



Short Communication

Low parental awareness about energy (calorie) recommendations for children's restaurant meals: findings from a national survey in the USA

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Abstract

Objective: To assess parental awareness of per-meal energy (calorie) recommendations for children's restaurant meals and to explore whether calorie awareness was associated with parental sociodemographic characteristics and frequency of eating restaurant food.

Design: Cross-sectional online survey administered in July 2014. Parents estimated calories (i.e. kilocalories; 1 kcal = 4.184 kJ) recommended for a child's lunch/dinner restaurant meal (range: 0–2000 kcal). Responses were categorized as 'underestimate' (<400 kcal), 'accurate' (400–600 kcal) and 'overestimate' (>600 kcal). Confidence in response was measured on a 4-point scale from 'very unsure' to 'very sure'. Logistic regressions estimated the odds of an 'accurate' response and confident response ('somewhat' or 'very sure') by parental sociodemographic characteristics and frequency of eating from restaurants. Sampling weights based on demographics were incorporated in all analyses.

Setting: USA.

Subjects: Parents (*n* 1207) of 5–12-year-old children.

Results: On average, parents estimated 631 (SE 19.4) kcal as the appropriate amount for a 5–12-year-old child's meal. Thirty-five per cent answered in the accurate range, while 33.3 and 31.8% underestimated and overestimated, respectively. Frequent dining at restaurants, lower income and urban geography were associated with lower odds of answering accurately. Parents' confidence in their estimates was low across the sample (26.0% confident) and only 10.1% were both accurate and confident.

Conclusions: Parent education about calorie recommendations for children could improve understanding and use of menu labelling information in restaurants. Targeted strategies are recommended to ensure that such efforts address, rather than exacerbate, health disparities.

Keywords

Parents
Menu labelling
Restaurants
Calories
Childhood nutrition

Childhood obesity has risen dramatically over past decades⁽¹⁾, alongside a significant increase in food consumption away from home⁽²⁾. Children's consumption from quick-service and full-service restaurants is associated with higher energy intake, compared with days when quick-service and full-service restaurant food is not consumed⁽³⁾. Sociodemographic disparities in

restaurant-food consumption exist among children from low-income households compared with children from middle- and high-income households⁽⁴⁾ and among non-Hispanic Black children compared with non-Hispanic White children⁽⁵⁾. Therefore, restaurants hold promise for improving children's diets and addressing health disparities.

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Energy (calorie) information at point of purchase is one strategy for lowering population-level energy intake in restaurants. Recent years have brought a proliferation of interest in menu labelling in restaurants and research studies examining the effects of this practice on patrons' orders have shown mixed results⁽⁶⁾, with evidence that awareness and use of calorie information may vary by sex, education and income^(7,8). Variability in competing demands, such as cost, habits and desire to please one's child⁽⁹⁾, plus lack of knowledge about calories generally and calorie recommendations specifically, may provide some explanation for these mixed results.

The aim of the present study was to assess parental awareness of per-meal calorie recommendations for children when eating in restaurants. These findings will inform: (i) whether intervention is needed to enhance parents' knowledge about and use of calorie information in restaurants; and (ii) which sociodemographic subgroups have the greatest need for such interventions.

Materials and methods

Sample and data collection

Nielsen Holdings N.V. (New York, NY, USA) was commissioned by researchers at ChildObesity180 at Tufts University to administer a cross-sectional online survey of habits, preferences and knowledge related to eating in restaurants. The survey was fielded in the USA in July 2014 and eligible participants were parents or legal guardians (n 1207; herein referred to as 'parents') of children aged 5–12 years. Almost all (95.9%) of the parents were primary caregivers (Table 1). Participants were obtained from the Harris Poll Online opt-in panel of millions of respondents; findings from the Harris Poll have been published previously in the nutrition literature^(10–13). The Harris Poll Online panel was recruited through hundreds of sources using diverse recruitment methods in order to minimize selection bias, including but not limited to: targeted emails sent by online partners to their audiences; graphical and text banner placement on partners' websites (including social media, news, search and community portals); trade show presentations; targeted postal mail invitations; and telephone recruitment of targeted populations. Panel invitations were emailed to a stratified random sample identified as US residents aged ≥ 18 years with a 5–12-year-old child in the household. Respondents were invited to participate in the survey through password-protected email invitations. Incentives for survey completion were offered in the form of Harris Poll points, which can be redeemed for cash and other rewards through the Harris Poll Online platform.

