

Flies in the Ointment? Addressing Potential Impediments to Population-Based Health Benefits of Restaurant Menu Labeling Initiatives

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Section 4205 of the U.S. Patient Protection and Affordable Care Act (2010) will require calorie labeling of food products sold in restaurant chains in the near future. However, research regarding the potential impact of this policy is mixed. The authors note some key impediments that diminish the likelihood of population-based reductions in calorie consumption, in addition to necessary conditions required to realize long-term favorable effects of menu labeling initiatives. The authors discuss key moderators of labeling effects that need to be considered and offer recommendations to enhance the effectiveness of calorie labeling. They also consider specific opportunities for further research and unintended consequences of labeling of restaurant items. They argue that although calorie labeling may not have a substantial impact in the short run on the broad population of restaurant diners, specific segments should benefit, and there potentially will be reductions in purchases of less healthy items for which the expectations of calorie-conscious consumers have been inaccurate.

Keywords: menu labeling, calorie disclosures, restaurant chain nutrition labels, U.S. Patient Protection and Affordable Care Act

In recent years, many policy makers and public health departments have advocated the implementation of calorie and nutrition labeling of food products sold in restaurant chains in an effort to improve the healthfulness of diners' dietary intake of foods consumed away from home (e.g., Bassett et al. 2008; *Federal Register* 2011b). While the Nutrition Labeling and Education Act of 1990 (Public Law 101-535) exempted restaurants from menu labeling, local and state mandates requiring menu labeling were recently passed in New York City, Philadelphia, and Seattle and the states of Massachusetts, California, Maine, and Oregon, among others (Center for Science in the Public Interest 2010). Facing divergent labeling requirements for menu disclosures across a mounting number of states and localities, many of the major restaurant chains and the National Restaurant Association supported national menu labeling legislation. Section 4205 of the U.S. Patient Protection and Affordable Care Act, enacted on March 23, 2010, requires chain restaurants throughout the United States to provide nutrient content information for standard

menu items. This national legislation requires chains with 20 or more locations doing business under the same name and offering substantially the same menu items to disclose calorie information on restaurant menus and menu boards. In addition, the chains must have additional nutrition information (e.g., fat, saturated fat, sodium, sugar) available on request from consumers. The act also requires "a succinct statement concerning suggested daily caloric intake" that is "designed to enable the public to understand, in the context of a total daily diet, the significance" of the calorie information (*Federal Register* 2010). In contrast to many local and state requirements, this legislation will also require labeling of food items in buffets, self-service outlets, and vending machines. On April 6, 2011, the U.S. Food and Drug Administration (FDA) proposed specific regulations for chain restaurants and vending machines (in accordance with the provisions of section 4205) and requested public comment within 60 days (*Federal Register* 2011a, b). The FDA noted that it intended to issue its final rules before the end of 2011.

Proponents of calorie labeling have argued that because diners are often unaware of and underestimate the calories content of food items purchased away from home, disclosure of this information has the potential to affect choices by reducing the selection of less healthy options and encouraging the selection of options lower in calories and nutrients (e.g., saturated fat, sodium) related to disease risk (e.g., Bassett et al. 2008; Burton et al. 2006; *Federal Register* 2011b; Wansink and Chandon 2006). Because U.S. consumers, on average, now consume one-third of their total

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calories from foods prepared outside the home, labeling would help diners make more informed choices, and any favorable changes would potentially contribute to the likelihood of frequent diners maintaining healthy target weights, thus assisting in the fight against obesity (*Federal Register* 2011b).

