

# Potential Effect of Physical Activity Calorie Equivalent Labeling on Parent Fast Food Decisions

Anthony J. Viera, MD, MPH<sup>a</sup>, Ray Antonelli<sup>b</sup>

## abstract

**OBJECTIVES:** Menu labels displaying food energy in physical activity calorie equivalents (PACE) is a possible strategy to encourage ordering meals with fewer calories and promoting physical activity. Potential effects of such labeling for children have never been examined.

**METHODS:** We conducted a national survey of 1000 parents randomized to 1 of 4 fast food menus: no labels, calories only, calories plus minutes, or calories plus miles needed to walk to burn the calories. Respondents were asked to imagine they were in a fast food restaurant and place an order for their child. At the survey's conclusion, all respondents were shown a calorie-only label and both PACE labels and asked to rate the likelihood each label would influence them to encourage their child to exercise.

**RESULTS:** We excluded respondents whose meals totaled 0 calories or >4000 calories, leaving 823 parents in the analysis. The mean age of the child for whom the meal was "ordered" was 9.5 years. Parents whose menus displayed no label ordered an average of 1294 calories, whereas those shown calories only, calories plus minutes, or calories plus miles ordered 1066, 1060, and 1099 calories, respectively ( $P = .0001$ ). Only 20% of parents reported that calories-only labeling would be "very likely" to prompt them to encourage their children to exercise versus 38% for calories plus minutes ( $P < .0001$ ) and 37% for calories plus miles ( $P < .0001$ ).

**CONCLUSIONS:** PACE labeling may influence parents' decisions on what fast food items to order for their children and encourage them to get their children to exercise.



**WHAT'S KNOWN ON THIS SUBJECT:** Menu labels depicting physical activity calorie equivalents may lead to ordering of fast food meals totaling fewer calories for adults. The effects of physical activity calorie equivalent labeling on parents' fast food decisions for their children have not been examined.

**WHAT THIS STUDY ADDS:** Parents shown menus with any type of caloric content label may order fast food meals totaling fewer calories for their children. Menu labels showing physical activity equivalents may be more likely to influence parents to encourage their children to exercise.

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Dr Viera conceptualized and designed the study, analyzed the data, and drafted the initial manuscript; Mr Antonelli assisted with design of the study, drafted the questionnaire, oversaw data collection and coding, helped interpret the data, and critically reviewed the manuscript; and both authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

[www.pediatrics.org/cgi/doi/10.1542/peds.2014-2902](http://www.pediatrics.org/cgi/doi/10.1542/peds.2014-2902)

**DOI:** 10.1542/peds.2014-2902

Accepted for publication Nov 11, 2014

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PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

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**FINANCIAL DISCLOSURE:** The authors have indicated they have no financial relationships relevant to this article to disclose.

**FUNDING:** This work was supported by funds from the endowed Charles B. Wilkerson, MD, '06 Distinguished Professorship of Family Medicine and by grant T35-DK007386 from the National Institutes of Health. Funded by the National Institutes of Health (NIH).

**POTENTIAL CONFLICT OF INTEREST:** The authors have indicated they have no potential conflicts of interest to disclose.

Childhood obesity is highly prevalent in the United States. In 2009–2010, nearly 1 in 3 US children aged 2 to 19 years was overweight or obese, and 1 in 6 was obese.<sup>1</sup> Children and teens who are obese tend to remain obese into adulthood, and childhood obesity is associated with adverse health outcomes in adulthood.<sup>2–4</sup> Preventing childhood obesity is thus an important strategy to prevent adult obesity.

