



Question: What is the effect of use of food and menu labels on dietary intake or body weight across U.S. population groups?

Table 1. Summary of studies examining the impact of menu labeling on food selection and consumption

Article Study Design NEL BAT Score*	Sample Size and Demographics (age, gender, race/ethnicity, education)	Menu Labeling Study Conditions Outcomes	Results	Summary of Findings
<p>Roberto, 2010</p> <p>Randomized controlled trial (RCT)</p> <p>0/28</p>	<p>N=273</p> <p>30.5y</p> <p>50% female 55% white</p> <p>65% at least some college</p>	<p>3 menu conditions:</p> <p>1) Menu without any calorie labels</p> <p>2) A menu with calorie labels</p> <p>3) A menu with calorie labels and a message “The recommended daily caloric intake for an average adult is 2000 calories”</p> <p>Study took place in a university classroom; participants sat behind dividers. Participants arrived at 5:30pm after abstaining from food for at least 3 hours. Participants were instructed to order whatever they liked, provided the meal represented one they might actually order when eating at a restaurant. To prevent individuals from over-ordering, they were told that no food could be taken home.</p> <p>Participants then chose a meal and consumed the food.</p>	<p>Menu condition and calories (no calorie label vs. calorie label only vs. calorie label plus daily recommendation information)</p> <p><i>Total calories ordered:</i> 2,189.4 (SD=1080.5) vs. 1,862.2 (SD=937.3) vs. 1,859.7 (SD=1,062.6), P=0.04, no-cal SD from cal-only and cal+info</p> <p><i>Total calories consumed:</i> 1,458.9 (SD=724.6) vs. 1,334.7 (SD=620.7) vs. 1,256.4 (SD=688.5), NS</p> <p><i>Total post dinner calories:</i> 179.1 (SD=310.3) vs. 293.6 (SD=386.7) vs. 176.8 (SD=308.9), P=0.03, cal-only SD from no-cal and cal+info</p> <p><i>Dinner plus post-dinner calories:</i> 1,630.04 (810.73) vs. 1,624.87 (741.01) vs. 1,379.64 (639.26), P=0.03, cal+info SD from no-cal and cal-only</p> <p>Secondary analysis for total calories consumed, no calorie information vs. pooled calorie</p>	<p>Compared to those in the no calorie label group, those in both calorie label conditions ordered fewer calories for dinner, and when calorie label group data was pooled, they consumed fewer calories during dinner. In the post dinner meal, the calorie label only group consumed more calories than the other groups. However, the calorie plus information group consumption significantly less energy for dinner and post dinner than the other two groups.</p>



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		Outcomes: Calories ordered; calories consumed; calories consumed after dinner meal	information groups Total calorie consumed: 1,466 (SD=724) vs. 1,289 (SD=656), P=0.04	
James, 2014 RCT 4/28	N=300 21.9y 56% female 88% white 77% college students	3 conditions: Lunch menu labeling (fast food and beverages) 1) Exercise-labels: Menu displaying minutes of brisk walking needed to burn the food (for the average young man or woman) 2) Kcal-labels: Displayed kilocalorie content of the foods and a statement with the total daily kcal needs of most women (2,000) and men (2,400), 3) No-label control Outcomes: Energy ordered at lunch; energy consumed at lunch; diet composition (%fat, protein, carbohydrate) ordered and consumed at lunch; energy consumed post-lunch (remainder of day)	Energy ordered at lunch, kcal: (P=0.008) for menu type; Mean (95% CI) for the exercise-labels group (763 (703,824)) vs. the no-labels group (902 (840, 963)), P=0.002; all other differences between groups NS Energy consumed at lunch, kcal: (P=0.04) for menu type; Mean (95% CI) for the exercise-labels group (673 (620,725)) vs. the no-labels group (770 (717, 823)), P=0.01; all other differences between groups NS Energy consumed post-lunch, kcal: (NS) for menu type; differences between groups NS Energy from fat, %: calories ordered: (P=0.03) for menu type; Mean (95% CI) for the exercise-labels group (36.5 (34.7, 38.3)) vs. the no-labels group (39.9 (38.1, 41.8)), P=0.009 Calories consumed: (NS) for menu	In young adults of mostly normal weight, exercise-labels led to ordering and consuming less energy and fat at lunch compared to no-labels. Energy ordered and consumed did not differ between the kcal-labels group and no-labels group, and post-lunch energy consumption was not different among the three groups.



