Accuracy of Stated Energy Contents of Restaurant Foods

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The prevalence of obesity in the United States increased from 14% of the population in 1976 to 34% in 2008, during which time both self-reported and per-capita energy intake increased. Reducing energy intake by self-monitoring or selecting foods with lower energy contents is widely recommended for the prevention and treatment of obesity. However, the feasibility of reducing energy intake using these approaches depends in part on the availability of accurate information on the energy contents of different foods. The accuracy of the energy contents of foods prepared in restaurants is of particular concern because the frequency of eating out has increased over time in parallel with the national prevalence of obesity. Several studies have observed a positive association between the frequency of eating out and body fatness.

From 2005 through 2006, 49% of US residents ate out at least 3 meals per week and 12% ate out more than 7 meals per week, making foods consumed away from home a major contributor to dietary energy. One small study in 2004 suggested that information on the energy contents of healthy menu choices was largely reliable, however, a recent pilot study reported that a convenience sample of 29 foods with low-energy contents contained a mean of 18% more energy than stated by restaurants.

Therefore, we conducted a multisite study purchasing randomly selected food items with high-energy and low-energy contents from quick-serve and sit-down restaurants in 3 states to monitor or select foods with lower energy contents from quick-serve and sit-down restaurants in Massachusetts, Arkansas, and Indiana between January and June 2010.

Main Outcome Measure The difference between restaurant-stated and laboratory-measured energy contents, which were corrected for standard metabolizable energy conversion factors.

Results The absolute stated energy contents were not significantly different from the absolute measured energy contents overall (difference of 10 kcal/portion; 95% confidence interval [CI], −15 to 34 kcal/portion; \( P = .52 \)); however, the stated energy contents of individual foods were variable relative to the measured energy contents. Of the 269 food items, 50 (19%) contained measured energy contents of at least 100 kcal/portion more than the stated energy contents. Of the 10% of foods with the highest excess energy in the initial sampling, 13 of 17 were available for a second sampling. In the first analysis, these foods contained average measured energy contents of 289 kcal/portion (95% CI, 186 to 392 kcal/portion) more than the stated energy contents; in the second analysis, these foods contained average measured energy contents of 258 kcal/portion (95% CI, 154 to 361 kcal/portion) more than the stated energy contents \( (P < .001) \) for each vs 0 kcal/portion difference. In addition, foods with lower stated energy contents contained higher measured energy contents than stated, while foods with higher stated energy contents contained lower measured energy contents \( (P < .001) \).

Conclusions Stated energy contents of restaurant foods were accurate overall. However, there was substantial inaccuracy for some individual foods, with understated energy contents for those with lower energy contents.

For editorial comment see p 315.

Context National recommendations for the prevention and treatment of obesity emphasize reducing energy intake. Foods purchased in restaurants provide approximately 35% of the daily energy intake in US individuals but the accuracy of the energy contents listed for these foods is unknown.

Objective To examine the accuracy of stated energy contents of foods purchased in restaurants.

Design and Setting A validated bomb calorimetry technique was used to measure dietary energy in food from 42 restaurants, comprising 269 total food items and 242 unique foods. The restaurants and foods were randomly selected from quick-serve and sit-down restaurants in Massachusetts, Arkansas, and Indiana between January and June 2010.

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evaluate the overall accuracy of restaurant-stated energy contents and examine factors associated with the accuracy of stated energy contents of individual food items.

METHODS

Food samples were collected from 42 restaurants located in 3 distinct US regions (≤25 miles of Boston, Massachusetts, and ≤65 miles of Lafayette, Indiana; the mileage was increased to include the city of Indianapolis). The stated energy contents of foods were compared with the laboratory-measured contents. The number of restaurants was selected to equally distribute randomly selected foods across the 3 regions. The food samples were collected between January and June 2010.

Random Selection of Restaurants and Foods

Eligible restaurants were defined as those belonging to a restaurant chain in the top 400 for sales dollars in 2008, having at least 1 outlet within the defined geographic regions, able to be classified as either quick-serve or sit-down, providing necessary nutrition information on their Web site, and having food items meeting study inclusion criteria. A total of 7 quick-serve and 7 sit-down restaurants were chosen per region. Random selection was conducted by assigning a number to each eligible restaurant and then generating a random order of the numbers using SAS statistical software version 9.1 (SAS Institute Inc, Cary, North Carolina) and selecting the first 7 numbers for each restaurant type for each region.