Physical activity is an important component of childhood obesity prevention. The US Department of Health and Human Services recommends that children and adolescents aged 6 to 17 years engage in at least 60 minutes of physical activity each day.<sup>5</sup> Similarly, the American Heart Association recommends that all children age 2 years and older should participate in at least 60 minutes of developmentally appropriate and varied, moderate-intensity physical activities every day or have at least two 30-minute periods or four 15-minute periods in which they can engage in vigorous activities appropriate to their age, gender, and stage of physical and emotional development.<sup>6</sup> Unfortunately, only 42% of 6- to 11-year-olds and only 8% of 12- to 15-year-olds approach this level of physical activity.<sup>7</sup>

Further contributing to childhood obesity is the fact that calories consumed at restaurants make up about one-third of the average American's diet.<sup>8</sup> Fast food consumption is particularly common among children and contributes to high fat and caloric intake.<sup>9</sup> Public health policymakers have consequently sought new ways to decrease caloric intake for both adults and children. Menu labeling is one approach that has received widespread acceptance following the Affordable Care Act's mandate that restaurants with >20 locations must post calorie counts.<sup>10</sup>

Despite their growing use, however, calorie labels on menus may not be

the most effective way to express food energy content to consumers. Studies report conflicting results in the ability of calorie-labeled menus to reduce caloric consumption in real-world settings.<sup>11,12</sup> Calorie labels do not appear to significantly reduce the number of calories consumed in a meal, a trend that appears to occur in adolescents as well as adults.<sup>13</sup> In fast food restaurants, consumers may have insufficient time to weigh various meal options based on caloric content, whereas others may lack the health literacy needed to use calorie-based nutrition information.<sup>14</sup> Some consumers may not understand what calories represent whereas others may lack the numeracy skills to apply calorie content of a food item to understanding the fraction of total calories consumed in a day. The little research that exists on the effect of calorie labeling on parents' choices for their children suggests no effect, although a hypothetical scenario study suggested that parents might order fewer calories for their children when a menu is labeled with calorie information.<sup>15,16</sup> Overall, though, it seems consumers may not know how to use calorie information to guide food ordering for themselves or for their children.

Labels that depict the physical activity required to expend the calories in a food item might be easier to understand and potentially more effective. We previously developed physical activity calorie expenditure (PACE) labels and examined their potential influence on adults' fast food decisions.<sup>17,18</sup> In a randomized trial using hypothetical scenarios, we found that those shown fast food labels depicting calories and miles to walk to burn those calories ordered on average about 100 fewer calories than when shown calorie information alone.<sup>18</sup> To our knowledge, no research has examined whether PACE labeling might influence parents' decisions about what foods they purchase for their children. Because physical activity equivalent labels

might theoretically also influence decisions to exercise, exploration of whether such an effect may translate to parental influence on children's behavior also is worth exploring. In this study, we examined whether parents shown PACE labels might order fewer fast food calories for their children. Because PACE labels also might work by motivating physical activity, we also explored whether they might influence parents to encourage their children to get more exercise.

## METHODS

### Overall Design

We conducted a national cross-sectional study by using a Web-based survey administered through Survey Sampling International (SSI). It was granted exempt status by the institutional review board of the University of North Carolina. Our survey consisted of a hypothetical complete fast food menu identical to the menu used in a previous study.<sup>18</sup> Briefly, the menu items shown to participants were chosen to represent generic items that are available at fast food restaurants nationwide. We included no brand names except in the labels for Coke, Diet Coke, and Sprite.

Participants were randomized to 1 of 4 labels for the menu items: no label, calories only, calories plus minutes to walk to burn the calories in the food item, or calories plus miles to walk to burn the calories in the food item. A registered dietician reviewed the menu, along with caloric content and the number of miles and minutes needed to burn off the calories in each item, calculations based on a 160-pound adult walking 2 miles per hour. We asked respondents to imagine they were in a fast food restaurant and to place an order for their child using the displayed menu. At the end of the survey, all respondents were asked to rate (5-point scale from "very unlikely" to "very likely") the likelihood that each type of menu

label would influence (1) their fast food ordering for their child, and (2) their potential to motivate their child to get some exercise.

### Participant Selection

Participants were recruited in the summer of 2014 by using SSI. Our only eligibility criteria were age 18 years or older, parent of at least 1 child ages 2 to 17 years, and had to have eaten at a fast food restaurant in the past month. SSI recruited participants via E-mail invitation to preexisting participant panels and by banner advertisements posted to online communities, social networks, and Web sites. Potential participants were digitally fingerprinted and

checked against third party databases to ensure each respondent was unique. As a quality assurance measure, respondents who completed the survey in less than one-third of the median response time were not included. Per usual SSI policy, respondents were offered a small cash reward, such as \$0.50 to \$1.00, or entry into sweepstakes for prize drawings.

