RESEARCH
Review

The Influence of Menu Labeling on Calories Selected or Consumed: A Systematic Review and Meta-Analysis

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ABSTRACT

Recent menu labeling initiatives in North America involve posting the calorie content of standard menu items, sometimes with other nutrients of public health concern, with or without contextual information (such as the recommended daily caloric intake for an average adult) or interpretive information (such as traffic light symbols). It is not clear whether this is an effective method to convey nutrition information to consumers wanting to make more-informed food choices. Of particular concern are those consumers who may be limited in their food and health literacy skills to make informed food choices to meet their dietary needs or goals. The purpose of this systematic review was to determine whether the provision of menu-based nutrition information affects the selection and consumption of calories in restaurants and other foodservice establishments. A secondary objective was to determine whether the format of the nutrition information (informative vs contextual or interpretive) influences calorie selection or consumption. Several bibliographic databases were searched for experimental or quasiexperimental studies that tested the effect of providing nutrition information in a restaurant or other foodservice setting on calories selected or consumed. Studies that recruited generally healthy, noninstitutionalized adolescents or adults were included. When two or more studies reported similar outcomes and sufficient data were available, meta-analysis was performed. Menu labeling with calories alone did not have the intended effect of decreasing calories selected or consumed (−31 kcal [P=0.35] and −13 kcal [P=0.61], respectively). The addition of contextual or interpretive nutrition information on menus appeared to assist consumers in the selection and consumption of fewer calories (−67 kcal [P=0.008] and −81 kcal [P=0.007], respectively). Sex influenced the effect of menu labeling on selection and consumption of calories, with women using the information to select and consume fewer calories. The findings of this review support the inclusion of contextual or interpretive nutrition information with calories on restaurant menus to help consumers select and consume fewer calories when eating outside the home. Further exploration is needed to determine the optimal approach for providing this menu-based nutrition information, particularly for those consumers who may be limited in their food and health literacy skills.
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RATES OF OBESITY AND DIET-RELATED CHRONIC disease in the North American population are increasing in tandem with food consumption and expenditure patterns that show an increasing reliance on eating outside the home, particularly at fast-food outlets.[1-9] Both cross-sectional and longitudinal surveys consistently associate frequent eating at restaurants and fast-food outlets with higher body mass index and weight gain.[10-12] Dietary intakes are noticeably affected by this pattern of eating. Specifically, portion sizes are larger and include higher amounts of less-desirable nutrients of (eg, fat, saturated fat, sodium, and added sugars) and lower amounts of more-desirable nutrients (such as calcium and iron).[12,13] These factors contribute to positive energy balance which can lead to overweight and obesity over the long term.

The provision of nutrition information (ie, nutrition labeling) is intended to act on one of the proximal determinants of overweight and obesity: consumers' food choices and subsequent dietary intakes. Yet nutrition labeling regulations for prepackaged foods in Canada and the United States do not currently extend to restaurant menus, except where a nutrient claim is made about the food offered. Although voluntary initiatives have made nutrition information available, typically upon request in some large chain restaurants, the information is rarely accessible at the point of ordering

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or purchase.[14,15] Furthermore, there are several barriers to consumers' understanding and use of this nutrition information, including price and time constraints; confusion and lack of understanding about caloric values; as well as the competing priorities of preference, hunger, and habitual ordering habits.[15] These factors, combined with consumers' general lack of awareness with respect to calorie content of restaurant foods, were key drivers of recent regulatory proposals in the United States to provide calorie content and contextual information for each standard menu item in chain restaurants, retail food establishments, and vending machines with 20 or more locations.[16] This information would be displayed on all menus, including menu boards, drive-through boards, Internet menus, and take-out menus.

