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RESEARCH ARTICLE

Messages Promoting Healthy Kids' Meals: An Online RCT

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Introduction: Calorie labeling is now required on all large U.S. chain restaurant menus, but its influence on consumer behavior is mixed. This study examines whether different parent-targeted messages encourage parents to order lower-calorie meals for their children in a hypothetical online setting.

Methods: An online RCT was conducted with sociodemographically diverse primary caregivers of children aged 6−12 years (data collected and analyzed in 2017−2019). Participants (N=2,373) were randomized to see 1 of 4 messages: (1) nonfood control, (2) kids' meals are the right size for children, (3) doctors recommend a 600 kcal per meal limit for kids, or (4) 600 kcal per meal is a generally recommended limit for kids. Participants ordered hypothetical meals for their children and themselves and rated meal and message perceptions.

Results: There were no significant differences between conditions in calories ordered for children at either restaurant, although all 3 food message conditions ordered fewer calories for their children than the control (full service: 27−68 fewer kcal, fast food: 18−64 fewer kcal). The general 600 kcal/meal limit message consistently performed best across outcomes, encouraging parents to order the fewest calories for their children at both restaurants (5%−7% fewer) and significantly increasing their understanding of calorie recommendations for kids' meals. It also significantly reduced fast-food calories parents ordered for themselves compared with the control (−106 kcal, p=0.042).

Conclusions: Although no statistically significant differences were detected, messages with specific calorie recommendations for kids led parents to order lower-calorie restaurant meals for their children, suggesting that additional real-world studies with larger sample sizes are warranted.

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INTRODUCTION

Nearly 1 in 3 U.S. children has overweight or obesity.[1] A key driver of weight gain is the consumption of fast food and full-service restaurant food, which is associated with poorer diet quality and increased caloric intake.[2−4] More than one third of children and adolescents in the U.S. eat fast food on any given day,[5] and Americans aged 2−19 years consume nearly one fifth of their daily calories from fast food and other restaurants.[6] To aid informed decision making when eating out, a federal law requiring chain restaurants to post calories on their menus was passed as part of the Affordable Care Act of 2010[7] and went into effect in May 2018.[8]

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Research on the effect of restaurant calorie labeling on consumers is mixed. Some studies have found that calorie labels contributed to fewer calories ordered or consumed, whereas others have found no effect.[9−13] Certain subgroups may be less likely to use calorie labels, particularly those in low-resource communities where obesity prevalence is highest,[14,15] so it is important to understand ways to increase the effectiveness of this federal policy. To promote the understanding and use of calorie labels, the U.S. Food and Drug Administration released a menu labeling messaging campaign,[16] but there is limited experimental evidence on which messages might be most effective. The aim of this study is to compare the extent to which different parent-targeted messages affect the calorie content of meals parents order for their children (primary outcome) in an experimental online setting. Secondary outcomes include calories parents order for themselves and meal and message perceptions.

METHODS

A preregistered[17] online RCT was conducted to understand the extent to which different messages affected calories parents hypothetically ordered for their children from restaurant menus compared with a control. A pretest was conducted before the main experiment to determine which messages to test. Data were collected and analyzed in 2017−2019. The University of Pennsylvania IRB approved this study.

Study Sample

Primary caregivers of at least 1 child aged 6−12 years were recruited through Survey Sampling International, an online panel of U.S. consumers aged ≥18 years. To protect against selection bias, participants received an invitation to take a survey without details on the survey's purpose. Participants were sampled to reflect the U.S. educational distribution on the basis of 2010 Census data, with oversampling for Hispanics and African Americans because they have the highest obesity prevalence.[18] On the basis of the means and SDs in the pretest, 600 participants were recruited per condition to provide 80% power with an α of 0.05 to detect differences of ≥100 kcal between conditions. Participants were excluded for (1) completing <50% of the survey, (2) completing the survey in less than one third of the median completion time, or (3) using a duplicate Internet protocol address (all prespecified). The final sample had 2,373 participants (Table 1, Figure 1).