While some lab-based research seems to support at least some of these conjectures (Burton, Howlett, and Tangari 2009; Roberto et al. 2010; Wansink and Chandon 2006), many recent field studies are not encouraging in terms of the likelihood of substantial changes in the overall consumption behavior of an aggregate market of restaurant patrons (Elbel, Gyamfi, and Kersh 2011; Elbel et al. 2009; Harnack et al. 2008). For example, soon after calorie labeling was implemented in New York City, Elbel et al. (2009) surveyed adults at fast-food restaurants in low-income, minority New York communities and compared their choices with a control sample in Newark, N.J. (where there was no menu board labeling). While 28% who saw calorie labeling in New York reported that the information (positively) influenced their choices, their mean calorie consumption did not differ from the control sample. Similarly, in a pretest–posttest design with a control group, labeling had no effect on caloric level of purchases for diners at a chain in King County, Wash. (Finkelstein et al. 2011). Another study indicates that menu labeling may have some positive effect on what parents order for their young children but not for themselves (Tandon et al. 2010). In contrast to these studies that show nonsignificant effects for adults, a large study of consumption changes at Starbucks outlets in New York City found that food calories per transaction decreased by approximately 14% after the implementation of labeling (Bollinger, Leslie, and Sorensen 2010).

In general, many of the recent field studies that have failed to find significant effects suffer from lack of consideration of various individual difference variables and menu item expectations that moderate effects and may be of considerable importance to evaluations and choices. For example, academic studies (away from the point of purchase) indicate that labeling will be beneficial only for *some* consumers and *some* items (e.g., Burton, Howlett, and Andrea Tangari 2009; Howlett et al. 2009), and they suggest a nonuniformity of effects across consumer segments and menu choices (Stewart and Martin 1994). For the majority of menu items and consumer transactions, calorie labeling may be unlikely to have a significant effect on consumer choices (Elbel, Gyamfi, and Kersh 2011; Elbel et al. 2009; Finkelstein et al. 2011). Drawing from health communications and consumer decision-making frameworks, there are several conditions that must be satisfied to achieve market-based effects of calorie and nutrition labeling programs for quick service and table service restaurants.

Impediments to Aggregate Market-Based Effects and Recommendations to Help Affect Restaurant Patrons' Choices

It is the hope of some in the health and medical communities that menu labeling will result in substantially reduced caloric intake across the broad, aggregate population of

restaurant diners, as might be assessed by measures such as a reduction in average calories consumed per meal (Bassett et al. 2008; Elbel et al. 2009; Seiders and Petty 2004). However, changing established, and often repetitive, consumer behaviors in the marketplace is always challenging, and choices made at restaurants are no exception. In Figure 1, we outline several factors that could prevent nutrition labeling in restaurant chains from resulting in substantial, pervasive changes in diners' choice behavior. In Table 1, we present some of the primary differences between recent controlled lab studies (that have suggested significant interactions when nutrition labeling is included on menus) and field studies that, in general, have not shown significant differences in aggregated consumer choices (e.g., Elbel, Gyamfi, and Kersh 2011; Elbel et al. 2009; Finkelstein et al. 2011). Drawing from Figure 1 and Table 1, Table 2 then summarizes some recommendations on how policy makers should attempt to address the identified impediments. Next, on the basis of this discussion, we present an overview of possible research extensions for field studies that attempt to evaluate the ensuing national calorie labeling intervention and the potential for unintended consequences for some segments of consumers.

Awareness of Disclosed Information

In an initial stage, restaurant patrons must be aware of the disclosed calorie information of the food offered (cf. Stewart and Martin 1994). This information is often viewed as

Figure 1. Factors Influencing the Consumer Segment Affected by Calorie Labeling at the Point of Purchase