Individual foods were then randomly selected. In sit-down restaurants, only entrees and their accompanying side dishes for which the energy content of the side dishes could be distinguished from the entree were considered eligible. Inclusion of only entrees and side dishes ensured a sample of the food types most typically consumed in sit-down restaurants. Eligible foods in quick-serve restaurants were all items except beverages, dimension, children’s meals, self-serve buffet foods, and blended items (eg, smoothies), except when blended drinks were a specialty of the restaurant. Eligible foods were then classified as having low-stated energy contents (<600 kcal/portion) or high-stated energy contents (≥600 kcal/portion) based on the entire amount served, regardless of what the Web site defined as 1 serving (except pizza, for which whole servings are typically for >1 person; therefore, portions for this study were the number of slices defined as 1 portion by the restaurant). The cut point of 600 kcal/portion was chosen as being approximately one-third of the energy requirement consistent with weight maintenance. Two foods with high-energy contents and 2 foods with low-energy contents were selected within each restaurant by a random selection process similar to that described above.

In addition to the main set of food samples, the 10% of entrees identified as having the highest positive percentage discrepancy between the measured and stated energy contents in the first analysis (n=17) were targeted for a second collection at the same restaurant locations. Due to menu changes, only 13 of the original 17 foods were still on the menus and these were collected for reanalysis.

Food Collection

One serving of each food was ordered as a take-out meal and restaurants were asked to separately package individual food items; the researchers did not identify themselves as such while ordering. Researchers transported the foods to the laboratory and weighed them using laboratory scales. Foods that were obtained in Arkansas and Indiana were packaged in double zip-top freezer-safe bags and were shipped frozen on dry ice to Massachusetts for analysis. Foods from Massachusetts were similarly processed to ensure equivalent handling. All foods from Arkansas and Indiana arrived at the Massachusetts laboratory in the frozen condition.

Energy Determination and Comparison

Energy was determined using a bomb calorimetry technique, which is accurate to a mean (SD) of −1.9% (0.3%) in simulated meals. As described in detail elsewhere, food samples were blended and freeze-dried into a homogeneous dry powder, and the heat of combustion was quantified in duplicate using benzoic acid as a methodological standard for calibration. The total energy content of each food was then determined as the product of total dried food weight and the mean heat of combustion of the duplicates. Because the restaurant-stated energy contents are for metabolizable energy (defined as the energy available to the body minus obligatory losses in feces and urine) while the bomb calorimetry technique measures gross energy (defined as energy including obligatory losses in feces and urine), conversion of stated metabolizable energy values to gross energy equivalents was performed by applying the appropriate multiplicative factors to restaurant-stated energy contents for macronutrients using the equation: gross energy = (fat [in grams] × 9.4) + (protein [in grams] × 5.65) + (total carbohydrate [in grams] × 4.15). For foods for which information on only 2 macronutrient values were available (n=30), the metabolizable energy equivalent of the third was calculated by subtraction, then converted to grams using Atwater factors (9 kcal/g of fat, 4 kcal/g of protein, 4 kcal/g of carbohydrate). No error was introduced by using these conversions because restaurant-stated metabolizable energy values also assume the same numerical losses of energy in the conversion of gross to metabolizable energy.

Statistical Analysis

The discrepancy between the stated and measured energy contents in kilocalories per portion was the primary outcome variable. Because these values were skewed, a logarithmic transformation was applied to the data prior to
formal analysis. For the primary outcome, the mean was compared with 0 using the \( t \) test. Two group comparisons of accuracy were performed using the \( t \) test for independent samples and included sit-down entrees vs side dishes and quick-serve vs sit-down restaurants. Comparisons of variability in these cases were performed with the Hartley test, which uses the folded \( F \) statistic to test whether the SDs of 2 populations are equal.\(^{23} \) We counted the number of foods exceeding the stated energy contents by more than 100 kcal/portion and the percentage of these foods was calculated using the total number of food items (n = 269) as the denominator.

Multifactor analysis of covariance was used to determine the association of predictors of interest, including restaurant type and stated energy content (as a continuous variable), with accuracy. The Pearson correlation coefficient was used to describe relationships between accuracy and stated energy content. Portion size discrepancy (measured vs stated gram weight), stated macronutrient proportions (percentage of kilocalories), and the cost of the food (in US $) were examined separately during post hoc testing.