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		Study took place in dining area of metabolic kitchen and graduate student residence dining area.	type; Mean (95% CI) for the exercise-labels group (36.4 (34.6, 38.3)) vs. the no-labels group (39.3 (37.5, 41.2)), P=0.09	
Harnack, 2008 RCT 3/28	N=594 16-25 y (24.8%), 26-40 y (19.4%), 41-60 y (41.8%), >60 y (14.1%) 59% female 97% non-Hispanic 75% at least some college	4 menu conditions: 1) No calories, no value pricing 2) Calories, no value pricing 3) Calories and value pricing 4) No calories, value pricing (control). All items were available at McDonald's restaurants. Study took place at dinnertime in 3 sites: 2 conference rooms in suburban hotels, and 1 urban church basement. Participants selected meals and consumed their selected meal. Outcomes: Calories ordered and consumed	No significant (NS) differences between study groups for calories ordered or consumed. Secondary analysis: Average energy intake was higher among males in all conditions (calories, price, and calories+price) compared control, P=0.01	Calorie labeling had no significant effect on food selection and consumption. Males choosing from menus with calorie information actually consumed more calories than those in the control group.
Dowray, 2013 RCT 2/28	N=802 44y 88% female 71% white 96% at least some	4 conditions: 1) No calorie label 2) Calorie label 3) Calorie and minutes walking need to burn the calories	Mean calories ordered: <i>Total calories:</i> No label (1020.15 (579.45)), calorie label (927.05 (681.74)), calorie and minutes walking label (916.15 (664.45)), calorie and	Respondents ordered significantly fewer total calories, fewer calories from burgers, and fewer calories from sides when shown the menu with both calorie information and miles



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	college	<p>(energy expenditure of a 160 lb adult walking at 30 minutes per mile) 4) Calorie and miles walking needed to burn the calories</p> <p>Fast food restaurant menu labeling, via online survey</p> <p>Outcomes: Mean calories ordered: total calories; burger calories; salad calories; side calories; dessert calories; drink calories; total calories ordered by body mass index (BMI)</p>	<p>miles walking label (826.29 (539.18)), (P=0.02); no label vs. miles walking label (P=0.0007), all other pairwise comparisons (NS)</p> <p><i>Burger calories:</i> No label (414.85 (256.2)), calorie label (381.58 (307.31)), calorie and minutes walking label (372.92(242.59)), calorie and miles walking label (336.24 (222.49)), (P=0.03), no label vs. miles walking label (P=0.001), all other pairwise comparisons (NS)</p> <p><i>Side calories:</i> No label (245.3 (189.02)), calorie label (201.92 (189.79)), calorie and minutes walking label (230.29 (167.97)), calorie and miles walking label (193.35 (192.22)), (P=0.02), no label vs. miles walking label (P=0.007), no label vs. calorie menu (P=0.02), all other pairwise comparisons (NS)</p> <p>Total calories ordered by BMI:</p> <p><i>Underweight/normal weight:</i> No label (1,094 (661)), calorie label (693 (333)), calorie and minutes walking label (929</p>	<p>need to walk, compared to those shown a menu with no labels. Menu labeling influenced the total calories ordered for underweight/normal weight respondents, but not for those who were overweight or obese.</p>



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			<p>(729)), calorie and miles walking label (702 (463)), (P=0.0001)</p> <p><i>Overweight</i> (NS)</p> <p><i>Obese</i> (NS)</p>	
<p>Gerend, 2009 RCT 15/28</p>	<p>N=288</p> <p>19y 62% female 73% Caucasian 100% college students</p>	<p>2 Menus:</p> <p>1) No calorie info 2) With calorie info</p> <p>In a laboratory setting, participants were asked to imagine three different hunger scenarios (i.e., "quick dinner", "starving", and "not too hungry") then to select foods from a fast food menu with or without calorie information. Calories were averaged across the three scenarios per participant. Menus included prices, but participants did not actually purchase the items and were not served items.</p> <p>Outcomes: Mean calories ordered: Total calories; burger</p>	<p>Caloric content of meals by menu condition (no calorie information vs. calorie information):</p> <p><i>Females:</i> Calories per meal: 934 (SD=371) vs. 788 (SD=274), P<0.05 <i>Items per meal:</i> NS <i>Calories per item:</i> 237 (SD=57) vs. 218 (SD=64), P<0.05 <i>Males:</i> Calories per meal, items per meal, and calories per item: NS</p>	<p>Females chose fewer calories per meal and per item when using menus with calorie information, but there was no significant difference for males. Males and females chose similar numbers of items per meal regardless of gender or menu group. This study had several limitations.</p>



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		calories; salad calories; side calories; dessert calories; drink calories; total calories ordered by BMI		
Roseman, 2013 RCT 14/28	N=302 >18y Gender NR Race/ethnicity NR Education NR	2 Fast-food menus: 1) With calorie information 2) Without calorie information Participants randomly given one of two fast-food menus: 1) with calorie information; 2) without calorie information. Prices were not provided on menus. Participants choose items, but did not actually have to purchase or consume the item. Outcomes: Calories of selected items Participants were recruited at high-pedestrian, downtown street corner of medium-sized US city (pop~300,000) and completed survey.	NS difference in caloric content of item selections between menu groups based on grocery nutritional label usage (P=0.198). NS difference in caloric content of item selections between menu groups based on restaurant labeling attitudes (P=0.306).	Caloric content of menu items did not affect food selection based on grocery nutritional label usage or restaurant labeling attitudes.
Tandon, 2010 RCT	N=99 parent/child dyads 38y parent/ 4.3y	McDonalds picture menu under two conditions: 1) Picture menu with price and	Total calories ordered for child by parent: Mean (SD): Intervention: 569.1 (208.1); Control: 671.5 (263.5); P=0.004	Parents in the intervention arm presented with calorie information ordered an average of 102 fewer calories for their