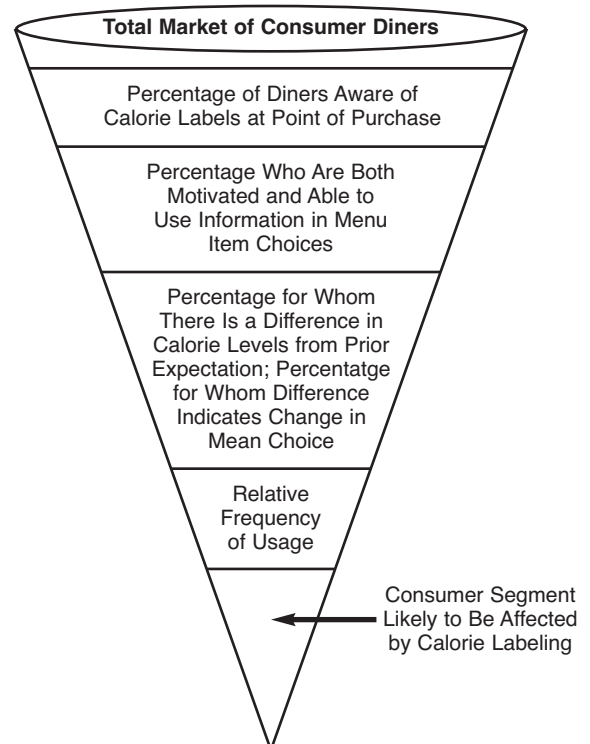


Table 1. Examples of Differences in Lab Versus Field Study Environments Addressing Calorie Labeling in Restaurants

Challenges to Effectiveness	Lab-Based Studies	Applied Field Studies
Are consumers' aware of calorie labels at the point-of-purchase?	Controlled environment, in which stimuli are designed to ensure that participants are aware of calorie labeling.	Consumers may or may not be aware of labeling for selected and competing menu options.
Is consumer motivation and knowledge sufficient to encourage usage of provided information?	Consumer individual difference variables are either measured or manipulated and then used as moderators of effects.	Consumers' enduring motivation and ability are not measured or considered.
Do consumer expectations of calorie levels for specific menu items differ from their objective levels?	Studies are designed with menu item options that are consistent or not consistent with expectations and item considered as a moderator.	Expectations of calorie/nutrient levels of menu items are not considered; effects are measured across all items and all diners.
Does the effect of labeling vary across frequent versus infrequent restaurant diners, and what is the role of habitual choices at restaurants?	Implicitly ignored in lab studies in which participants are randomly assigned to conditions.	Implicitly included when participants are selected from restaurant patrons (frequent patrons have a greater chance of selection than infrequent patrons).
What are the effects of other beliefs or enduring psychological characteristics (e.g., the "unhealthy = tasty" intuition)?	May be measured and considered as potential moderators.	Not measured or considered in assessing effects of calorie labeling on menu choices.
What are the effects of situational influences and other attributes (e.g., smells, price, perceived taste, point-of-purchase promotions, perceived value)?	In general, these are controlled for or not addressed.	Often have a primary effect on choice at the point of purchase.

Notes: Some examples of field studies include Bassett et al. (2008), Elbel, Gyamfi, and Kersh (2011), Elbel et al. (2009), Finkelstein et al. (2011), and Har-nack et al. (2008). Examples of lab-based studies include Burton et al. (2006), Burton, Howlett, and Tangari (2009), Chandon and Wansink (2007), Howlett et al. (2009), and Wansink and Chandon (2006).

credence attributes that diners are often unaware of before and/or after consumption (Caswell and Mojduszka 1996; Darby and Karni 1973). Without awareness at the point of purchase, calorie disclosures will have no effect. Even if calorie information is available, awareness may be limited. One study of Subway diners showed that when calorie information was placed close to the point of purchase, only approximately one-third of the diners reported seeing it (Bassett et al. 2008; Roberto, Agnew, and Brownell 2009). Certainly, few diners see nutrition information in the predis-closure environment (e.g., Wootan and Osborn 2006). As Table 1 indicates, in contrast to these field studies, lab-based experiments use stimuli that maximize awareness of the disclosure. Marketing and advertising researchers are well aware that without market conditions that result in diner awareness of calorie information, requirements for disclo-sures will not be beneficial to restaurant patrons. Informa-tion search is needed, and if the information is not easily available, many diners likely will not expend the time and effort necessary to obtain the information (Roberto, Agnew, and Brownell 2009).