### Outcome Variables

Our main outcome variable was total calories that parents ordered for their child. We also examined total calories ordered as “burgers” (including all sandwich types), sides (eg, French fries), drinks, and desserts.

### Additional Variables

We assessed basic demographics of respondents. Parents were asked to report their height and weight, which were used to calculate their BMI. Parents also were asked whether their child was overweight with response options of yes, no, or not sure. We also assessed health literacy by using the Newest Vital Sign, which has been validated in multiple studies.<sup>19</sup> Health literacy was deemed “adequate” if respondents answered at least 4 items correctly. Otherwise, health literacy was considered low/marginal. We asked parents about exercise frequency and collected information about the child for whom the fast food meal was “ordered.”

**TABLE 1** Characteristics of Study Sample, *n* = 823

	All, <i>n</i> = 823	No Label, <i>n</i> = 189	Calories Only, <i>n</i> = 209	Calories + minutes, <i>n</i> = 213	Calories + miles, <i>n</i> = 212	<i>P</i>
Age, mean (SD)	38 (9.8)	38 (9.7)	38 (10)	39 (10)	39 (9.6)	.48
Women, %	72	77	72	66	76	.048
Race/ethnicity, %						
Black	10	13	13	8.1	6.7	.07
White	72	64	73	73	75	
Hispanic	8.6	10	7.2	10	6.7	
Other	9.7	13	6.7	8.1	11	
Education level, %						
At least some high school	21	19	25	22	17	.29
At least some college	64	64	61	61	70	
Graduate degree	15	17	14	17	13	
Health literacy level, %						
Adequate	55	49	56	59	56	.19
Low/marginal	45	51	44	41	44	
Total yearly income						
<\$35 000	26	24	26	25	30	.62
\$35 000–\$50 000	42	42	41	46	37	
>\$50 000	32	34	33	29	33	
Parent BMI category, %						
Normal	40	46	40	37	38	.14
Overweight	31	34	28	30	32	
Obese	29	20	32	33	29	
Days per mo at least 30 min of exercise	9.9 (9.1)	9.1 (8.8)	10 (9.1)	9.6 (9.0)	11 (9.4)	.40
Age group of child for whom meal was “ordered,” y						.03
2–6	33	41	35	28	30	
7–12	34	24	38	37	36	
13–17	33	34	27	34	34	
Mean age in years of child for whom meal was “ordered” (SD)	9.5 (4.6)	9.2 (5.0)	9.2 (4.3)	9.9 (4.5)	9.8 (4.5)	.20
Gender of child for whom meal was “ordered,” % boys	54	56	55	53	53	.93
Reports child for whom meal was “ordered” is overweight, %	9	7.4	7.2	12	10	.33
Average d/wk fast food ordered for child for dinner	1.3 (1.3)	1.4 (1.4)	1.2 (1.3)	1.3 (1.3)	1.2 (1.2)	.34
Average d/wk fast food ordered for child for snack	0.72 (1.3)	0.93 (1.5)	0.77 (1.4)	0.64 (1.2)	0.57 (1.0)	.02
Region of country, %						
West	25	24	23	26	25	.33
Midwest	22	15	22	24	25	
South	36	40	39	34	32	
Northeast	17	21	16	15	18	

**TABLE 2** Fast Food Calories Parents “Ordered” for Their Children

	All, <i>n</i> = 823	No label, <i>n</i> = 189	Calories only, <i>n</i> = 209	Calories + minutes, <i>n</i> = 213	Calories + miles, <i>n</i> = 212	<i>P</i>
Total calories	1125	1294	1066*	1060**	1099***	.0001
For children 2–6	944	1088	887	866	902	<.0001
For children 7–12	1088	1208	1088	1076	1028	.11
For children >12	1336	1561	1256	1172	1355	.002
Parents with adequate health literacy	1032	1157	997	977	1027	.07
Parents with low/marginal health literacy	1241	1423	1155	1180	1192	.01
For parents with BMI <30 kg/m <sup>2</sup>	1145	1291	1067	1079	1138	<.0001
For parents with BMI ≥30 kg/m <sup>2</sup>	1034	1243	1024	987	969	.02
Burger calories	335	378	316	318	333	.01
Side calories	272	287	269	268	264	.32
Drink calories	231	260	226	223	220	.20
Dessert calories	199	259	188	162	195	.0007

Pairwise comparisons to no label: \**P* = .001; \*\**P* < .001; \*\*\**P* = .006.