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0/28	child 77% female parent/49% female child 75% white 88% at least some college	numeric calorie information 2) Picture menu with price but no calorie information. Outcomes: Energy ordered for parent; energy ordered for child (by parent) Took place in a pediatric-care clinic	Total calories ordered for parent: <i>Mean (SD): Intervention: 765.9 (385.9); Control: 759.3 (523.5); P=0.9</i>	children than the parents in the control arm not presented with calorie information. There was no difference in parent's energy ordered between the two groups.
Wisdom, 2010 RCT 12/28	N=638 29y 39% female 54% white Education: NR	Lunchtime at fast food sandwich restaurant Menu labeling conditions (2x2): - With and without calories - With and without daily calorie recommendation Outcomes: Caloric content of food selection	Providing calorie information: Significantly fewer calories ordered (B = -60.7, t(621) = -3.20, P < 0.001), Providing the daily calorie recommendation: Significantly fewer calories ordered (B = -37.8, t(621) = -2.01, P < 0.05). Specific cal info*daily recommended cal info: NS	Providing calorie information on menu led to fewer calories ordered.
Burton, 2006 RCT	N=193 39 y	Participants completed mail survey with 1 of 6 menu conditions	Purchase intentions: <i>Hamburger and French Fries platter:</i> Lower PI for cal+nutrients (M=3.43,	The addition of calorie and nutrient information for dinner house items influenced



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3/28	63% female Race/ethnicity NR 97% high school graduates	<p>3 (cal info) x2 (daily recommendation) design: <i>3 nutrition menu conditions:</i> 1) Calories, fat, saturated/trans fat, and sodium levels presented (“cal+nutrients”), 2) only calorie information presented, and 3) No nutrition information presented.</p> <p>2 versions of daily recommended values: 1) Daily value recommendations for fat, saturated fat and sodium based on a 2000 calorie diet 2.) No daily values.</p> <p>Outcomes: Purchase intent (PI; 7-point scale)</p>	<p>P<0.01) and cal only conditions (M=3.80, P<0.05) compared to control, <i>Mean (SD):</i> No nutrition information: 4.44 (2.1); Calories only (3.80 (2.1); <i>Calories and nutrients:</i> 3.43 (2.1); <i>Chef’s salad:</i> Cal+nutrient lower PI compared to control (P<0.01) and cal-only (P<0.02); <i>Mean (SD):</i> No nutrition info control: 4.92 (1.7); Calories only: 4.68 (1.7) (NS); Calories and nutrients: 3.97 (2.0) <i>Grilled chicken breast and baked potato:</i> NS; <i>Mean (SD):</i> No nutrition information: 5.59 (1.6); Calories only: 5.58 (1.6); Calories and nutrients: 5.55 (1.7); <i>Turkey sandwich:</i> Stronger PI for cal-only and cal+nutrients compared to control (P<0.01 and P<0.05, respectively); <i>Mean (SD):</i> No nutrition information: 4.86 (1.9); Calories only: 5.86 (1.5); Calories and nutrients: 5.48 (1.7) <i>Purchase likelihoods (univariate F value, P-value):</i> Nutrition information: 2.9 (P=NS); Daily value information: 0.9 (P=NS); Item type: 47.9 (P<0.01); <i>Nutrition information x item type:</i> 5.2 (P<0.01); Nutrition information x daily</p>	purchase intention. Purchase intention decreased for items that were less-healthy than expected, whereas they remained constant or slightly increased for items more consistent with nutritional expectations.



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			value information: 1.4 (P=NS); Daily value information x item type: 2.4 (P=NS); Nutrition information x item type x daily value information: 1.1 (P=NS) <i>Daily value information: NS</i>	
Ellison, 2013 RCT 4/28	N=138 18-35y: 70% 56% female Race/ethnicity: NR 63% current college students	Full-service restaurant, restaurant divided into 3 sections, each section received 1 of 3 menus (no indication of which meal, lunch or dinner) 3 Menu labeling conditions: 1) <i>Control:</i> No nutritional information, 2) <i>Numeric menu:</i> Calories-only, the number of calories in parentheses before each item's price, 3) <i>Symbolic menu:</i> Calorie+traffic light, numeric caloric information preceding each item's price and a traffic light symbol representing low, medium, or high calories (Green light=<400kcal, yellow light=401-800kcal, and red light=>800kcal)	Entrée calories ordered: Compared to control, numeric NS; symbolic menu led to significantly fewer entrée calories ordered compared to other two conditions (P=0.033); “Extra” calories ordered: NS; Total calories ordered: Numeric and Symbolic compared to control NS, Symbolic menu condition ordered significantly fewer calories than numeric menu condition (P=0.063)	The calorie+traffic light label significantly reduced entrée calories ordered but there was no difference between the control and calorie-only label. Neither type of calorie labeling reduced extra calories or total calories ordered compared to the control.



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		Outcomes: Calories ordered (entrée calories, “extra” calories (sides/beverages))		