Participating parents completed questions about socio-demographic characteristics (parental age, annual household income, urbanicity, education level, race/ethnicity), frequency of dining at restaurants and getting takeout with

their child ('never', 'a few times a year', 'once a month', 'a few times a month', '1–3 times a week', '4 or more times a week') and their awareness of calorie (i.e. kilocalories; 1 kcal = 4.184 kJ) recommendations. Questions about calorie awareness included an open-ended question used to assess accuracy: 'To the best of your knowledge, how many calories should a typical child aged 5–12 years eat when having a lunch or dinner meal from a restaurant? A meal includes the main dish, side dish, and drink', with responses confined to the range of 0–2000 kcal. Then participants were asked a question used to assess confidence: 'How sure are you of your answer?' and selected 'very unsure', 'somewhat unsure', 'somewhat sure' or 'very sure'. Confidence was included as a variable in order to capture the perceived certainty of responses (e.g. whether the respondent perceived their answer as a guess or a fact).

Data analysis

Parents' frequency of visiting restaurants with their child (dining in and takeout) was dichotomized into infrequent (< 1 time/week) and frequent (≥ 1 time/week) categories to facilitate application of findings to intervention efforts targeting frequent restaurant patrons.

Additionally, eligibility for free- or reduced-price school meals ($\leq 185\%$ of the federal poverty level) was calculated as a binary indicator of socio-economic status using reported annual household income, total household size and the US Department of Agriculture Child Nutrition Program's Income Eligibility Guidelines for 1 July 2013 through 30 June 2014⁽¹⁴⁾. Other sociodemographic variables were categorized as shown in Table 1.

Responses to the open-ended calorie awareness question were categorized as: 'underestimate' (< 400 kcal), 'accurate' (400–600 kcal) and 'overestimate' (> 600 kcal). Based on the 2015 Dietary Guidelines for Americans⁽¹⁵⁾, the recommended daily energy intake for 5–12-year-olds ranges from 1200 kcal (5-year-old boys and girls) to 1800 kcal (12-year-old boys); these recommendations were divided by 3 to approximate lunch/dinner calorie needs (referred to herein as 'per-meal calorie needs'), yielding the 'accurate' range of 400–600 kcal. This range was based on the energy needs of sedentary children because the majority of US children (58%) do not meet daily physical activity recommendations⁽¹⁶⁾. While this recommendation does not differ from per-meal recommendations in other settings, 'in restaurants' was specified in this question given the research team's interests and to account for the potential that parents conceptualized recommendations in this setting differently from other settings.

Frequencies were calculated for each sociodemographic variable described above, overall and among parents who were: (i) accurate when asked about calorie awareness (responding between 400 and 600 kcal); (ii) confident ('somewhat sure' or 'very sure') about their response;

**Table 1** Parent characteristics overall and among those who responded (i) accurately when asked about energy (calorie) awareness†, (ii) confidently in their answer and (iii) both accurately and confidently (*n* 1207): US parents of children aged 5–12 years participating in an online survey‡, July 2014

	% of total sample	% among parents who responded...		
		Accurately	Confidently§	Accurately† & confidently
Total sample (<i>n</i> 1207)	100.0	34.9	26.0	10.1
Sociodemographic characteristics				
Age (years)				
<30	10.1	9.4	8.9	5.9
30–39	37.0	39.6	38.3	52.1
40–49	37.2	38.8	37.2	32.5
50–73	15.6	12.2	15.6	9.5
Sex				
Male	42.0	44.4	49.4	48.8
Female	58.0	55.6	50.6	51.2
Race/ethnicity				
Non-Hispanic White	63.2	69.9	53.2	53.3
Non-Hispanic Black	11.6	7.5	14.9	12.3
Non-Hispanic Asian	4.9	3.2	6.2	2.7
Hispanic	18.9	17.5	22.6	28.1
Other or unknown	1.4	2.0	3.2	3.7
Annual household income (\$US)				
<25 000	15.2	9.7	16.1	11.3
25 000–49 999	20.3	15.0	16.2	13.1
50 000–74 999	17.9	18.3	16.9	15.0
75 000–99 999	14.4	19.4	17.8	23.0
≥100 000	29.0	35.0	31.9	35.7
Prefer not to answer	3.2	2.6	1.2	1.9
Reduced-price school meal eligibility¶				
No (annual household income >185 % of FPL)	68.5	76.4	70.1	75.7
Yes (annual household income ≤185 % of FPL)	31.5	23.6	29.9	24.3
Highest education level				
HS or less	32.6	32.5	27.7	30.1
Associate degree, post-HS or some college	32.7	26.1	28.2	18.1
College or higher	34.8	41.4	44.1	51.8
Urbanicity				
Urban	21.9	13.8	19.6	15.5
Suburban	53.5	58.4	56.1	53.0
Rural	24.6	27.8	24.2	31.5
Restaurant behaviours				
Restaurant frequency: dining in				
Infrequent (<1 time/week)	78.0	83.4	64.7	72.7
Frequent (≥1 time/week)	22.0	16.6	35.3	27.3
Restaurant frequency: takeout				
Infrequent (<1 time/week)	75.0	76.9	64.8	65.0
Frequent (≥1 time/week)	25.0	23.1	35.2	35.0