While lab-based studies are designed to ensure there is awareness, to address this problem in applied settings, the information must be placed on menus and menu boards in an appropriate size and format located next to critical, diag-nostic food attributes (item description, price, cues related to taste) used in the choice decision. However, when choices are repetitive or habitual, even optimal positioning may not lead to access of the information. For consumers

examining alternative options on a menu/menu board, placement next to attributes most likely to be accessed by consumers is most likely to maximize awareness and encourage the incorporation of the calorie/nutrition infor-mation in meal choices (Glanz et al. 1998). Putting the information in locations that require greater consumer effort, particularly given the importance placed on fast ser-vice at many restaurants, will substantially diminish any potential public health and consumer benefit. While this seems obvious to marketers and communication researchers, markets such as Seattle offered flexibility in where and how the information is disclosed. The FDA will ensure that calori-e information is "clear and conspicuous" by presenting it so that the disclosure is "no smaller than the type size of the name or price of the associated standard menu item on the menu or menu board, whichever is smaller" (*Federal Regis-ter* 2011b). However, even when placed conspicuously on menu boards or menus, if (only) 60% of the market becomes aware of the calorie disclosure information (e.g., Bassett et al. 2008), the potential for pervasive, broad-based effects is initially reduced by 40%.

Knowledge and Motivation

Awareness of calorie and nutrition levels is not helpful in the decision process if there is not sufficient knowledge and/or motivation to use the information in the choice deci-sion. Consistent with many consumer processing conceptu-alizations (e.g., elaboration likelihood, heuristic-systematic processing), adequate levels of both motivation and knowl-

Table 2. Calorie Labeling Challenges and Consumer Welfare and Evaluation Recommendations

Calorie Labeling Challenge	Policy and Marketing Recommendations
•Are consumers aware of calorie labels at point of purchase?	<ul style="list-style-type: none"> •Position labels near attributes most likely to be accessed (item description, price) on menus and menu boards. •Make size and format sufficient for ease of access and processing. •Promote availability and usefulness of information through consumer education programs.
•Are consumer levels of motivation and knowledge sufficient to encourage utilization of calorie information in making more healthful menu item choices at the point of purchase?	<ul style="list-style-type: none"> •Provide point-of-purchase information to help consumers understand the calorie disclosure within the context of a daily diet (consider use of graphs and simplifying heuristics). •Use education programs and promotion to enhance motivation and intrinsic knowledge of nutrition and disease risk; attempt to prime and reinforce caloric content interest at point of purchase. •Evaluate calorie labeling programs within specific consumer segments rather than a mass-market level.
•Do disclosed calorie levels differ from prior expectations of calorie level?	<ul style="list-style-type: none"> •Evaluate calorie labeling programs at an item level rather than at an average meal change level. •Communicate the importance of small calorie reductions on a daily basis on long-term weight loss and weight maintenance. •Track additions to product mix at chains over time.
<ul style="list-style-type: none"> •Are health-conscious consumers already avoiding high-calorie items? •Will calorie disclosures affect frequent as well as infrequent restaurant diners? •Are there segments that attempt to maximize calories consumed for price paid? •Is there a segment of consumers with a strong “unhealthy = tasty intuition” that choose items with higher reported calorie levels, offsetting improvements in choices in other segments? 	<ul style="list-style-type: none"> •Use public service announcements and promotions to encourage the less motivated segment to consider the calorie levels/healthfulness of restaurant meal purchases. •Consider underlying rationale for why some consumer beliefs may result in higher calorie choices (e.g., the “unhealthy = tasty intuition”) and use promotion and education to address such effects. •When possible, target communications at specific frequent restaurant diner segments and at-risk groups for whom benefits may be greatest.

edge are required to affect behavioral outcomes (Stewart and Martin 1994). While these intrinsic individual consumer characteristics are needed for menu labeling to have the desired effects on choice and consumption, as we note in Table 1, most market-based field studies of labeling ignore these variables. If a substantial proportion of the population is not motivated to process and use the information (i.e., they are neither health nor calorie conscious) and/or do not have sufficient internal or external knowledge accessible needed to use and interpret the information, the disclosures will not have substantial, broad-based effects.

