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A randomized trial of calorie labeling on menus

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ABSTRACT

Background. Food consumed outside the home accounts for a growing proportion of the North American diet and has been associated with increased obesity.

Purpose. To examine the effect of nutrition labeling on menus on awareness, use, and food consumption, including the impact of "traffic light" labeling and adding other nutrients.

Methods. Blinded, randomized trial with 635 Canadian adults conducted in 2010–2011. Participants ordered a free meal from one of four experimental menus: 1) no nutritional information shown, 2) calorie amounts only, 3) calorie amounts in "traffic lights", and 4) calorie, fat, sodium, and sugar shown in "traffic lights". Recall of nutrition information, knowledge of calorie content and nutrient consumption were assessed.

Results. Participants in the calorie conditions were more likely to recall the calorie content of meals and to report using nutrition information when ordering. The calorie content of meals was not significantly different across conditions; however, calorie consumption was significantly lower among participants in the *Calorie-only* condition compared to the *No information* condition (mean = −96 kcal, $p = .048$).

Conclusions. Menu labeling increased awareness and use of nutrition information and reduced consumption. Adding "traffic lights", fat, sodium, and sugar amounts to menus had little impact compared to calorie-only labeling.

Introduction

In Canada, approximately 25% of adult Canadians are obese and an additional 37% are overweight (Public Health Agency of Canada, 2011). Over the past 25 years, obesity in Canada has increased among all age groups and socioeconomic strata and in all geographic regions. However, socioeconomic disparities are apparent, with significantly higher levels of obesity among lower socioeconomic groups and aboriginal populations in particular (Public Health Agency of Canada, 2011). The economic burden of obesity in Canada is considerable: recent estimates suggest that the direct costs attributable to overweight and obesity exceed $6.0 billion or 4% of health expenditures (Anis et al., 2010).

Increased energy intake is a primary determinant of rising obesity rates (Jeffery and Harnack, 2007). In North America, energy intake has increased dramatically as a result of greater portion sizes and greater consumption of energy-dense foods (Dietary Guidelines Advisory Committee, 2010; IOM, Institute of Medicine, 2010; Slater et al., 2009; Statistics Canada. Food Statistics, 2008, 2009). Increased energy intake has been driven in part by greater calorie intake outside the home at "fast-food" and other restaurants (DGAC, Dietary Guidelines Advisory Committee, 2010; French et al., 2000; Slater et al., 2009). Approximately 60–70% of Canadians report eating out at least once a week, and the Canadian Restaurant and Foodservices Association (2012) estimates that restaurant food accounts for approximately one-fifth of the average Canadian's daily diet (Joint Initiative of the National Institute of Nutrition and the Canadian Food Information Council, 2004; Reaman, 2010; Stewart et al., 2006). Food eaten outside the home is associated with higher calorie intake and fat intake, as well as lower intake of fiber, calcium, fruit, and vegetables (Canadian Restaurant Foodservice Association, 2010; Dietary Guidelines Advisory Committee, 2010; French et al., 2001; Kant and Graubard, 2004; Satia et al., 2004; Schmidt et al., 2005), and excess weight gain in prospective studies (Brownell, 2004; Mancino et al., 2009; Pereira et al., 2005; Thompson et al., 2004).

A recent scan of the nutrient profile of foods served at 85 of the leading restaurants in Canada indicated substantial variability in calorie levels even among the same types of food offerings (Powell et al., 2007). Given this variability, it is not surprising that most consumers are unable to accurately estimate the calorie level of restaurant foods (Burton et al., 2006; Scourboutakos and L'Abbé, 2012). A growing number of restaurants make nutrition information available online and in pamphlets available upon request. However, according to a 2007 survey, none of the 136 Canadian outlets surveyed provided nutrition information for standard items on menus or menu boards, where it is most visible prior to ordering (Centre for Science in the Public

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Interest, 2008; Wansink and Chandon, 2006). Therefore, although Canadians consume a substantial proportion of their energy intake outside the home, it remains unclear whether they are aware of the nutritional quality of the food they are consuming.

In Canada, nutrition labeling regulations are limited to pre-packaged food products and do not apply to foods served in restaurants (Health Canada, 2010; Health Canada, 2012; Joint Initiative of the National Institute of Nutrition the Canadian Food Information Council, 2004). Mandatory menu board labeling regulations have been implemented in a number of other jurisdictions. In 2008, New York City became the first jurisdiction in the world to require calorie information on menus at restaurants (US Food Drug Administration, 2011). The regulations require restaurant chains with 15 or more locations to list calories on menu boards, menus, or food item display tags. The font and format of the calorie number must be at least as large as the name or price of the menu item. Similar menu regulations have been implemented in six US states and several US cities, and federal regulations are under development (Center for Science in the Public Interest, 2010; New York City Department of Health Mental Hygiene and Board of Health, 2006).