An additional post hoc analysis of variance with the Tukey post hoc procedure was used to determine the association of food category with accuracy, and the Levene test was used to compare variability between the food groups. This test uses analysis of variance with the Tukey post hoc procedure on the residual squares calculated from the original analysis of variance model.\(^{24} \) Food categories were defined by the menus in the case of pizza, sandwiches, salads, soups, and desserts. Meat entrees were defined as those based on fish, chicken, or beef. In addition, entrees not easily placed in other categories, including mixed pasta dishes, omelets, and ethnic dishes, were termed mixed dishes. Vegetables and fruit were combined because there were only 3 fruit dishes and this group consisted of non-salad vegetable and fruit side dishes. Carbohydrate-rich foods were rice, potatoes, breads, and beans.

Statistical significance was set at a 2-sided \( P \) value of less than .05. Based on the mean and standard deviation from a pilot study,\(^ {17} \) it was estimated that 87 total foods were needed to have 80% power to detect an overall discrepancy of 18%. In our study, 167 items were purchased (which created 269 food samples for analysis because the included side dishes were analyzed separately) to allow for exploration of discrepancies across restaurant types and stated energy content categories. All statistical analyses were performed using SAS software version 9.1 (SAS Institute Inc, Cary, North Carolina).

RESULTS
For the main analysis, 269 food items (including 242 unique items) from 42 restaurants were collected in 167 orders (FIGURE 1 and eTable at http://www.jama.com). Of these 269 food items, 108 (40%) had measured energy contents at least 10 kcal/portion higher than the stated energy contents and 141 (52%) had measured energy contents at least 10 kcal/portion lower than the stated energy contents. Twenty foods (7%) had differences in measured energy contents of between 10 and –10 kcal/portion compared with the stated energy contents. Measured food energy contents averaged 10 kcal/portion (95% confidence interval [CI], –15 to 34 kcal/portion; \( P = .52 \) ) higher than the stated energy contents in all samples combined. Nineteen percent of foods (n = 50) contained greater than 100 kcal/portion more than the stated energy contents. No analysis of results in relation to region (Arkansas, Indiana, Massachusetts) was performed because the study was not designed to examine between-region comparisons.

The multiple analysis of covariance for predictors of the discrepancy between stated and measured energy contents, which included restaurant type (quick-serve vs sit-down) and stated energy contents \( (R^2 = 0.10; P < .001) \), identified a statistically significant interaction between restaurant type and stated energy contents. For quick-serve restaurants, stated energy contents were not associated with the difference between stated and measured energy contents \( (R^2 = 0.01; P = .32) \). However, for entrees from sit-down restaurants, stated energy contents were inversely associated with the difference between stated and measured energy contents \( (R^2 = 0.27, P < .001; \) FIGURE 2). Furthermore, the simple linear regression equation for entrees from sit-down restaurants (energy content difference = 176 – 0.28 × stated energy content) indicated that foods with more than 625 kcal/portion of stated energy contained lower measured energy contents than stated, while foods with 625 kcal/portion or less had higher measured energy contents than stated.
There was also significantly greater variability in the discrepancy between the stated and measured energy contents in all foods from sit-down restaurants compared with all foods from quick-serve restaurants (SD of 225 kcal/portion vs SD of 134 kcal/portion, respectively; \( P < .001 \)) and also for entrees only from sit-down restaurants compared with all foods from quick-serve restaurants (SD of 214 kcal/portion vs SD of 134 kcal/portion, respectively; \( P = .02 \)). Side dishes from sit-down restaurants contained higher measured energy contents than stated compared with the entrees they accompanied (58 kcal/portion [95% CI, 13 to 102 kcal/portion] vs 48 kcal/portion [95% CI, −94 to −1 kcal/portion], respectively; \( P = .03 \)) and were significantly more variable relative to measured energy contents (\( P < .001 \)).