Measures

To develop the test messages, focus groups and shop-along interviews were first conducted to understand parent perceptions of calorie labels on menus and messaging to promote label use.[19] From that qualitative data, 6 messages were created to encourage parents to order healthier foods for their children in 3 broad categories: messages promoting the use of the kids' menu, calorie-based messages, and messages encouraging parents to order milk or water for their child. A message recommending not more than 600 kcal per meal was developed on the basis of benchmarks for kids' menu portion sizes set by nutrition experts.[20] These messages were pretested by comparing them with others in an online randomized experiment with 4,093 parents. The Appendix (available online) provides the pretest preregistration, methods, and results (Appendix Tables 1-4, Appendix Figures 1-3, available online).

The main experiment was a partial replication and extension of the pretest, comparing the pretest's 2 best-performing messages (Adult-Sized Clothes, 600 Calories Doctor; Appendix Figure 2, available online) and a modification of one of them against a control to determine whether the effects replicated using a similar design and to better understand the potential drivers of effects. Through the Qualtrics survey platform using simple randomization, parents were randomized to see 1 of the following 4 messages (Figure 2): (1) Nonfood Control, (2) Adult-Sized Clothes (Pretest Message 2), (3) 600 Calories Doctor (Pretest Message 3), or (4) 600 Calories General (tested to understand if Message 3's pretest success was due to its calorie recommendation for children or its authoritative medical language and imagery). All participants also saw a neutral message (Library) in a random order before or after the food-related message to help conceal the study's purpose.

After providing informed consent, participants saw their randomized message and the library message in a random order for 10 seconds each. They then completed an online survey (Appendix, available online). At the beginning of the survey, they were asked whether they had >1 child aged between 6 and 12 years, and if so, they were told to answer the questions on the basis of their youngest child within that age range.

Participants viewed menus from a popular fast food (McDonald's) and full-service restaurant (Chili's) in a random order. Menus were from restaurant websites, and they displayed a subset of items, all of which were labeled with their calorie content. Participants were asked to imagine that they were at each restaurant at that moment with their child for dinner and to order a meal for themselves and for their child by selecting up to 5 menu items at a time. In total, participants saw each restaurant menu twice—once to order for themselves and once for their child (order randomized)—before moving to the other menu. The primary outcome was the average number of calories parents ordered for their child from each restaurant. Secondary outcomes included the percentage of participants ordering an item from the kids' menu for their child and the average number of calories parents ordered for themselves from each restaurant.

Secondary outcomes also included restaurant meal perceptions and message perceptions. Participants were shown 4 meal images (1 kids' meal and 1 adult meal from each restaurant) that included meal names, descriptions, and prices (Appendix, available online). These meals did not appear on the previous menus and were displayed 1 at a time in a random order. Participants indicated how often they purchased that type of meal for their child and rated their perceptions of the meals' healthfulness on a 7-point Likert-type scale. These questions were based on previously published marketing studies.[21−23] Participants also estimated the meals' calorie content both on an ordinal scale from 1 (much less than recommended for dinner for a child) to 5 (much more than recommended for dinner for a child) and on a continuous scale in calories (open text response restricted to 0−10,000). Participants were then shown the food-related message they had seen at the beginning of the survey, and they selected how it made them predominantly feel—cheerful, pleased, stimulated, soothed, insulted, irritated, or repulsed. These questions were adapted from previously published marketing studies.[24−27]