Evidence on the impact of menu labeling is mixed. Among the studies that used experimental research designs to examine the impact on food ordering, eight studies reported a reduction in calorie intake (Bassett et al., 2008; Burton and Creyer, 2004; Davis-Chervin et al., 1985; Howlett et al., 2009; Mayer et al., 1987; Roberto et al., 2010; Stubenitsky et al., 2000; US Food and Drug Administration, 2011), two reported no effect (Harnack et al., 2008; Tandon et al., 2010), and one study reported increased intake associated with labeling (Hoefkens et al., 2011). It should be noted that the type of information presented in the menu labels, the study protocol, and the study setting varied widely across these studies. Research conducted in New York City suggests that consumer awareness and use of calorie information increased following menu labeling regulations (Aaron et al., 1995). Only five studies to date have examined the impact of mandatory calorie labeling regulations, including four studies in New York (Bollinger et al., 2010; Dumanovsky et al., 2010; Elbel et al., 2009, 2011) and one study in King County, Washington State (Finkelstein et al., 2011). Three of the studies did not detect any differences in average calories ordered (Elbel et al., 2009, 2011; Finkelstein et al., 2011), and one study reported mixed findings (Dumanovsky et al., 2011). The final study found that average calories per transaction in Starbucks outlets fell by 6% after calorie posting was implemented in New York City, compared to Starbucks with calorie posting in control jurisdictions (Bollinger et al., 2010). To date, two studies on calorie labeling have been published in Canada: both studies report an association between nutrient labeling on menus and lower calorie consumption (Girz et al., 2012; Vanderlee and Hammond, 2013).

Overall, few menu labeling studies have measured actual food consumption, as opposed to food ordering. Consumers may alter the amount of food they consume in response to calorie labeling; however, only five studies to date have assessed food consumption in response to menu labeling. One such study used direct observation to estimate intake (Howlett et al., 2009), another relied on self-report, while three studies collected food waste and calculated intake based on the weight of the food waste (Aaron et al., 1995; Harnack et al., 2008; Roberto et al., 2010). Finally, we are unaware of any studies that have empirically tested different formats of nutrition information on menus. Menu labeling studies have almost exclusively examined the display of calorie amounts on menus, with very few exceptions (Dumanovsky et al, 2011; Harnack et al., 2008). Research conducted on pre-packaged food labeling indicates that the use of prescriptive information, such as traffic lights to communicate "high", "moderate", and "low" levels of nutrients, reduces the cognitive burden on consumers and may increase comprehension and use (Thorndike et al., 2012). A single published study has examined the use of traffic light systems on menu displays and observed an increase in healthy food choices associated with traffic light menu labeling (Thorndike et al., 2012). Finally, most research to date has examined the presentation of calorie information on menus; it is not known whether adding other nutrients might enhance or detract from this use of nutritional information.

The current study sought to examine the effect of menu labeling on food ordering and food consumption, including the effect of displaying calories along with other nutrients, such as sodium, fat, and sugar, as well as in different formats, such as traffic lights.

Methods

Participants

The study was conducted with 635 adults from South-Western Ontario, Canada. Subjects were recruited via newspaper, bus, and online advertisements. Eligible participants were 18 years of age or older, able to speak and read English, and self-reported no food allergies to gluten or other grain products. The participants were told that the study was related to "lifestyles" in the Waterloo Region; nutrition or diet was not mentioned in any recruitment materials to minimize self-selection bias. The participants received $20 for completing the study. Target sample sizes of 150 participants in each of the four conditions were established prior to the study to provide 80% power to detect differences of 126 cal between groups, where $\alpha = .05$, 2-tailed. Means (825 cal in the control group) and standard deviations (400) were based on previous research using a similar protocol (Harnack et al., 2008) and equal variances between groups were assumed. Sample size calculations took into account that a conservative estimate of 20% of the study data will be unusable due to missing or invalid data. Ethics approval was provided by the Office of Research Ethics at the University of Waterloo. The study has been registered with ClinicalTrials.gov (Identifier: NCT01948752).

Study design

A between-groups experiment was conducted between November 2010 and June 2011. Prior to the study, all participants were informed that they would receive a free meal from *Subway* as part of the study. All sessions occurred at 6:00 pm to eliminate time effects and to justify the offer of a free meal. After ascertaining consent, the participants were provided with menus and asked to select their meal. The participants were informed that they could order one sandwich, one "side" (i.e., bag of chips), and one drink. The participants were also instructed that, due to study requirements, no food could be taken home or saved for later.

Experimental conditions

The participants were randomized to receive one of four menus: 1) menus with no nutritional information; 2) menus with calorie amounts next to each item; 3) menus with calorie amounts using the "traffic light" format, and 4) menus with calorie, fat, sodium, and sugar amounts in "traffic light" format (see Fig. 1). Traffic lights featured either a green, amber, or red light based on criteria adapted from the UK Food Standards Agency (2007) for pre-packaged food (see Table 1). Nutritional information for all menu items was collected

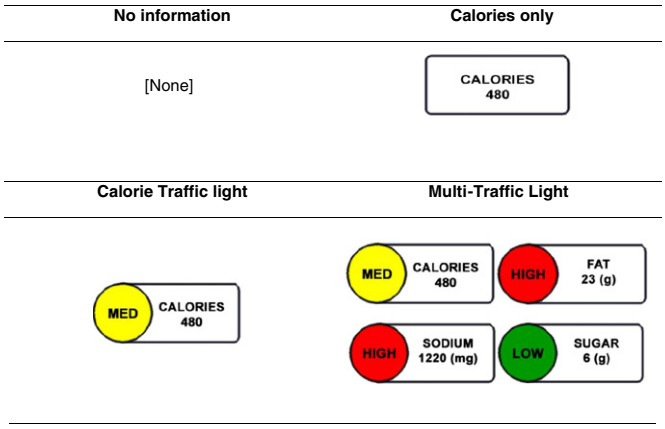

Fig. 1. Nutritional information displayed on menus by experimental condition*. *Example shown for "Cold Cut Combo". Information was shown for all menu items individually. Full images of each menu are available at http://www.davidhammond.ca/downloads/Papers/MenuStudy/.