### Table 1. Measured vs Stated Energy Content Among 269 Restaurant Food Items

<table>
<thead>
<tr>
<th></th>
<th>Massachusetts</th>
<th>Arkansas</th>
<th>Indiana</th>
<th>All Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean (95% CI)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All foods at quick-serve restaurants</td>
<td>644 (514 to 773)</td>
<td>622 (502 to 742)</td>
<td>714 (588 to 841)</td>
<td>660 (590 to 730)</td>
</tr>
<tr>
<td>Sit-down restaurants</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All entrees</td>
<td>837 (686 to 989)</td>
<td>795 (649 to 940)</td>
<td>754 (588 to 919)</td>
<td>705 (709 to 861)</td>
</tr>
<tr>
<td>Side dishes</td>
<td>567 (459 to 676)</td>
<td>503 (404 to 602)</td>
<td>459 (367 to 551)</td>
<td>507 (450 to 564)</td>
</tr>
<tr>
<td>All foods</td>
<td>592 (509 to 676)</td>
<td>541 (464 to 618)</td>
<td>534 (456 to 611)</td>
<td>555 (509 to 600)</td>
</tr>
<tr>
<td>All foods at quick-serve restaurants</td>
<td>685 (560 to 810)</td>
<td>586 (469 to 702)</td>
<td>733 (589 to 877)</td>
<td>668 (595 to 741)</td>
</tr>
<tr>
<td>Sit-down restaurants</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All entrees</td>
<td>757 (624 to 891)</td>
<td>783 (644 to 922)</td>
<td>703 (578 to 827)</td>
<td>747 (674 to 821)</td>
</tr>
<tr>
<td>Side dishes</td>
<td>346 (254 to 438)</td>
<td>411 (249 to 573)</td>
<td>251 (215 to 293)</td>
<td>303 (272 to 389)</td>
</tr>
<tr>
<td>All foods</td>
<td>544 (450 to 639)</td>
<td>581 (465 to 697)</td>
<td>439 (362 to 515)</td>
<td>517 (462 to 572)</td>
</tr>
<tr>
<td>All foods</td>
<td>590 (515 to 666)</td>
<td>583 (497 to 669)</td>
<td>525 (452 to 597)</td>
<td>564 (520 to 609)</td>
</tr>
<tr>
<td>All foods at quick-serve restaurants</td>
<td>41 (0.46 to 82)</td>
<td>−36 (−67 to −5)</td>
<td>19 (−53 to 91)</td>
<td>8 (−21 to 37)</td>
</tr>
<tr>
<td>Sit-down restaurants</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All entrees</td>
<td>−79 (−132 to −26)</td>
<td>−12 (−105 to −82)</td>
<td>−51 (−149 to −47)</td>
<td>−48 (−94 to −1)</td>
</tr>
<tr>
<td>Side dishes</td>
<td>29 (−30 to 89)</td>
<td>154 (28 to 281)</td>
<td>17 (−15 to 17)</td>
<td>58 (13 to 102)</td>
</tr>
<tr>
<td>All foods</td>
<td>−23 (−64 to 18)</td>
<td>78 (−3 to 160)</td>
<td>−20 (−61 to 20)</td>
<td>10 (−22 to 43)</td>
</tr>
<tr>
<td>All foods</td>
<td>−2 (−33 to 29)</td>
<td>42 (−15 to 99)</td>
<td>−9 (−44 to 26)</td>
<td>10 (−15 to 34)</td>
</tr>
</tbody>
</table>

Abbreviation: CI, confidence interval.

A multifactor analysis of variance model was fit for quick-serve foods and sit-down entrees (no side dishes) and included the following predictors: restaurant type, stated energy, and their interaction (model \( R^2 = 0.10 \)). The interaction was significant (\( P = .04 \)); thus, the correlation of energy difference and stated energy is presented for each restaurant type separately. Simple linear regression equation for sit-down entrees: energy difference = 176 − 0.28 \( \times \) stated energy.
In post hoc analyses, the discrepancy between measured and stated portion size was significantly associated with the accuracy of the stated energy contents ($R^2=0.07; \ P=.008$). However, there was no statistically significant association between stated portions of macronutrients or cost of the food and the accuracy of the stated energy contents.

The 10% of foods ($n=17$) from both quick-serve and sit-down restaurants with the highest positive discrepancy between measured and stated energy contents in the first analysis were targeted for resampling. The data for the 13 foods that were available for a second purchase (ie, had not been taken off the menu) are shown in Figure 3. In the first analysis, this group of foods had a mean difference between measured and stated energy contents of 289 kcal/portion (95% CI, 186 to 392 kcal/portion) (compared with 0 kcal/portion difference, $P<.001$), and there was a similar discrepancy in the reanalysis (258 kcal/portion [95% CI, 154 to 361 kcal/portion] compared with 0 kcal/portion; $P<.001$) (for the comparison with the first sample, $P=.37$). Considering the first and second sampling of the 13 foods together, the 26 foods had a mean measured energy content of 273 kcal/portion (95% CI, 205 to 341 kcal/portion) higher than the stated energy content, representing a 48% discrepancy.

