PEDIATRICS®
OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

Is Frequency of Shared Family Meals Related to the Nutritional Health of Children and Adolescents?

Amber J. Hammons and Barbara H. Fiese

Pediatrics 2011;127;e1565; originally published online May 2, 2011;
DOI: 10.1542/peds.2010-1440

Is Frequency of Shared Family Meals Related to the Nutritional Health of Children and Adolescents?

AUTHORS: Amber J. Hammons, PhD and Barbara H. Fiese, PhD

Family Resiliency Center, Human and Community Development, University of Illinois, Urbana-Champaign, Urbana, Illinois

KEY WORDS
family meal patterns, family meal frequency, family nutrition, obesity, eating disorders

ABBREVIATIONS
OR—odds ratio
CI—confidence interval
SES—socioeconomic status
df—degree(s) of freedom

www.pediatrics.org/cgi/doi/10.1542/peds.2010-1440

doi:10.1542/peds.2010-1440

Accepted for publication Feb 4, 2011

Address correspondence to Amber J. Hammons, PhD, Family Resiliency Center, Human and Community Development, University of Illinois, Urbana-Champaign, 2028 Christopher Hall, M/C 081-904, W Nevada St, Urbana, IL 61801. E-mail: ahammons@illinois.edu

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

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

abstract

FREE

OBJECTIVE: We used meta-analytic methods to examine the frequency of shared family mealtimes in relation to nutritional health in children and adolescents. The primary objective was to determine consistency and strength of effects across 17 studies that examined overweight and obese, food consumption and eating patterns, and disordered eating.

METHODS: The total sample size for all studies was 182 836 children and adolescents (mean sample age: 2.8–17.3 years). Pooled odds ratios were calculated. A random-effects model was used to estimate all outcomes.

RESULTS: The frequency of shared family meals is significantly related to nutritional health in children and adolescents. Children and adolescents who share family meals 3 or more times per week are more likely to be in a normal weight range and have healthier dietary and eating patterns than those who share fewer than 3 family meals together. In addition, they are less likely to engage in disordered eating.

CONCLUSIONS: Educational and public health initiatives aimed at promoting shared family mealtimes may improve nutritional health of children and adolescents. Clinicians may advise their patients about the benefits of sharing 3 or more family mealtimes per week; benefits include a reduction in the odds for overweight (12%), eating unhealthy foods (20%), and disordered eating (35%) and an increase in the odds for eating healthy foods (24%). *Pediatrics* 2011;127:e1565–e1574

Study results have suggested that family mealtimes may act as a protective factor for many nutritional health-related problems during childhood and adolescence, including issues of overweight, unhealthy eating, and disordered eating. Findings have been mixed with some studies that reported strong relations to health outcomes such as obesity, whereas others have reported no relation.[1,2] These inconsistencies make it difficult to inform parents of the relation between family meals and health outcomes. Inconsistencies may stem from the variability in ages examined and the concentration on both genders rather than examining them separately. Although the American Academy of Pediatrics recommends that families regularly eat meals together as part of its initiative of what families can do to prevent childhood obesity,[3] pediatricians could benefit from more precise estimates of the effects of shared family mealtimes on children's nutritional health. In this meta-analysis, we determined the strength of the relationship between the frequency of shared family mealtimes and children's nutritional health.

We were interested in 3 major public health concerns: obesity, unhealthy eating, and disordered eating. In particular, we examined the effects of sharing 3 or more meals per week versus 1 or none. When study design allowed, we investigated the long-term potential for family meals operating as a protective factor for these health indicators.