### Data Analysis

Respondents who ordered a meal totaling 0 calories for themselves or for their children, or >4000 calories for themselves or for their children were excluded from analysis because such responses implied lack of understanding of the survey or carelessness in response. For the remaining respondents, we report mean or percent for variables overall and across the 4 menu types. We compared total calories as well as meal component calories across menu types and tested for significance by using analysis of variance. We compared the

percentage of parents reporting various levels of potential influence of PACE labels on meal ordering for their children and for prompting parents to encourage children to exercise. Finally, we examined the influence of PACE labels stratified by health literacy. Analyses were conducted by using Stata software (Stata Corp, College Station, TX).

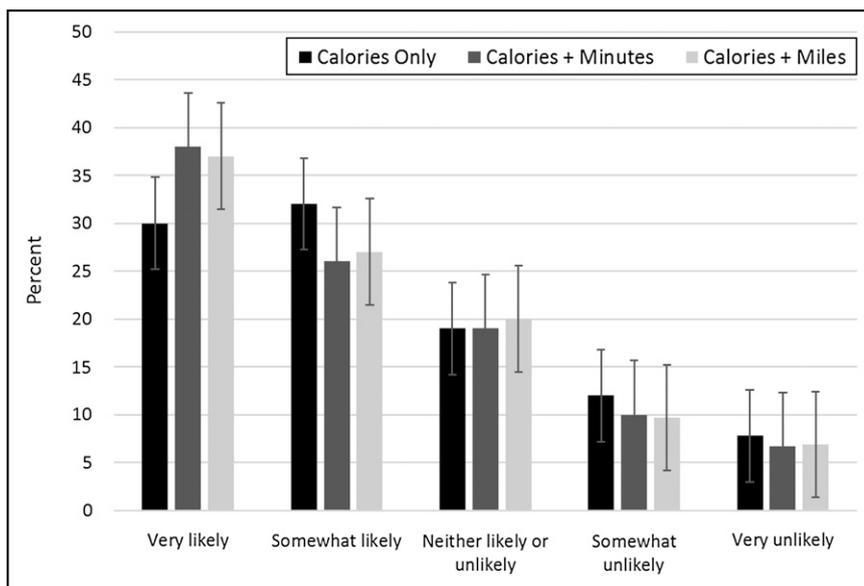
### RESULTS

#### Characteristics of Respondents

A total of 1552 E-mail invitations were sent by SSI to potentially eligible participants, of which 1545

were opened. A total of 544 people were screened out for 1 of the following: not fulfilling eligibility criteria (*n* = 370), hitting a closed quota (*n* = 64), or attempted survey on an unsupported device (*n* = 9). Of the 1101 eligible respondents remaining, 2 dropped out on their own after the introduction, 94 dropped out on their own at some other point in the survey, and 5 were classified as “speeders.” Thus, our adjusted response rate was 1000 (91%) of 1101. After excluding respondents who ordered a meal totaling 0 calories for themselves (*n* = 4) or for their children (*n* = 7), or >4000 calories for themselves (*n* = 155) or for their children (*n* = 11), a total of 823 respondents were included in this analysis, randomized to a no-label menu (*n* = 189), calories-only menu (*n* = 209), calories plus minutes (*n* = 213), or calories plus miles (*n* = 212). The mean age of respondents was 38 and similar across groups (Table 1). Approximately 60% of respondents were overweight or obese. Most respondents were women (72%) and white (72%). Approximately 79% of respondents had at least some college education; however, health literacy was measured as adequate in only 55%.

The mean age of the child for whom the parent placed a hypothetical food order was 9.5 years (Table 1). Only 9% of parents reported their child as



**FIGURE 1**

Reported potential influence of PACE labels on parents’ fast food meal choice for children, overall.