Current US regulatory proposals, as well as the barriers to healthy eating outside the home and the limited influence of current interventions, have heightened the call for action by Canadian policy makers, public health and consumer advocacy groups, and dietetics practitioners to improve Canadian consumers' access to nutrition information that they can use to make informed food choices in settings outside the home.[17-20] More than a decade ago, the World Health Organization also noted that nutrition information should be made available to consumers in a simple manner so that they can select healthier choices when eating in restaurants and fast-food outlets.[21] Despite taste and the sensory appeal of foods being the most important determinants of food choices for the majority of people, consumers would also like to have nutrition information available when eating in restaurants and other foodservice establishments[1,22-24]; however, evidence suggests that consumers may not be able to understand and use available nutrition information to make their food choices.[25,26] Instead, many rely on simple decision-making heuristics that use only a fraction of the available information (eg, rule of thumb) or place their trust in organizations to help make their food choices with minimal effort, particularly when time and computational resources are limiting factors.[27,28]

During the past 5 years, two reviews on the effect of menu labeling have been published.[29,30] The first concluded that several studies reported modest increases in the selection of healthier menu items but also noted that a few of the included studies reported unintended effects among some population subgroups, such as college-age men.[29] The second review concluded that calorie labeling does not have the intended effect of decreasing calorie purchasing or consumption.[30] Both reviews noted that many of the included studies suffered from methodologic shortcomings; for example, some studies were pre–post designs with no control or comparison group. Since the publication of these reviews, the results of additional studies have become available.

The most effective way to convey nutrition information to those consumers with the weakest health and functional literacy skills has yet to be established. Consumer confusion and lack of understanding about caloric values in menu labeling initiatives suggests that informative approaches may not be the best approach to convey nutrition information. A recent examination of consumer use and understanding of nutrition information in the marketplace suggests that a shift from an informative approach to a contextual or interpretive approach that provides quick and easy guidance would encourage healthier food choices, whereas informative approaches would have limited success in encouraging healthier food decisions and choices.[31]

A systematic review was undertaken to determine whether or not the current evidence, when limited to studies with a control or comparison group, supports menu-based nutrition information for the selection or consumption of fewer calories. A secondary objective was to determine if the format of the nutrition information (informative vs contextual/interpretive) influenced consumers' use of nutrition information and influenced calories selected or consumed.

METHODS

Study Selection

The aim of the study selection step was to identify all controlled experimental and quasiexperimental studies that reported the effect of informative, contextual, or interpretive menu labeling on calories selected or consumed. The term *informative* describes approaches that provide nutrient content amounts only, such as the number of calories in a menu item. *Contextual* refers to approaches that provide additional information, such as the recommended daily calories for an average adult, to help put the number of calories into context for consumers. The term *interpretive* describes approaches that offer an additional interpretation of the menu item. These include exercise equivalency labels that provide the number of minutes of exercise needed to burn the calories contained in the food item or traffic light labels, where green, amber, or red symbols are used to represent increasing calorie amounts. Databases searched included MEDLINE, EMBASE, CINAHL, Global Health, AGRICOLA, AGRIS, Econlit Food Science and Technology Abstracts, International Pharmaceutical Abstracts, PsycINFO, and Social Policy and Practice. Four search themes were combined: setting (restaurant or other foodservice establishment), intervention (provision of nutrition information, with or without additional contextual or interpretive information), outcome (consumers' response to menu labeling), and study type (experimental or quasiexperimental). A detailed description of the MEDLINE search strategy is provided in Figure 1 (available online at www.andjrnl.org). Date limits were January 1, 1990 to March 20, 2013, because the nutrition labeling environment was fundamentally different in Canada and the United States before 1990. Reference lists of all relevant articles and reviews were hand-searched for studies not identified by the database search. The Internet was searched by entering a subset of the key search terms into Google.

Two reviewers (M.C. and E.D.M.) independently screened titles and abstracts for eligible articles. Full versions of all potentially eligible articles were obtained and assessed. When there was disagreement on the relevance of an article, it was discussed until consensus was reached. Articles were considered for inclusion if they were conducted in Canada, the United States, or any other country with a similar nutrition labeling environment, such as the United Kingdom, Australia, or New Zealand. Study participants had to be generally healthy, noninstitutionalized adolescents (aged 11 to 17 years) or adults (aged $\geq$18 years). The intervention needed to be the provision of nutrition information in a