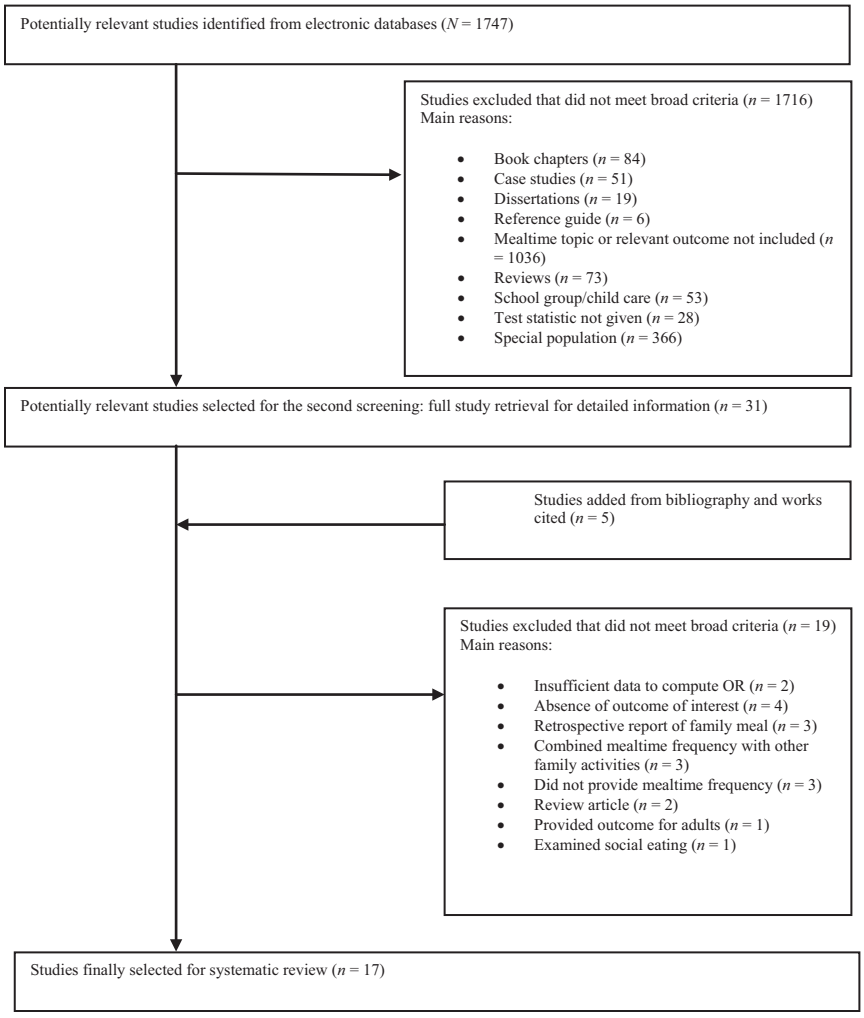

FIGURE 1
Flowchart of the study-selection process.

METHODS

Data Sources and Literature Search

Four search engines were used to systematically locate empirical research: PubMed, PsycINFO, Web of Science, and the Cochrane Database of Systematic Reviews. We conducted the study in 2009, and there were no year restrictions. The following key words were used: ("family" or "interaction") and ("mealtime" or "dinnertime").

Criteria for Study Inclusion

Inclusion criteria were that (1) studies must have had a measure of family meal frequency, (2) outcome variable(s) must have included at least 1 of the following categories: obesity, food consumption (ie, [un]healthy eating), and disordered eating, (3) the data must have used an estimate that was an odds ratio (OR) or could be transformed into an OR, (4) outcome variables must have been child or adolescent focused, (5) studies must have been peer-reviewed, and (6) studies must have been written in English. Authors were contacted when information was not present in the article. A total of 1747 studies were identified initially, but 1730 were excluded (see Fig 1 for exclusion reasons).

The following information was coded: (1) average age of sample participants; (2) study design (longitudinal or cross-sectional); (3) gender mix of the sample; (4) control for confounding variables; and (5) outcome of interest. For purposes of being thorough, 2 coders independently examined all dimensions (1–5) for all included studies. Agreement was high (89%). In addition,

the reference and works-cited lists of all included studies were reviewed to capture all potential studies. All information was entered into the Comprehensive Meta-analysis (CMA 2.0 [Biostat, Englewood, NJ]) program.

Defining Shared Family Mealtimes

Most studies ($n = 12$) asked participants to consider the number of family members present for the meal. For instance, some asked participants to report on how often some, most, all, or, more broadly, other family members shared a meal together. Other studies just asked participants to report on how often regular family dinners occurred but made no mention of the number of family members present ($n = 3$). Two studies asked participants to report only on shared meals that had at least 1 parent present.