**TABLE 3** Percentage of Parents Reporting Potential Influence of PACE Labels on Their Fast Food Meal Choice for Children and to Encourage Children to Exercise, Stratified by Health Literacy Level

		Low/marginal health literacy, %	Adequate health literacy, %	<i>P</i>
Influence fast food meal choice	Calories only	56	67	.001
	Calories + minutes	57	70	<.0001
	Calories + miles	58	68	.002
Encourage child to exercise	Calories only	48	50	.47
	Calories + minutes	56	70	<.0001
	Calories + miles	57	69	<.0001

Potential influence = somewhat likely or very likely.

overweight. On average, parents reported ordering fast food for their children for dinner 1.3 days per week and less than once per week for a snack.

### Calories Ordered for Children

Overall, the average meal parents selected for their child totaled 1125 calories (Table 2). For children 2 to 6 years of age, meals totaled an average of 944 calories, whereas for teenage children, meals averaged 1336 calories. Meal calories also differed by parental health literacy status, with those having adequate health literacy ordering fewer total calories (1032 vs 1241,  $P < .0001$ ).

Parents whose menus displayed no label ordered an average of 1294 calories for their child's meal, whereas those shown any label

ordered approximately 200 fewer average calories ( $P = .0001$ ) for their children (Table 2). Overall, the total calories ordered were not statistically significantly different among the 3 labels. The patterns were similar when stratified by age group of the child or BMI category of the parent. Calorie differences were mostly due to differences in burger and dessert calories.

### Reported Potential Influence of PACE Labels on Fast Food Meal Choice

Among the entire sample ( $n = 823$ ), 30% of parents reported that calories-only labeling would be very likely to influence their selection of fast food for their children (Fig 1). Labels with physical activity equivalents, regardless of whether shown in minutes or miles appeared

slightly more influential at the "very likely" end of the scale.

The potential influence of labels varied by health literacy status. A greater percentage of parents with adequate health literacy reported that labels, regardless of whether calories-only or calories plus physical activity equivalents, would at least be somewhat likely to influence their meal selection for their children (Table 3).

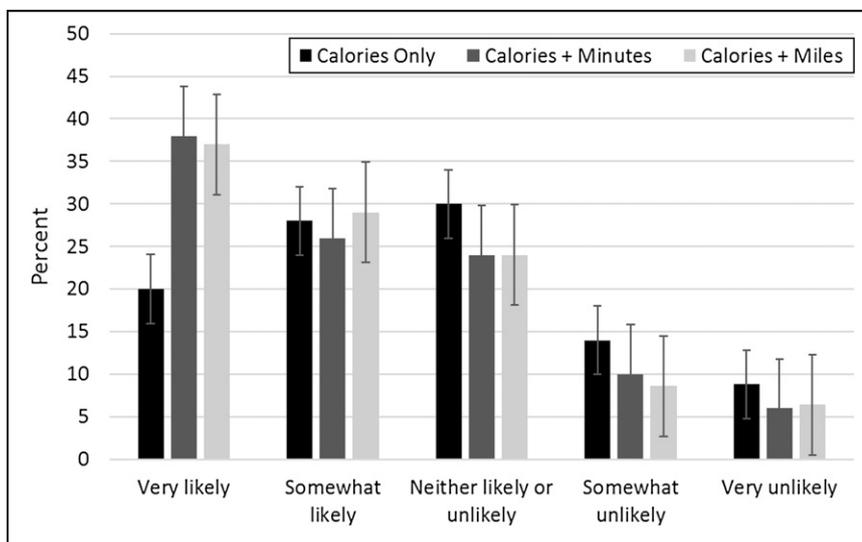
### Reported Potential Influence of PACE Labels on Encouraging Children to Exercise

Among the entire sample, 20% of parents reported that calories-only labeling would be very likely to prompt them to encourage their children to exercise (Fig 2). Labels with physical activity equivalents, regardless of whether shown in minutes or miles were significantly more influential at the very likely end of the scale, with calories plus minutes rated as such by 38% and calories plus miles rated as such by 37% ( $P < .0001$  for each compared with calories only).