As shown in Table 2, an analysis of differences between stated and measured energy contents in relation to food type showed that carbohydrate-rich foods (81 kcal/portion [95% CI, 23 to 140 kcal/portion]; $P=.004$) and desserts (38 kcal/portion [95% CI, −0.49 to 77 kcal/portion]; $P=.02$) contained significantly more energy than stated (both $P$ values were based on log-transformed data). In addition, carbohydrate-rich foods and salads had significantly more variability in the difference between stated and measured energy contents than sandwiches (SD, 251 and 185 vs 177 kcal/portion, respectively; $P=.04$ for salads compared with sandwiches and $P=.02$ for carbohydrate-rich foods compared with sandwiches).

**COMMENT**

The prevalence of obesity remains at epidemic levels and national recommendations emphasize reducing energy intake to facilitate weight loss and prevent weight gain. However, the extent to which this recommendation can be implemented depends in part on the accuracy of available information on the energy contents of foods that are typically consumed. Foods purchased in restaurants are of particular concern with respect to the accuracy of the available information because they were estimated in 2008 to provide approximately 35% of energy intake.

In this regionally representative study of randomly selected food items, there was no significant mean difference between the measured and stated energy contents in all foods considered together, and the stated energy contents averaged only 10 kcal/portion higher than the measured energy contents. However, the stated information of individual foods was variable and 19% of individually tested foods contained energy contents of at least 100 kcal/portion more than the stated energy contents, an amount that has been projected to cause 5 to 7 kg of weight gain per year if consumed daily. Although not typical, 1 side dish in our study contained an excess of 1000 kcal/portion more than the stated energy amount of 450 kcal/portion, which is an amount that is nearly half the total daily energy requirement for most individuals. Thus, the overall results suggest that stated information on food energy content in restaurants is broadly accurate, a finding that supports in-

**Table 2. Measured vs Stated Energy Content Among Restaurant Food Items by Food Category**

<table>
<thead>
<tr>
<th>Food Category</th>
<th>Energy, Mean (95% Confidence Interval), kcal/portion</th>
<th>$P$ Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stated</td>
<td>Measured</td>
</tr>
<tr>
<td>Desserts</td>
<td>10 362 (220 to 544)</td>
<td>421 (228 to 613)</td>
</tr>
<tr>
<td>Pizza</td>
<td>18 550 (346 to 755)</td>
<td>532 (353 to 711)</td>
</tr>
<tr>
<td>Sandwiches</td>
<td>48 832 (746 to 917)</td>
<td>798 (719 to 877)</td>
</tr>
<tr>
<td>Meat</td>
<td>22 574 (459 to 689)</td>
<td>524 (423 to 624)</td>
</tr>
<tr>
<td>Mixed dishes</td>
<td>46 882 (754 to 1009)</td>
<td>846 (734 to 959)</td>
</tr>
<tr>
<td>Vegetables and fruit</td>
<td>16 128 (89 to 167)</td>
<td>117 (72 to 162)</td>
</tr>
<tr>
<td>Salads</td>
<td>26 510 (393 to 627)</td>
<td>537 (396 to 678)</td>
</tr>
<tr>
<td>Soups</td>
<td>10 236 (149 to 323)</td>
<td>278 (177 to 379)</td>
</tr>
<tr>
<td>Carbohydrate-rich foods</td>
<td>73 339 (296 to 382)</td>
<td>420 (345 to 496)</td>
</tr>
</tbody>
</table>

$^A$The discrepancy between the $P$ value and the 95% confidence interval is due to the $P$ value being calculated using the log-transformed energy content.

$^B$For comparison of SDs (salads were more variable than sandwiches), the $P$ value was equal to .04. The Tukey post hoc test was used to control for multiple comparisons.

$^C$For comparison of SDs (carbohydrate-rich foods were more variable than sandwiches), the $P$ value was equal to .02. The Tukey post hoc test was used to control for multiple comparisons.
increased reporting of nutrition information in restaurants. However, among entrees obtained in sit-down restaurants, those with a lower stated energy content (ie, the most appropriate choices for individuals trying to lose weight or prevent weight gain) systematically contained more energy than stated, whereas foods with higher stated energy contents had lower energy contents than stated. This finding is broadly consistent with our previous preliminary observation of high measured food energy contents relative to stated energy contents in foods with lower stated energy contents and has the potential to impede individual efforts to reduce energy intake to prevent or treat obesity.

In addition, among the 10% of foods with the greatest positive difference between measured and stated energy contents that were available for resampling (mean excess energy content of 289 kcal/portion in 13 foods, representing a 52% difference), there was a similar discrepancy in the second sample obtained several months after the initial collection. This finding addresses a question raised in our pilot study of whether inaccuracy in an individual stated food item is due to random error or is food-specific, and indicates that some popular restaurants do serve meals that repeatedly contain substantially higher energy contents than stated.