These conjectures are supported by findings that show that for calorie/nutrition disclosures to affect food choices, consumers must first have the motivation to process and use this information (Berman and Lavizzo-Mourey 2008; Howlett et al. 2009; Keller et al. 1997).¹ In addition, in the restaurant environment, contextual cues (smells) and other more diagnostic product attributes (e.g., taste, price, presentation, meal size) may be overwhelming at the point of choice, even for the highly motivated segment of diners (Burton, Howlett, and Tangari 2009; Glanz et al. 1998; Harnack et al. 2008). As one example, restaurant chains could (uninten-

tionally) discourage diners from ordering more healthy items by charging substantially higher prices for healthier options, thus forcing people to make trade-offs among cost, satiation, and perceived value when choosing between regular and healthier selections. In a challenging economic environment, even very motivated, health-conscious diners will often be tempted by the trade-offs among price, portion size/satiation, and item healthfulness. Considering the subset of consumers with *both* awareness of calorie information when ordering and sufficient motivation and internal/external knowledge to use the information as a primary factor in the choice decision, the likely impact of labeling is reduced to a relatively small minority of the total market (as we show in Figure 1). Note that such estimates do not directly consider the relative effects of other salient point-of-purchase product attributes. In addition, there is some concern that any reductions in calories from main dish items may be counterbalanced or exceeded by unintended consequences, including increases in calories from side items, desserts, or subsequent consumption (e.g., Chandon and Wansink 2007; Stewart and Martin 1994).

In conjunction with this motivational factor, diners must have sufficient knowledge or a context to allow interpretation of the information (e.g., how favorable or unfavorable is a 1200-calorie meal/item?). The inability of consumers to interpret calorie and nutrient information in the context of a

¹This “motivational” component also can be characterized as “health consciousness,” personal relevance, concern for weight, health concern, and so forth.

daily diet has been a criticism of the changes in the Nutrition Facts Panel revision some two decades ago, changes that have ultimately failed to help prevent increases in obesity rates. While there is a multitude of useful information in the panel, the “Daily Values” appear difficult for some consumer segments to interpret and incorporate directly in their daily dietary evaluations and decisions (International Food Information Council 2008; Viswanathan and Hastak 2002; Viswanathan, Hastak, and Gau 2009). Provisions in the bill are meant to aid consumer interpretation by requiring a succinct statement regarding the caloric level that is designed to enable the public to understand, in the context of a total daily diet, the significance of the disclosed information.² While the FDA is attempting to establish specific requirements that help emphasize this information, there are operational limitations. In addition, even without prior knowledge or awareness/processing of such point-of-purchase guidelines, the other menu items the restaurant offers may provide a nutrition context that could substantially help with the relative interpretation of any specific item.

The combination of high levels of motivation and knowledge is optimal and represents one reason an initial education program becomes a critical component to the success of a menu labeling program. Such education programs also can enhance consumer search at the point of purchase by communicating to restaurant patrons that the calorie/nutrition information is currently available in restaurants in easy-to-access formats (Pomeranz and Brownell 2008; Stewart and Martin 1994). Nevertheless, while consumer education programs can be helpful in this regard, they can only be expected to do so much in affecting the relative importance of nutrition compared with attributes such as taste, price, satiation, perceived value, and so forth. The interpretation of disclosed information is far easier for policy makers to address than the consumer motivational component.