Table 1. Participant Characteristics

Characteristics	Full sample (N=2,373), %	Sunscreen control (*n*=603), %	Adult-Sized Clothes (*n*=595), %	600 Calories Doctor (*n*=581), %	600 Calories General (*n*=594), %	Holm–Bonferroni corrected *p*-value
Female	75.1	76.7	72.9	76.0	74.8	0.448
Overweight or obese	65.1	65.7	64.4	65.4	65.0	0.923
Age, years, mean (SD)	35.8 (8.9)	36.5 (9.4)	35.1 (8.7)	35.5 (8.4)	35.8 (9.0)	0.053
Age of youngest child 6–12 years, mean (SD)	8.4 (2.0)	8.5 (2.0)	8.3 (2.0)	8.5 (2.0)	8.4 (2.0)	0.578
Number of children, mean (SD)	2.3 (1.4)	2.4 (1.4)	2.3 (1.4)	2.3 (1.2)	2.4 (1.5)	0.655
Hispanic	31.5	31.7	32.1	32.7	29.5	0.650
Race						0.930
White	48.6	49.8	46.7	48.9	48.8	
Black	32.0	32.0	33.6	30.6	31.8	
Asian/Hawaiian	8.5	7.8	8.4	8.3	9.4	
Native American	1.7	1.7	1.7	1.9	1.5	
Other	9.3	8.8	9.6	10.3	8.4	
Education						0.747
High school degree or less	39.7	41.8	39.7	38.9	38.6	
Associate degree/some college	27.1	26.9	27.9	27.9	25.8	
College or graduate degree	33.2	31.3	32.4	33.2	35.7	
Marital status						0.314
Single	21.1	19.1	23.4	21.4	20.7	
Married	57.7	56.8	55.8	57.4	60.9	
Not married, living with significant other	12.3	13.2	12.1	12.5	11.6	
Separated	2.2	2.0	2.7	2.5	1.7	
Divorced or widowed	6.6	8.9	6.0	6.3	5.0	
Income, $						0.513
<25,000	20.7	22.1	20.5	20.9	19.1	
25,001–50,000	29.1	27.7	29.5	30.7	28.7	
50,001–75,000	21.4	21.8	20.1	19.8	23.8	
75,001–100,000	13.5	12.8	14.5	15.1	11.5	
100,001–125,000	7.1	7.1	6.5	6.7	8.3	
125,001–150,000	3.6	3.4	5.0	2.3	3.8	
>150,000	4.7	5.2	3.9	4.6	4.9	
Frequency of eating out at full-service sit-down chain restaurants						0.489
Never	9.9	9.4	9.4	9.6	11.2	
1 time per month or less	45.7	46.2	49.2	44.9	42.4	

(*continued on next page*)

Table 1. Participant Characteristics (*continued*)

Characteristics	Full sample (N=2,373), %	Sunscreen control (*n*=603), %	Adult-Sized Clothes (*n*=595), %	600 Calories Doctor (*n*=581), %	600 Calories General (*n*=594), %	Holm–Bonferroni corrected *p*-value
2–3 times per month	27.1	26.5	25.9	28.5	27.5	
1–2 times per week	12.1	12.2	11.2	12.4	12.5	
3–6 times per week	3.5	3.0	2.9	3.3	4.6	
Every day	1.0	2.0	0.9	0.5	0.7	
More than once a day	0.8	0.7	0.7	0.9	1.0	
Frequency of eating out at fast-food restaurants						0.763
Never	2.5	2.4	2.7	2.1	2.8	
1 time per month or less	20.9	19.3	24.0	20.8	19.8	
2–3 times per month	35.8	35.9	33.7	35.8	37.8	
1–2 times per week	29.0	28.8	29.3	31.1	26.8	
3–6 times per week	8.6	10.2	7.5	7.2	9.5	
Every day	2.3	2.7	2.0	2.1	2.2	
More than once a day	1.0	0.8	0.9	1.1	1.2	
Frequency of ordering from the kids' menu at full-service sit-down chain restaurants for their child						0.256
Never	3.5	2.8	3.9	3.7	3.5	
Rarely	10.6	9.3	9.8	11.6	11.8	
Sometimes	27.6	31.5	24.2	29.4	25.2	
Often	25.1	24.9	25.1	23.4	26.8	
Always	33.3	31.5	37.0	31.9	32.6	
Frequency of ordering from the kids' menu at fast-food restaurants for their child						0.532
Never	3.6	4.0	3.3	3.4	3.7	
Rarely	11.6	12.1	9.8	13.9	10.8	
Sometimes	26.6	26.2	24.8	26.7	28.6	
Often	27.5	27.2	29.0	28.2	25.5	
Always	30.7	30.6	33.0	27.5	31.4	
Relationship with weight						0.034
Trying to lose weight	**57.3**[a]	58.2	**61.3**	**53.9**	55.9	
Trying to gain weight	**8.9**[b]	8.3	**6.0**	**10.7**	**10.6**	
Not trying to lose or gain weight	33.8	33.6	32.8	35.4	33.5	