FPL, federal poverty level; HS, high school.

Figures adjusted for sampling weight.

†Calorie (i.e. kilocalories; 1 kcal = 4.184 kJ) awareness indicator based on the energy recommendations from the 2015 Dietary Guidelines for Americans for sedentary children aged 5–12 years. The range of total daily energy, 1200–1800 kcal, was divided by 3 to get the 'accurate' range of 400–600 kcal per meal.

‡Participants were parents or legal guardians of children aged 5–12 years.

§Confident defined as 'somewhat sure' or 'very sure'.

||While age categories are displayed here for stratification purposes, age as a continuous variable was used for logistic regression analyses.

¶Reduced-price school meal eligibility was calculated based on annual household income and total household size according to the US Department of Agriculture Child Nutrition Program's Income Eligibility Guidelines for 1 July 2013 through 30 June 2014.

and (iii) both accurate and confident using the prior definitions. Unadjusted and adjusted logistic regression analyses were conducted, testing whether the odds of being (i) accurate and (ii) confident differed by parental sociodemographic characteristics and restaurant dining frequency (as defined above). Unadjusted logistic regression analyses modelled independent variables listed in Table 1 separately, while adjusted models included all covariates. Sensitivity analyses used the full categorical variables for restaurant dining frequency, with the modal 'once a month'

response option as the reference category, and yielded similar results to the dichotomized variables (data not shown). Due to small cell sizes, logistic regressions predicting the odds of being accurate and confident were not performed. There were no missing data on any of the aforementioned variables. All statistical significance tests were performed at the $\alpha = 0.05$ level.

Sampling weights based on parental age, sex, race, ethnicity, education, region and household income were generated by Nielsen Holdings N.V. using a RIM (random

Table 2 Unadjusted and adjusted logistic regression models predicting parental awareness of the energy (calorie) recommendation for a child's lunch or dinner restaurant meal (400–600 kcal) by parental characteristics (*n* 1207): US parents of children aged 5–12 years participating in an online survey†, July 2014

	Unadjusted		Adjusted	
	OR	95% CI	OR	95% CI
Age (years)	0.99	0.97, 1.01	0.98*	0.96, 1.00
Sex				
Female (reference)	1.00	–	1.00	–
Male	1.17	0.82, 1.67	1.19	0.80, 1.76
Race/ethnicity				
Non-Hispanic White (reference)	1.00	–	1.00	–
Non-Hispanic Black	0.46*	0.23, 0.92	0.57	0.27, 1.19
Non-Hispanic Asian	0.46*	0.23, 0.95	0.50	0.23, 1.05
Hispanic	0.76	0.44, 1.30	0.82	0.47, 1.42
Other or unknown	1.53	0.52, 4.56	0.85	0.23, 3.16
Reduced-price school meal eligibility				
No (annual household income >185% of FPL) (reference)	1.00	–	1.00	–
Yes (annual household income ≤185% of FPL)	0.56**	0.37, 0.83	0.57*	0.36, 0.90
Highest education level				
College or higher (reference)	1.00	–	1.00	–
HS or less	0.75	0.49, 1.15	0.84	0.52, 1.36
Associate degree, post-HS training or some college	0.54**	0.38, 0.79	0.62*	0.42, 0.93
Urbanicity				
Suburban (reference)	1.00	–	1.00	–
Urban	0.46***	0.29, 0.73	0.50**	0.31, 0.83
Rural	1.06	0.70, 1.60	1.14	0.74, 1.75
Restaurant frequency: dining in				
Infrequent (<1 time/week) (reference)	1.00	–	1.00	–
Frequent (≥1 time/week)	0.60*	0.40, 0.90	0.52**	0.34, 0.80
Restaurant frequency: takeout				
Infrequent (<1 time/week) (reference)	1.00	–	1.00	–
Frequent (≥1 time/week)	0.85	0.58, 1.24	0.99	0.67, 1.47

FPL, federal poverty level; HS, high school.