Outcome Categories

Three categories were constructed on the basis of reported outcomes: weight status, food consumption, and disordered eating. Consistent with the definition used most commonly across the studies, overweight was defined as having a BMI at the ≥85th percentile.[4] Food consumption was grouped into 2 categories to reflect the consumption of unhealthy versus healthy foods. Food consumption was measured by using a food-frequency checklist, and unhealthy foods included soda, fast food, fried food, and sweets/candy. Unhealthy eating also included the absence of healthy foods such as skipping breakfast and not eating at least 2 fruits or vegetables in a day. These foods were usually separated into categories on the basis of total intake (eg, greater than once per day to rarely/never consuming). Healthy eating included fruit and vegetable consumption, multivitamin use, and breakfast consumption. For fruit and vegetable consumption, responses were dichotomized into yes/no responses on the basis of whether the person met the national recommendations per day. Disordered eating included bingeing/purging, extreme and less extreme weight-control behaviors (ie, taking diet pills, self-induced vomiting, using laxatives, using diuretics, fasting, eating very little food, using food substitutes, skipping meals, and smoking cigarettes as a means of weight control).

Statistical Analyses and Data Synthesis

Each study was used as the unit of analysis. Adjusted ORs with 95% confidence intervals (CIs) were used to estimate the relation between family meal frequency and the outcomes. All studies reported ORs with the exception of 1 study,[5] which reported only frequency data; therefore, an OR was calculated on the basis of available information. In the analyses that examined obesity, food consumption (ie, unhealthy eating), and disordered eating, ORs of <1 indicate a protective factor. For healthy eating, ORs of >1 indicate a protective factor. If a study reported multiple outcomes, mean effect sizes were calculated for "independence concerns," limiting 1 effect size per study. If each outcome is treated as being independent, 2 problems can occur. One issue is that studies with multiple outcomes are weighted more heavily; the other problem involves underestimating the precision and overestimating the error. The ideal way of handling multiple outcomes is to compute the mean of the outcomes for each individual study and then to use this score as the unit of analysis.[6] This approach also takes the correlation among the outcomes into account. Furthermore, if a study reported outcomes for boys and girls separately, or younger and older adolescents separately, these outcomes were combined to yield an overall effect size for that study. In addition, if a study shared a sample with another study, the outcomes were combined to contribute only 1 total outcome in the analyses that examined the overall effect of family meal frequency. However, in the analyses that examined separate categories of outcomes, studies that shared the same sample but reported on different outcomes were able to report a unique effect size for each category of outcome. ORs that were reported by using "never having family meals together" as the reference group were transformed into their reciprocals, and corresponding 95% CIs were computed.

The random-effects model was used to calculate pooled effect sizes (ORs) with 95% CIs. We used the Q statistic to test for heterogeneity in the effect sizes. For studies with large samples, a nonsignificant value suggests that the effect size comes from the same population and that the finding is robust across studies. If the value was significant, moderators were examined. We also used I^2 because the Q statistic and corresponding P value only address 1 aspect of heterogeneity—that of the true dispersion that equals 0. This statistic, I^2, is a degree of inconsistency and measures the proportion of variance that is true rather than random error.[6] An I^2 value close to 0 means that nearly all of the variance is a result of random error, whereas an I^2 value farther away from 0 may reflect real variance and indicate the potential for a moderator analysis. For the situation in which moderators were tested, we only tested for 1 moderator, because it is not recommended to test for more when the number of studies is small ($n < 10$).[6] To assess publication bias we relied on the classic fail-safe N,[7] which is used to address the "file-drawer problem." The fail-safe N yields the number of missing articles that would have to exist to bring the effect size to nonsignificance. The larger the number is, the more stable the finding.

Small numbers indicate that the findings should be interpreted with caution.

RESULTS

Study Descriptives

Table 1 lists descriptive information for the 17 included studies.[1,2,5,8–21] The total sample size across studies was 182 836 participants (range: 145–99 462 participants*). The mean sample age ranged from 2.8 to 17.3 years. In terms of geographical makeup, the studies were conducted in the United States ($n = 12$),[1,8–12,14,15,17,19–21] Australia ($n = 1$),[2] Canada ($n = 1$),[13] Finland ($n = 1$),[18] Japan ($n = 1$),[5] and New Zealand ($n = 1$).[16] All studies were adjusted for confounders with the exception of 1 study.[5] Twelve studies[1,2,8–12,14,17,19–21] controlled for race/ethnicity. Similarly, 12 studies[1,2,9–12,14,17–21] reported information on socioeconomic status (SES). Measures used included household income, education, occupation, employment, poverty indicators, family composition, public assistance use, and having a computer in the household. In these studies, SES was used as a control variable. The proportion of each gender was equal (50% female).

Thirteen studies reported on the percentages of family meals that the study families shared.[1,8–11,13,16–21] The majority of families had meals together 5 to 7 nights per week (52%), 31% shared 1 to 4 meals together, and 14% did not share any meals together.