Note: Boldface indicates statistically significant differences across study conditions ($p<0.05$ with Holm–Bonferroni correction).
[a]Statistically significant difference: 600 Calories Doctor versus Adult-Sized Clothes.
[b]Statistically significant difference: 600 Calories General and 600 Calories Doctor versus Adult-Sized Clothes.

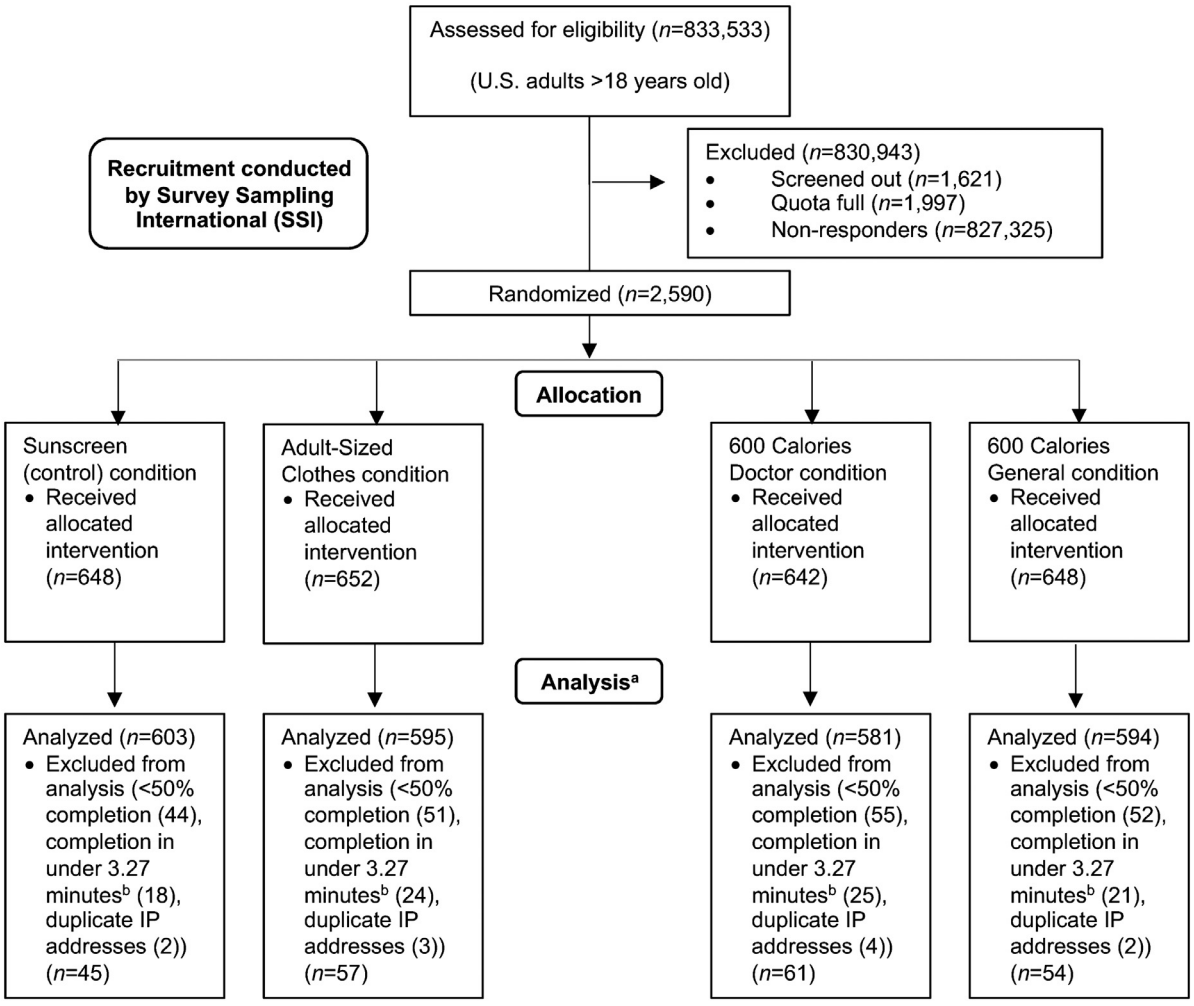

Figure 1. CONSORT diagram.

[a]Some participants met multiple exclusion criteria, so the final *n* excluded does not always equal the sum of each separate exclusion criterion *n*.
[b]One third of the median completion time, 9.8 minutes.

IP, Internet protocol; SSI, Survey Sampling International.

At the end of the survey, participants reported demographic information and how often they ate at full-service and fast-food restaurants and ordered from the kids' menu for their children. Other questions can be found in the Appendix (available online), and additional demographics are displayed in Table 1.

Statistical Analysis

This experiment was a preregistered replication and extension of the pretest.[17] The differences in background characteristics across conditions (shown in Table 1) were tested for using ANOVAs for continuous variables and chi-square tests for categorical variables. Linear and logistic regression were used to respectively compare continuous and categorical outcomes across conditions (shown in Table 2). Analyses for meal perception outcomes controlled for the self-reported frequency of purchasing each meal (prespecified) because past behavior tends to predict future behavior. No other covariates were included in the regression models because randomization of conditions should eliminate potential confounding in large samples. Quantile regression was used to compare the secondary outcome of participants' calorie estimates between conditions because the data contained extreme outliers and were highly skewed. A stratified exploratory analysis was also conducted to examine the effect of message condition on calories ordered for children by frequency of visiting fast-food/full-service restaurants (1–2 times per week or more vs 2–3 times per month or less) because more frequent visitors may already know what they want and be less receptive to calorie labeling. All nonexploratory analyses used the Holm–Bonferroni procedure to correct for multiple comparisons,[28] and all reported (nonexploratory) *p*-values are corrected.