Prior Calorie Expectations

If the majority of items marketed by chain restaurants are relatively consistent with diners’ expectations of calories and nutrition levels, calorie disclosures will not have substantial effects. Specifically, it has been argued that the calorie/nutrition information for any specific meal item must differ from diners’ prior expectations for the information to affect choice (Howlett et al. 2009). This suggests that the calorie disclosure must provide new information or some “surprise” for restaurant patrons. For example, if a consumer expects a Burger King Whopper value meal to be 1500 calories and a disclosure simply confirms that it is 1500 calories, it is not likely to change attitudes or choices, even if the diner perceives that this is a “high” level for a single meal (Burton, Howlett, and Tangari 2009). As Table 1 shows, in general, consideration of consumer expectations

²It appears that the FDA will use a single 2000-calorie daily diet as a reference point (e.g., “A 2000-calorie daily diet is used as the basis for general nutrition advice; however, individual calorie needs may vary”). However, it has requested comments, along with any consumer research, on whether this statement will achieve the specified goal of aiding consumers’ understanding of the significance of the disclosed calorie information (*Federal Register* 2011b).

and changes at the individual item level have been ignored in recent field studies on calorie labeling.

There can be desirable effects from deviations from expectations in either a “positive” or a “negative” direction. As an example of the positive effect, a diner may find that a salad initially perceived as “nutritious” is actually lower in calories than he or she thought, and thus the calorie disclosure promotes the choice of this lower-calorie meal (Burton, Howlett, and Tangari 2009). In contrast, the diner may find that a large hamburger platter value meal is higher in calories than he or she expected, which promotes the decision not to select this less nutritious meal (Kozup, Creyer, and Burton 2003; Wansink and Chandon 2006).

While it is well documented that diners underestimate calories for many specific items addressed in research studies and popular press articles (e.g., 700-calorie muffins from Starbucks, 1100-calorie milkshakes from McDonald’s), there is little published research addressing the broad market domain of items across the full menu offerings of restaurant chains. Differences between expectations and actual levels will likely need to exceed some threshold to matter to most diners. While this threshold level will vary across diners, this level is likely to be relatively substantial for many diners, given the importance of attributes such as taste and price level. Across the total array of restaurant items in the marketplace, it is possible that there are not many food products that actually exceed individual threshold levels. This suggests that market evaluations of programs need to consider this and extend analyses to changes at the item level. In addition, because many studies suggest that small calorie reductions on a daily basis can affect long-term weight loss and weight maintenance, this benefit might be emphasized in education campaigns.

Previous Behavior/Choices

If many diners within the segment that is both motivated and knowledgeable are already conscientiously working to avoid the less healthy restaurant items, the percentage of the market influenced by the calorie disclosures will be further decreased. That is, even though these consumers may underestimate the quantitative calorie levels of less healthy items, most diners are aware of which items are higher-calorie choices and thus already attempt to avoid them (Burton, Howlett, and Tangari 2009). (Although the segment of health conscious diners may substantially underestimate the calorie level of a 1500-calorie large hamburger and fries combination meal, they know [qualitatively] that it is not a healthy option and thus are not selecting it even when calorie levels are not available.) Lab-based research has offered support for the conceptually based interaction of item expectations, nutrition motivation, and nutrition disclosures (Bates et al. 2009; Howlett et al. 2009), but most field studies evaluating labeling interventions have rarely considered both higher-order interactions and covariates to gain a more precise understanding of market-based effects. Findings also suggest that for any attempt to achieve an extensive population-based reduction in calorie levels for *all* restaurant meals consumed, it may ultimately be necessary to make the lesser motivated segment more concerned about the calorie levels and healthfulness of restaurant meal

purchases. While education programs and publicity are recommended and potentially offer some benefit, changing crystallized attitudes and motivations toward healthy consumption is an extremely difficult task that has been a goal of public health officials for decades.