Figures adjusted for sampling weight. Reference categories represent most common response. All covariates listed were modelled separately, shown as unadjusted OR, and together in the fully adjusted model, shown as adjusted OR.

P*<0.05, *P*<0.01, ****P*<0.001.

†Participants were parents or legal guardians of children aged 5–12 years.

iterative method)⁽¹⁷⁾ weighting process, with each respondent given a single weight value. Individual weight values were capped based on standard parameters by sample size to limit any extreme weight or outliers. Sampling weights were incorporated into all analyses using complex survey methods, so that overall results would be representative of parents of 5–12-year-old children in the USA. Survey data were analysed using the statistical software packages SAS version 9.3 and 9.4.

Results

The average age of respondents was 40.9 (SE 0.39) years. Twenty-two per cent and 25% of parents reported frequent (≥1 time/week) dining at restaurants or getting takeout with their child, respectively. Other sample characteristics are described in Table 1.

Accuracy

Parents reported that an average of 631 (SE 19) kcal (median 500 kcal) were appropriate for a child's restaurant meal. Responses ranged from 0 to 2000 kcal. Approximately one-third of parents answered in the accurate

range of 400–600 kcal (34.9%), while 33.3 and 31.8% of parents underestimated (<400 kcal) and overestimated (>600 kcal), respectively.

As shown in Table 2, parents with lower socio-economic status were less likely than parents with higher socio-economic status to respond accurately (adjusted OR (AOR)=0.57; 95% CI 0.36, 0.90). Compared with suburban parents, urban parents had 50% lower odds of being accurate (AOR=0.50; 95% CI 0.31, 0.83). Compared with parents who reported infrequent dining at restaurants with their child (<1 time/week), parents who reported frequent dining at restaurants (≥1 time/week) had 48% lower odds of being accurate (AOR=0.52; 95% CI 0.34, 0.80). Increasing parental age (continuous variable) was a significant predictor of lower accuracy of calorie awareness (AOR=0.98; 95% CI 0.96, 1.00).

Confidence

Overall, 26.0% of parents reported they were confident in their answer. Compared with parents who reported infrequent dining at restaurants, those who reported frequent dining had significantly higher odds of being confident in their response (AOR=2.19; 95% CI 1.35, 3.55; Table 3).

**Table 3** Unadjusted and adjusted logistic regression models predicting parental confidence ('somewhat sure' or 'very sure') in their response to the energy (calorie) awareness question by parental characteristics (*n* 1207): US parents of children aged 5–12 years participating in an online survey†, July 2014

	Unadjusted		Adjusted	
	OR	95% CI	OR	95% CI
Age (years)	1.00	0.98, 1.02	1.00	0.98, 1.03
Sex				
Female (reference)	1.00	–	1.00	–
Male	1.50*	1.03, 2.20	1.42	0.95, 2.12
Race/ethnicity				
Non-Hispanic White (reference)	1.00	–	1.00	–
Non-Hispanic Black	1.78	0.97, 3.29	1.88	0.99, 3.59
Non-Hispanic Asian	1.73	0.87, 3.44	1.14	0.55, 2.38
Hispanic	1.61	0.93, 2.78	1.72	0.99, 3.00
Other or unknown	5.10**	1.73, 15.03	8.47***	2.63, 27.32
Reduced-price school meal eligibility				
No (annual household income >185% of FPL) (reference)	1.00	–	1.00	–
Yes (annual household income ≤185% of FPL)	0.90	0.59, 1.37	1.18	0.74, 1.89
Highest education level				
College or higher (reference)	1.00	–	1.00	–
HS or less	0.58*	0.36, 0.94	0.68	0.39, 1.17
Associate degree, post-HS training or some college	0.59**	0.39, 0.88	0.68	0.44, 1.05
Urbanicity				
Suburban (reference)	1.00	–	1.00	–
Urban	0.81	0.50, 1.33	0.74	0.44, 1.25
Rural	0.92	0.58, 1.45	1.15	0.70, 1.89
Restaurant frequency: dining in				
Infrequent (<1 time/week) (reference)	1.00	–	1.00	–
Frequent (≥1 time/week)	2.60***	1.72, 3.92	2.19**	1.35, 3.55
Restaurant frequency: takeout				
Infrequent (<1 time/week) (reference)	1.00	–	1.00	–
Frequent (≥1 time/week)	1.99***	1.34, 2.96	1.38	0.88, 2.16

FPL, federal poverty level; HS, high school.