RESULTS

Primary caregivers of children aged 6–12 years (*n*=2,590) were recruited and randomized to 1 of 4

Figure 2. Message conditions.

message conditions (Control, Adult-Sized Clothes, 600 Calories Doctor, and 600 Calories General; Figure 2). A total of 217 participants were excluded before analysis (Figure 1). The final analytic sample included 2,373 participants (Table 1) and was balanced across conditions, except for the relationship with weight variable assessed at the end of the survey. This variable was significantly different between conditions (p=0.034), but it was not controlled for in analyses because the messages may have differentially influenced responses to that item. The sample's educational distribution was comparable with national averages, whereas oversampling for Black and Hispanic participants resulted in roughly twice as many Black and Hispanic participants as national averages.[29] The majority of participants reported that they often or always ordered for their children from the kids' menu at full-service and fast-food restaurants.

For the primary outcome of restaurant meal choice, there were no significant differences between conditions in calories ordered for children at either restaurant, but all 3 experimental conditions ordered fewer calories for their children than the control (full service: 27−68 fewer kcal, fast food: 18−64 fewer kcal). Although not statistically significant, parents who saw the 600 Calories General message ordered the fewest calories for their children at both the full-service (1,362 kcal, 95 CI%=1,283, 1,440 kcal) and fast-food (898 kcal, 95% CI=846, 950 kcal) restaurants (Table 2, Appendix Figure 4, available online). The 600 Calories General parents also ordered significantly fewer fast-food calories for themselves than the control (−106 kcal, p=0.042; secondary outcome). A significantly higher percentage of Adult-Sized Clothes participants ordered entrees from the fast-food kids' menus for their children than 600 Calories Doctor (p<0.001) and 600 Calories General (p=0.022) participants. Participants across all conditions ordered an average of 3 items for their children from both restaurants.