Restaurant Usage

As Figure 1 and Table 1 suggest, effects within the heavy restaurant user segment and explicit consideration of relationships with restaurant dining frequency will affect findings. If desired changes occur only for the segment of less frequent restaurant diners (who may be among the more health-conscious segment), the calorie disclosures are unlikely to have substantial effects for the aggregate market, at least as assessed by measures such as average calories consumed per meal. This suggests the importance of targeted messages directed to specific market segments in promotion and education programs to increase effectiveness.

Existing Product Modifications and New Product Innovations

The public health and medical communities hope that mandates forcing provision of nutrition information will motivate restaurant chains to (1) alter their product mix by introducing new lower-calorie, healthy product offerings; (2) decrease the calorie/negative nutrient (e.g., saturated fat, fat, sodium) content of relatively less healthy, high-volume items currently marketed; and (3) reduce sizes of the enormous meals often served (Berman and Lavizzo-Mourey 2008; Young and Nestle 2007). For example, after Yum Brands voluntarily agreed to provide calorie information for their stores, the company introduced grilled (not fried) chicken menu entrées at its KFC outlets, the Freshside Grille Menu at Long John Silver's, and the Fresco Menu at Taco Bell. If restaurant chains begin to aggressively compete on calorie and nutrition levels in menu offerings and promotion, the indirect, longer-term results of labeling initiatives for public health could be substantial. If product modifications, good-tasting lower-calorie product innovations, and the reduction of serving sizes are frequent outcomes, such changes have the potential to affect consumption across a large segment of restaurant patrons. Various implementation decisions that make the disclosed information highly accessible and accentuate its importance to long-term health create market characteristics that potentially encourage such competition between chains and could lead to changes that are extremely beneficial to consumer welfare.

Unintended Consequences

Several of the field studies reporting no changes in purchase behavior have focused on low-income neighborhoods in New York City (Elbel, Gyamfi, and Kersh 2011; Elbel et al. 2009). Due to concern with satiation and value (amount of food calories and/or taste offered per dollar spent), some of these consumers, unfortunately, may be among those least likely to consider (lower) calorie level a crucial attribute when making a food choice. Similarly, because these studies have not been true longitudinal research, using the same set of restaurant patrons before and after the label-

ing intervention, other unintended consequences for specific segments were not addressed. This is consistent with the warnings literature that suggests that there often can be unintended consequences of disclosures that are meant to benefit consumers (Stewart and Martin 1994). For example, to what degree do consumers with a strong "unhealthy = tasty intuition" (Raghunathan, Naylor, and Hoyer 2006) decide to purchase the highest-calorie, least healthful choices in a postdisclosure environment because they infer substantially better taste? Such unintended consequences resulting in higher-calorie meals for some segments may offset any desired changes in other segments in which calorie levels are reduced, leading to nonsignificant results for the aggregate market of restaurant diners.

There is some hope that in the long run, the mere presence and repetitive exposure to calorie information and contextual aids (as long as they are frequently accessed at the decision point of purchase) will help create a more calorie-vigilant populace. That is, mere repetitive exposure, combined with education campaigns, in the long run *could* change attitudes toward nutrition in the away-from-home context, potentially making less concerned diners more calorie conscious. Thus, it seems probable that the education component that accompanies the labeling campaign will be extremely important in promoting any broad-based change in consumption behavior.

Implications for Consumer and Retailer-Based Research

As we noted previously and as Table 1 shows, most of the field studies in markets that previously mandated labeling (New York City, Seattle) have used pretest–posttest designs with a control using nonstatic groups of consumers. The primary dependent variable has been changes in calories consumed per meal before and after implementation of the calorie disclosure for these nonstatic groups. Both our preceding discussion and Table 1 suggest some of the limitations of this basic design and imply several opportunities for future studies to offer more sensitive tests of the calorie disclosure interventions.