### DISCUSSION

To our knowledge, this study is the first to examine the potential effect of PACE labeling on parental decisions for their children. Our main findings are that (1) parents may be ordering single meals for their children at fast food restaurants that total >1000 calories, (2) parents shown any type of label that displays calorie information may order a fast food meal for their child totaling fewer calories, (3) labels showing physical activity equivalents may prompt parents to encourage their children to exercise, and (4) labels showing physical activity equivalents may be more influential in promoting parents' encouragement of their children to exercise among parents with adequate health literacy.

We previously examined the potential influence of PACE labels on a sample



**FIGURE 2** Reported potential influence of PACE labels on parents to encourage children to exercise, overall.

of adults and found that those shown physical activity equivalents in miles (to walk) ordered on average about 100 fewer calories compared with those shown calories only from the same hypothetical menu used in this study.<sup>18</sup> In that study, we found little difference in calories ordered when shown physical activity equivalents in minutes (to walk) compared with calories alone. Similar to the present findings, any label displaying caloric information (ie, with or without a physical activity equivalent) seemed to be influential on hypothetical fast food decisions.

Our finding that parents order fewer calories for their children in a hypothetical scenario when shown calorie labeling is similar to the finding of a previous study in which 99 parents of 3- to 6-year-olds were randomized to a McDonald's menu with or without calorie labeling.<sup>15</sup> Parents shown the menu with calories ordered an average of 102 fewer calories for their children. In a study of actual calories purchased by parents for their 6- to 11-year-old children in a calorie-labeled county versus a non-calorie-labeled county, however, no difference between counties was seen.<sup>16</sup>

Children's physical activity is hindered by "screen time," and parents may not realize the amount of exercise children need to be healthy and to provide some "balance" to the amount of calories they eat. In our study, PACE labels were more effective than calorie-only labels in at least getting parents to think about encouraging their children to exercise more. Whether this potential effect of PACE labeling would translate to a real-world effect remains to be investigated, but a simple population-level intervention that potentially can get children to eat less and move more could make a tremendous impact.

To be an effective public health intervention, a labeling scheme has to be easily understood. We

hypothesized that calorie labeling may have differential effects based on people's health literacy and numeracy levels. Indeed, we noted that labeling seemed to exert its effect on respondents with low/marginal health literacy and not as much among parents with adequate health literacy. Interestingly, though, more parents with adequate health literacy felt that any of the labels would be helpful in influencing fast food meal choices. This difference might be because parents with higher health literacy are already more careful about what they order for their children and there is a reporting bias. The PACE labels seemed to have a differential effect on reported likelihood of motivating parents to encourage their children to exercise, appearing more influential among the parents with adequate health literacy.

Strengths of this study include its large national sample of participants and the randomization of parents to each of the 4 menu versions. The greatest limitation of our study is that we used a hypothetical scenario that cannot truly substitute for the actual experience of ordering food for a child at a fast food restaurant or for measuring ability to motivate parents to encourage their children to exercise. It is worth noting that any measurement bias would be expected to be nondifferential given the randomization to the menu types.

We did not display the cost of the fast food items, which could influence food-ordering behavior. However, pricing at fast food restaurants is low and therefore unlikely to be a barrier. We also did not include specific "children's" items, such as prepackaged combination meals, on the hypothetical menu. It is possible that parents would have ordered fewer total calories for their children if such items were included. Finally, our labels were not tailored to children. Rather, they were designed for adults. However, we were

interested in whether such labels could translate to an effect for children because, especially for young children, adults are responsible for ordering their food. Finally, we did not compare physical activity equivalent labeling by itself (ie, without listing calories as well) to calories alone and to no label, but this comparison would be worth future testing.

## CONCLUSIONS

PACE labels may influence parents' decisions on what fast food items to order for their children and, uniquely, encourage them to try to get their children to exercise. The potentially resulting combination of fewer calories consumed with greater physical activity could help begin to curb childhood obesity. Real-world research is needed to evaluate the effects of PACE labeling for adults and children.

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*Pediatrics* 2015;135:e376

DOI: 10.1542/peds.2014-2902 originally published online January 26, 2015;

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