For secondary outcomes of restaurant meal perceptions, participants who saw either of the 600 Calories messages showed the best understanding of how many calories were recommended for children in a single meal. They rated the 2 meals with <600 kcal as having

Table 2. Meal Choice, Meal Perception, and Message Perception Outcomes

Variable	Sunscreen control (*n*=603)	Adult-Sized Clothes (*n*=595)	600 Calories Doctor (*n*=581)	600 Calories General (*n*=594)
Meal choices				
Full-service calories ordered for child, mean (SD)	1,429.51 (979.21)	1,402.51 (1,019.96)	1,382.73 (1,026.10)	1,361.63 (979.23)
Fast-food calories ordered for child, mean (SD)	962.16 (638.21)	943.71 (652.78)	936.82 (678.77)	897.99 (645.69)
Full-service calories ordered for respondent, mean (SD)	1,914.07 (1,110.11)	1,919.24 (1,188.40)	1,819.32 (1,125.21)	1,846.31 (1,120.72)
Fast-food calories ordered for respondent, mean (SD)	**1,287.16 (669.83)**[a]	1,254.58 (723.30)	1,229.81 (683.20)	**1,181.01 (665.74)**[b]
Ordered full-service kids' menu entrée for child, %	76.95	77.98	75.39	75.42
Ordered fast-food kids' menu entrée for child, %	60.86	**67.39**[a,c]	**55.77**[d]	**59.43**[d]
Ordered milk/water from full-service menu for child, %	20.56	20.50	21.69	20.20
Ordered milk/water from fast-food menu for child, %	18.57	22.02	17.56	18.18
Meal perceptions				
Chili's Kids' Pizza (880 kcal)				
Healthy (1–7)	3.59 (1.66)	3.63 (1.64)	3.55 (1.59)	3.57 (1.56)
Calorie content of meal relative to recommendation for dinner for child (1–5)	**3.46 (1.09)**[a]	**3.46 (1.09)**[a]	3.50 (1.13)	**3.63 (1.00)**[b,d]
Median calorie estimate	800	840	800	800
McDonald's Chicken McNugget Happy Meal (495 kcal)				
Healthy (1–7)	3.23 (1.72)	3.30 (1.65)	3.39 (1.76)	3.41 (1.75)
Calorie content of meal relative to recommendation for dinner for child (1–5)	**3.29 (1.12)**[a]	**3.36 (1.11)**[a,c]	**3.18 (1.15)**[d]	**3.06 (1.10)**[b,d]
Median calorie estimate	500	500	500	500
Chili's Mango-Chile Chicken (490 kcal)				
Healthy (1–7)	5.15 (1.46)	5.10 (1.59)	5.13 (1.50)	5.15 (1.45)
Calorie content of meal relative to recommendation for dinner for child (1–5)	**2.95 (1.01)**[a,c]	**2.98 (1.08)**[a,c]	**2.75 (1.04)**[b,d]	**2.79 (1.04)**[b,d]
Median calorie estimate	490	490	490	490
McDonald's Quarter Pounder w/Cheese Extra Value Meal (1,090 kcal)				
Healthy (1–7)	2.27 (1.72)	2.24 (1.76)	2.33 (1.80)	2.31 (1.75)
Calorie content of meal relative to recommendation for dinner for child (1–5)	4.03 (1.32)	4.13 (1.30)	4.13 (1.26)	4.09 (1.36)
Median calorie estimate	1,060	1,090	1,070	1,000
Message perceptions				
Predominantly positive reaction, %	**93.30**[a,d]	**76.10**[a,b]	**80.70**[a,b]	**85.25**[b,c]

