 2013; Yepes, 2015) which likely overestimates customers' comprehension of the use of labels for decision-making (Cowburn and Stockley, 2005). Recently, research has used eye tracking technology in front-of-package food (e.g. Ares et al., 2013; Bialkova et al., 2014), suggesting the technique's applicability to customers' behavior in the context of restaurants. Lately, Reale and Flint (2016a) investigated the role of semi-directive (e.g. color-coded label) and directive labeling (e.g. health logo) in promoting informed food choices at a sit-down service restaurant setting in U.K.

The purpose of the present study is to assess customers' attitudes and behavioral responses to labeling formats on a fast-food menu. The combination of eye tracking technique and surveys on customers' food choices in experiments offers industry practitioners a unique strategy to simultaneously observe both processes and outcomes of individuals' behavior at the point-of-purchase (Krucien et al., 2017). The effectiveness of comparing various visual formats adds insight for menus' designs. The specific objectives of this study are:

- 1) to examine the impact of formats for menu labeling on customers' visual attention;
- 2) identify customers' preferences for labeling formats on menus;
- 3) to measure the impact of formats for labeling on customers' choices from menus.

2. Literature review

2.1. Public health and menu labeling

Obesity is one major public health concern today. The growing prevalence of obesity has had correlation with the rise in consumption of food-away-from-home (Drichoutis et al., 2012). Consequently, the restaurant industry has been the target of recent regulations intended to encourage reduction of obesity by providing relevant nutritional information and creating awareness at the point-of-purchase (U.S. Food and Drug Administration, 2017). In the past few years, menu labeling has become mandatory or voluntary at restaurants in several countries, including U.S. (Patient Protection and Affordable Care Act of 2010-PPACA, Section 4205 in 2010 Patient Protection and Affordable Care Act, 2010 Patient Protection and Affordable Care Act of 2010-PPACA, Section 4205 in 2010), European Union (Commission Directive 2003/120/EC for European Union in 2003), Australia (Food Nutritional Information Amendment Act for Australian Capital Territory Government

in 2011), Korea (Special Act on Children's Food Safety and Nutrition for Korea in 2009), and others (Kim and Ham, 2016).

The assumption of the governmental regulations is that menu labeling is an effective information channel to assist customers' informed choices for diets among alternatives (Drichoutis et al., 2012). However, previous studies generated mixed results regarding the impact of menu labeling on customers' decisions. For example, Burton et al. (2009) and Dowray et al. (2013) showed that labeling of calorie content reduces consumption of junk food. In contrast, some others revealed small or even null effects from labels containing caloric information (Swartz et al., 2011; for a meta-analytic review, see Long et al., 2015). Hence, the simple presence of labeling on menus cannot guarantee functionality (Bialkova et al., 2014). Borgmeier and Weesternhoefer (2009) suggested that scholars could pay more attention on the impact of food labeling formats on customers' healthiness evaluation and food choices. The rationale for their statement was that the form of representation (i.e., food labeling formats) (Schwarz and Clore, 1996) influences how customers process the corresponding information (i.e., nutritional information) (Bialkova et al., 2014), which consequently affect their decisions (i.e., food choices). Therefore, the current argument contends that formats for menu labeling may influence customers' decision-making process at restaurants (Bialkova and van Trijp, 2010).

2.2. Three formats for labeling on menus

Despite the fact that labeling on menus appears in restaurants, many customers are unable to understand or utilize the information as they are unaware of what the number of calories means and its association to daily calorie intake (Blumenthal and Volpp, 2010). For example, in most restaurants, menu labeling contains a numeric format for nutritional information. However, calorie information may not be sufficient to inform customers and motivate behavioral change (Dowray et al., 2013). This informational disconnection may explain that some previous studies found insignificant impact of menu labeling with a numeric format on customers' purchase decisions (e.g., Dumanovsky et al., 2010; Elbel et al., 2011). Consequently, recent studies have suggested that applying alternative formats for menu labeling may stimulate customers' selections and formation of perceptions at the point-of-purchase (e.g., Ellison et al., 2013; Morley et al., 2013; Reale and Flint, 2016a,b).

One of the alternatives for menu labeling that previous researchers (Ellison et al., 2013; Morley et al., 2013; Van Herpen and Trijp, 2011) suggested is a color-coded format (also known as traffic light labeling; hereafter referred to as color-coded labeling), which is semi-directive (Reale and Flint, 2016). The format of color-coded labeling provides ratings for caloric information by adding a color scheme (red: high caloric content, amber: medium, and green: low) to the numeric labeling, which is similar to the front-of-packet labels at supermarkets in some countries, such as U.K. and Australia. Therefore, the format of color-coded labeling provides "at a glance" information to customers (Van Herpen and Trijp, 2011) and facilitates customers' informed decisions due to reduced cognitive workload (Jones and Richardson, 2007). In an experimental study, Ellison et al. (2013) found that the color-coded labeling can lead customers to select lower-calorie items while numeric labels alone did not affect selections. From a choice experiment involving eye tracking, Bialkova et al. (2014) found that customers fixated longer and more often on products labeled with color-coded format compared with those labeled with the numeric format. With a similar approach, Reale and Flint (2016a) also suggested that the color-coded format captured customers' visual attentions and had a significant impact on food choices. Additionally, customers tend to better understand the color-coded labels in comparison to monochromatic ones (Borgmeier and Westenhoefer, 2009). Therefore, providing color-coded labeling for customers may potentially enhance the effectiveness of menu labeling in restaurants (Liu et al., 2012; Morley et al., 2013). However, some existing studies denied the effectiveness of

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