Figures adjusted for sampling weight. Reference categories represent most common response. All covariates listed were modelled separately, shown as unadjusted OR, and together in the fully adjusted model, shown as adjusted OR.

P* < 0.05, *P* < 0.01, ****P* < 0.001.

†Participants were parents or legal guardians of children aged 5–12 years.

Accuracy and confidence

One-tenth (10.1%) of respondents were both accurate and confident.

Discussion

The current cross-sectional study of parents of 5–12-year-old children in the USA demonstrates a lack of awareness and high uncertainty about calorie recommendations for a child's restaurant meal. Only one-third of parents answered within the accurate range and only 10% were both accurate and confident in their answer. Lower accuracy was observed among older parents, parents with lower incomes, urban parents and parents who eat at a restaurant with their child ≥1 time/week. Despite lower accuracy, reported confidence was higher among parents who reported more frequently visiting restaurants with their child (≥1 time/week).

The study's findings are consistent with previous reports that approximately one-quarter⁽¹⁸⁾ to one-third⁽¹⁹⁾ of adults accurately estimated daily energy needs for adults. Higher rates of accuracy were reported in two other studies of adults^(20,21), although these studies included fixed response categories and a wide 'accurate' range.

In one study⁽²⁰⁾ using a nationally representative sample that oversampled Blacks and Hispanics, approximately half of adult male and female respondents reported 'knowing enough about daily energy requirements to make lower-calorie choices' for themselves, compared with the 26% of respondents who reported confidence in their answer about children's calorie needs in the present study.

The present study's findings add to the existing literature highlighting the need to enhance menu labelling efforts to increase effectiveness^(22,23). Lack of knowledge about calorie recommendations may partially explain the limited effectiveness of menu labelling to date^(24–26). Low health literacy⁽²⁷⁾ also poses a challenge to effective use of calorie information; efforts to reach those with low health literacy are particularly important for health equity. Within the context of a national childhood obesity crisis, calorie literacy could positively impact meals for children resulting in more appropriately-sized selections.

Limitations of the study include that participation required access to an Internet-enabled device and an email address, and only existing Harris Poll Online members were recruited. The majority of survey participants were White and many were higher income.

However, several recruitment strategies were used to minimize selection bias and the recruited sample was weighted to be representative of the respondent group, parents of 5–12-year-old children in the USA. Moreover, analyses exploring demographic factors as predictors of the outcomes of interest were also conducted in order to uncover whether these variables differ among socio-demographic groups. Additionally, parents may have considered the specific age of their child, rather than considering the 'typical' 5–12-year-old child, which may have influenced responses. Because information about children's physical activity levels was not available, we conducted our analyses using energy estimates for sedentary children given that the majority of children fall into this category⁽¹⁶⁾. While these decisions impede precision at the individual level for some children (e.g. underestimating energy needs for older, highly active children), they provide a reasonable approximation at the aggregate level for the broader population of children within this age range. For the purposes of the current study we divided daily energy requirements among three meals, which does not account for snacking; however, this calorie allotment is consistent with per-meal expert recommendations for kids' meals in restaurants^(28,29). The study's strengths include a large, nationally representative sample. Additionally, the study fills a gap in the literature by quantifying, for the first time, parental awareness of per-meal calorie recommendations for children when eating in restaurants, overall and by sociodemographic characteristics.

Future research is warranted to better understand which messages about healthier eating in restaurants resonate with consumers and whether those messages, in combination with menu labelling, lead to healthier, lower-calorie orders at restaurants. Strategies that show promise and that should be further studied include focused messages about easy swaps to lower the calorie content of meals⁽³⁰⁾ and contextualization of calorie information rather than relying solely on absolute numbers of calories^(31,32). In addition, researchers should continue to test approaches that shift the availability^(33,34) and marketing^(35–37) of menu items, making the healthier choice the easier choice^(35,38). As parents influence the eating behaviours of their children in restaurants⁽³⁹⁾ as well as other in- and out-of-home settings, parents should be engaged in research and their feeding goals⁽⁴⁰⁾, competing benefits (e.g. taste, convenience, price, child satisfaction)⁽⁴¹⁾ and the realities of hunger and poverty⁽²²⁾ should be taken into consideration. To ensure education and menu labelling address, rather than exacerbate, health disparities, these efforts should engage groups disproportionately impacted by obesity.

The present study revealed widespread lack of awareness about per-meal calorie recommendations for children in restaurants among US parents. Additional strategies are warranted to facilitate maximum impact of menu labelling and the selection of healthier children's meals in restaurants.

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