As Table 1 shows, laboratory research suggests that labeling should have a substantial effect only for items with levels that deviate from consumer expectations and for consumers who are sufficiently motivated and/or knowledgeable to use the information in their decisions (e.g., Howlett et al. 2009). Thus, in addition to the simple main effect of the disclosure, research should examine the interaction of the labeling intervention, item type expectation, and individual difference variables. In addition to prior experimental findings, this is consistent with the many comments of health-conscious consumers who have anecdotally noted their surprise regarding the unexpected high caloric levels of some salads and sandwiches that have resulted in changes in meal attitudes and choice behavior (see, e.g., Tangari et al. 2010, Study 1).

In addition, analyses that aggregate all consumers ignore the possible unintended consequences of choices for some segments that may offset improvements in decisions from other segments. For example, for the segment with a strong belief in the "unhealthy = tasty" relationship (Raghunathan,

Naylor, and Hoyer 2006) and little concern about weight or health consequences of choices (e.g., the segment of younger consumers who are normal weight), what changes occur? Do those with this strong belief overlap with heavier restaurant dining frequency, particularly for fast-food outlets? How are underweight consumers (albeit a smaller consumer segment) responding to calorie labeling? How do such refinements in precision for analyses within segments affect conclusions about results of the labeling initiative?

Because the law covers venues ranging from table service and fast-food restaurants to buffets to vending machines, practical issues related to the calorie disclosure environment across these venues are apparent. How will awareness of the labeling vary across these venues, and do the relative changes in choice behaviors differ across these away-from-home locations?

There also are important questions that may be addressed at the organizational chain level, similar to the Starbucks analyses (Bollinger, Leslie, and Sorensen 2010). For example, research might use purchase data from chains to assess changes for existing high-volume products that are both consistent and inconsistent with calorie expectations, before and after the calorie disclosure is required. Policy makers should also address additions to product mixes (both more and less healthy options) at chains over time and whether there are nutrition-related modifications to high-volume items and reductions in serving sizes over time. Similarly, are there changes over time in the promotions that major chains use, and how are these related to current advertising and positioning? Because the disclosure focuses only on calories, what will the effect be for changes in product formulation for nutrients such as sodium, which is linked to health but not directly related to calorie level?

Conclusion

Our discussion suggests several potential obstacles to a restaurant menu labeling initiative having pervasive, population-based benefits. If assessed only through program evaluation studies using pre- and postdisclosure assessments of calories per meal for a broad, undifferentiated sample of restaurant diners, our arguments would suggest that any average changes for the total market of diners should only be modest. While decisions made about implementation by the FDA and education programs can have some beneficial effects for consumer welfare, it is clear that evaluations of the national disclosure intervention should consider several potential moderators and various consumer segments.

In summary, we argue that the outcomes and potential benefit to public health of menu labeling programs should also consider effects within specific target segments (e.g., those who are vs. those who are not motivated/health conscious, very frequent vs. very infrequent diners, those aware vs. not aware of the calorie/nutrition disclosure, awareness of education program messages, obese/overweight vs. normal-weight consumers, combinations of these subgroups) and menu item types. Because of the substantial differences across diner segments and individual difference variables, aggregated averages may mask more substantive changes within diner segments that should be considered. Changes at

the item selection level (within segments) using scanner data may be more informative than trying to detect population-based changes in total calories consumed in average meals.

Nevertheless, given some \$600 billion in restaurant food expenditures and 70 billion meals and snacks served by U.S. restaurants annually (National Restaurant Association 2011), a national labeling program should have the potential to remove a significant level of calories annually from the diets of specific segments of American consumers and offer a substantial plausible benefit for the segments affected. In addition, changes to the nutritional content of menu offerings made by restaurant chains because of labeling may result in a substantial incremental benefit for public health. Designs that incorporate the longitudinal tracking of static diner segments over multiple data points (e.g., panels) before and after menu labeling (including appropriate control groups, segmentation variables, and covariates) potentially offer more sensitive tests for detecting changes related to restaurant menu labeling.

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