Note: Boldface indicates statistical significance (Holm–Bonferroni corrected $p<0.05$).
Continuous variables were analyzed with linear regression, and categorical variables were analyzed with logistic regression. For meal perception outcomes, after the pretest experiment, Chili's reformulated menu items; their updated calories are reflected in this table. All meal perception outcome analyses controlled for the frequency of purchasing each item. Calorie content of meal relative to recommendation for dinner for child ranges from 1 (much less than recommended for dinner for a child) to 5 (much more than recommended for dinner for a child). Predominantly positive reactions (message perceptions) included respondents reporting that the message predominantly made them feel cheerful, pleased, stimulated, or soothed. Appendix (available online) provides survey questions.
[a]Statistically significantly different from 600 Calories General.
[b]Statistically significantly different from Sunscreen Control.
[c]Statistically significantly different from 600 Calories Doctor.
[d]Statistically significantly different from Adult-Sized Clothes.

significantly fewer calories than the recommended number for a child's dinner compared with control participants ($p<0.001$). The 600 Calories General participants additionally rated the full-service kids' meal with >600 kcal as having significantly more calories than the recommended number for a child compared with control ($p=0.029$) and Adult-Sized Clothes ($p=0.033$) participants (Table 2).

For secondary outcomes of message perceptions, among the experimental messages, 600 Calories General received the highest percentage of predominantly positive reactions (cheerful, pleased, stimulated, or soothed; 84%) (Table 2). This message performed significantly better than Adult-Sized Clothes, which received the highest percentage of predominantly negative reactions (insulted, irritated, or repulsed; 24%, $p<0.001$).

In summary, there were no statistically significant differences in the primary outcome of calories ordered for children. However, the 600 Calories General message consistently performed best across outcomes: it encouraged parents to order the fewest calories for their children at both restaurants, significantly increased their understanding of the recommended number of calories per meal for their children, and was received significantly more positively than other messages. It also significantly decreased fast-food calories parents ordered for themselves. The 600 Calories Doctor message performed similarly well and did not differ significantly from the 600 Calories General message on any outcome.

The exploratory analysis (Appendix Table 5, available online) showed that participants who ate at fast-food and full-service restaurants ≥1−2 times a week ordered more calories across all message conditions than those who ate at those restaurants ≤2−3 times a month, but there were no significant differences in calories ordered between conditions in either stratified group.

DISCUSSION

An RCT was conducted to test the extent to which different parent-targeted messages influenced parents' intentions to order lower-calorie meals for their children. None of the 3 experimental messages tested in this study significantly reduced calories ordered for children compared with the control. This may have been because the study was powered on the basis of pretest results to detect differences of ≥100 kcal, but observed reductions were smaller (at most 64−68 kcal or 5%−7% from the 600 Calories General message). Although this may appear relatively small, 5%−7% fewer calories consumed in a single meal could be meaningful over the course of a day and at the population level, especially given the frequency with which children eat at restaurants.

Despite a lack of significant findings on the primary outcome, the 600 Calories messages, which had specific calorie recommendations for kids, consistently performed best in the pretest and main experiment, encouraging parents to order the fewest calories for their children at fast-food and full-service restaurants. Parents exposed to the 600 Calories General message ordered significantly fewer fast-food calories for themselves (−106 kcal, −8%), which suggests that child-related messaging may influence parents. Both 600 Calories messages were rated as more likable, relatable, and influential than other messages, and they significantly improved parents' understanding of the recommended number of calories per meal for children.

The Adult-Sized Clothes message consistently increased ordering from the kids' menu but resulted in parents ordering roughly 40 more calories for their children than the 600 Calories General message. Although this study's fast-food kids' meals contained a reasonable number of calories (average: 463 kcal, maximum: 555 kcal), full-service kids' meals were much higher in calories (average: 707 kcal, maximum: 1,190 kcal). Despite the National Restaurant Association's 2011 Kids LiveWell initiative to increase the nutritional content of children's menu items through voluntary action,[30] evaluations have found little progress in improving the healthfulness of most kids' menu items—although there has been some progress for sides and beverages,[31] many kids' meals remain high in calories.[32,33] Messages that encourage ordering from the kids' menu may result in lower-calorie choices at certain restaurants but may be less effective at full-service restaurants with higher-calorie options. Pretest messages with the directive to order water or milk increased water and milk orders but did not result in lower-calorie meals.