While quick-serve restaurants have frequently been criticized for offering suboptimal nutrition choices, the stated energy content relative to measured energy content compared with sandwiches. The greater inconsistency in stated energy content among choices viewed by the public as healthy is only partly explained by the fact that these items had lower stated energy contents. It may be relevant that there are currently no federal regulations specifying acceptable limits of accuracy for stated information of individual restaurant-purchased foods, whereas packaged food regulations require that measured energy content in a random sample of 12 units must average no more than 120% of the stated energy content.

Understanding the specific reasons why individual foods have inaccurate stated energy contents (especially in sit-down restaurants) was not the focus of this study but portion weights predicted inaccuracy, suggesting that poor quality control of portion size may have been a contributing factor. Evidence of suboptimal quality control of portion size at the restaurant level was seen in the observation that items typically portioned at the factory level before reaching the restaurant (eg, most fast-food items) tended to have the greatest stated accuracy. Thus, greater attention to onsite quality control of portioning may improve the accuracy of the stated energy content in restaurants; one possible method would be to mimic offsite portioning methods by using scales or volume weights for key ingredients.

Assuming that providing the general public greater access to information on food energy contents may help address the obesity epidemic, what constitutes an adequate level of reliability in stated energy contents of individual restaurant foods should be considered, as well as recommendations for how such benchmarks can be achieved, with feasible implementation and oversight in different types of restaurants. However, the finding that the foods with lower stated energy contents were the ones that tended to have higher measured energy contents than stated suggests more than just random error, and further exploration of the reasons for this problem are needed.

All study foods were obtained as take-out items and were separately packaged into individual containers. Although anecdotaly consumers frequently request items to be packaged separately, and we are not aware of any evidence suggesting that packaging could have influenced the results obtained, this possibility should be addressed in future investigations. Furthermore, single samples of foods were taken, with the exception of the duplicate resampling protocol, and although we identify portion size as one factor contributing to errors in stated food energy contents, the study could not identify further causes of errors including quality control in recipes or errors in the database composition of ingredients (eg, USDA Nutrient Database for Standard Reference). In addition, the bomb calorimetry technique used in this study was shown in a previous validation to underrecover energy content by 1.9%, an amount that has not yet been confirmed in additional testing. If confirmed and added back to the measured values in this study, this would result in a slightly larger overall discrepancy between measured and stated energy contents.

The results of this study have implications for pending implementation of new legislation requiring more restaurants to document the energy content of their menu items. Posted information on energy content in restaurants may influence consumer choice toward options with lower stated energy contents. Although our study showed that stated energy contents in restaurants are relatively accurate on average, thus supporting greater availability of this information, projected benefits for preventing weight gain and facilitating weight loss are likely to be reduced if restaurant foods with lower stated energy contents provide more energy content than stated. Additional portion control in restaurants has the potential to facilitate individual ef-
forts to reduce energy intake and to help resolve the national obesity epidemic.

Author Contributions: Dr Roberts had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Study concept and design: Urban, McCrory, Dallas, Das, Weber, Roberts.

Acquisition of data: Urban, McCrory, Weber, Roberts.

Analysis and interpretation of data: Urban, Dallas, Saltzman, Roberts.

Drafting of the manuscript: Urban, Roberts.

Critical revision of the manuscript for important intellectual content: Urban, McCrory, Dallas, Das, Saltzman, Weber, Roberts.

Statistical analysis: Urban, Dallas, Roberts.

Obtained funding: McCrory, Weber, Roberts.

Administrative, technical, or material support: McCrory, Weber.


Conflict of Interest Disclosures: All authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Dr McCrory reported that her institution received money from GSK Consumer Healthcare to conduct investigator-initiated research on dietary macronutrient composition interactions with oralist effects on appetite and related variables; and money was paid to her institution (Department of Foods and Nutrition, Purdue University) for the corporate affiliates program in which interested parties, mostly food manufacturers or suppliers thereof, pay an annual fee to learn about recent research and discuss topical nutrition-related issues such as the 2010 Dietary Guidelines. No other authors reported disclosures.

Funding/Support: This work was supported by the US Department of Agriculture agreement No. 58-1950-0-014 with Tufts University, by internal department research funds from Purdue University, and by the Arkansas Children’s Hospital Research Institute and the Arkansas Biosciences Institute.

Role of the Sponsor: The sponsors had no role in the design and conduct of the study; the collection, analysis, and interpretation of the data; or the preparation, review, or approval of the manuscript.

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