These findings suggest that messages designed to encourage parents to choose lower-calorie options should explicitly provide information on how many calories to order for their children. Providing a range of recommended calories per meal (e.g., 400−600 kcal) may be more helpful than just a calorie limit (as was tested in this study) so that parents do not incorrectly infer that any meal under 600 kcal is inadequate, but such a strategy needs to be tested. A range in recommended calories could also help parents choose appropriate portion sizes for children of different ages with different nutritional needs because providing a single number may lead some parents to order too many calories for younger children with fewer calorie needs. These findings can be used to inform public health messaging efforts, such as the Food and Drug Administration's recently released calorie label messaging campaign, which explains that calorie labels are now on menus and

can be used to inform decisions if a consumer is trying to eat healthier.[16] Although this campaign mentions total daily recommended calories, this study's results suggest that it could be more impactful if it provided age-specific calorie range recommendations per meal. It is also important to understand whether such messages exacerbate disordered eating behavior before implementing them on a national scale.[34]

Despite the observed (although nonsignificant) calorie reductions from messages, parents in even the best-performing message condition still ordered far more calories per meal for their children than recommended (898 fast-food kcal and 1,362 full-service kcal). This suggests that meaningful calorie reduction will require a variety of strategies that may include voluntary restaurant activities such as item reformulation or adding healthy default beverages/sides to kids' meals, or legislation requiring healthy default beverages/healthier food options in kids' meals, as has been passed in California,[35] Baltimore,[36] and New York City.[37] More data, however, are needed to understand the effectiveness of these strategies.

This study had several strengths. This is the first study, to the authors' knowledge, to test messages that can augment parents' use of calorie labels when ordering for their children. Key effects were replicated across a pretest and main experiment with demographically different samples of parents. Realistic menus and a range of outcomes were used.

Limitations

This study has several limitations. It measured hypothetical (not actual) choices and did not measure consumption. Its online setting may have introduced a social desirability bias to select healthier options, although this would be similar across conditions and is unlikely given participant anonymity. Reported calories ordered for children from real-world fast-food restaurants, however, are consistent with this study's observed values.[38] Another study found that parents ordered fewer calories for their children in a real-world full-service restaurant setting than reported in these findings,[39] but it only analyzed calories ordered from the kids' menu, whereas this study analyzed calories from the kids' and adult menus. Messages might also have been more salient in this online context because participants ordered food immediately after viewing them. Responses may differ if messages were part of an online public health messaging campaign or in an actual restaurant setting because these experiments only examined a brief 1-time exposure to static messages and did not include menu prices. The study was also underpowered to detect <100-kcal differences, so future research should explore how in-person, repeated exposure to the 600 Calorie and Adult-Sized Clothes messages influences ordering behavior and consumption among larger, different populations and in different types of restaurants.

CONCLUSIONS

Parent-targeted messages may increase the effect of calorie labeling, but reductions may be small and should be replicated in real-world settings. Messages designed to encourage parents to choose lower-calorie options may be most effective if they explicitly provide a numerical calorie recommendation for kids' meals. These findings can inform federal and industry-led education campaigns to supplement menu labeling.

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CAR conceptualized the study, obtained funding, oversaw data collection, and provided critical manuscript revisions. AAM created all images for the surveys, analyzed and interpreted the data, and drafted the manuscript. SVH, MBS, JPB, FKB, CDE, KG, and JWK aided with study design and provided critical manuscript revisions. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

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SUPPLEMENTAL MATERIAL

Supplemental materials associated with this article can be found in the online version at https://doi.org/10.1016/j.amepre.2020.11.012.

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