Analyses were performed separately for cross-sectional and longitudinal studies. Some studies reported ORs for findings at baseline and at follow-up. In these cases, they contributed an effect size for each analysis. Fifteen studies reported cross-sectional findings,[1,2,5,8–11,13–20] and 5 reported longitudinal findings.[1,8,10,12,21]

Overweight and Obese

Eight studies[1,2,8–13] examined family meals in relation to weight status. In terms of shared family meal frequency, studies considering overweight examined at least 3 meals per week compared with fewer than 3 meals per week. Four of the 8 studies reported nonsignificant findings.[1,2,10,13] The studies included 44 016 participants, and individual study samples ranged from 145 to 14 431. Ages ranged from 4 to 17 years. The pooled OR was significant (0.88 [95% CI: 0.81–0.97]) with a test of heterogeneity ($Q = 13.55$; degrees of freedom [df] $= 7$; $P = .06$; $I^2 = 48.35\%$), which suggests that children and adolescents were 12% less likely to be overweight in families that had at least 3 shared family meals per week than those who ate fewer than 3 shared family meals per week. The fail-safe N revealed that there would have to be 50 studies located for the results to be nullified. The Q statistic and I^2 value together suggest that the effect sizes do not come from the same population. Therefore, we tested age as a potential moderator, because the result of the test of heterogeneity was significant. There were 2 studies that examined younger children,[9,12] 2 that examined middle school–aged children,[8,13] and 4 that examined older children (high school–aged).[1,2,10,11] Age was not a significant moderator ($Q_B = 1.32$; $df = 2$; $P =$ not significant).

Food Consumption and Eating Habits

There were 8 studies that examined food consumption.[2,5,13–18] The consumption of unhealthy foods was analyzed and reported separately from the consumption of healthy foods for simplicity of interpretation of the ORs. The studies included a total of 56 919 participants (range: from 404–18 177 per study). Mean ages ranged from 2.8 to 17 years.

Unhealthy Eating

Six studies measured the consumption of unhealthy foods by adolescents.[2,5,15–18] In terms of shared family meal frequency, studies compared at least 3 meals per week to fewer than 3 meals per week. The pooled OR was significant (0.80 [95% CI: 0.68–0.95]) with a test of heterogeneity ($Q = 26.92$; $df = 5$; $P < .001$; $I^2 = 81.43\%$), which suggests that children and adolescents in families that share at least 3 family meals per week have a 20% reduction in the odds of eating unhealthy foods than those in families that have fewer than 3 shared family meals together. The fail-safe N revealed that there would have to be 74 studies located for the results to be nullified. Because there was a significant Q value for heterogeneity, we tested age as a potential moderator. There were 2 studies that examined younger children (primary school– and junior high–aged)[5,18] and 4 that examined older children (high school–aged).[2,15–17] The difference between groups was significant ($Q_B = 6.01$; $df = 1$; $P = .001$); older children had a larger effect (OR: 0.74 [95% CI: 0.70–0.79]) than the younger children (OR: 0.93 [95% CI: 0.77–1.10]).

Healthy Eating

Five studies measured healthy dietary habits as well as the consumption of healthy foods,[5,13–16] which included consumption of fruits and vegetables, eating breakfast, and taking a multivitamin. Studies that examined healthy foods and eating habits compared at least 3 to fewer than 3 shared family meals per week. The pooled OR was significant (1.24 [95% CI: 1.13–1.37]) with a test of heterogeneity ($Q = 14.04$; $df = 4$; $P < .01$; $I^2 = 71.51\%$), which suggests that families that shared at

*When the numbers of participants are reported throughout "Results," they represent the true number of participants, which means that studies that shared the same sample are included only once.

TABLE 1 List of Studies

Authors, Year of Study, Country	Sample Characteristics	Frequency Measurement	Outcome Measurement (Obesity, Healthy Eating, Disordered Eating)	Control Variables	Calculated OR (95% CI)[a]
Anderson and Whitaker[9] (2010), United States	Early Childhood Longitudinal Study Birth Cohort; n = 8550; 4-y-olds; 49% female; cross-sectional	>5 evenings per week vs 0	Obesity: (BMI: interviewer obtained; >95th percentile classified as obese)	Child age, gender, racial/ethnic group, household income/poverty ratio, single-parent household, maternal education, maternal BMI, and maternal age, obtaining sleep >10.5 h/d, <2 h of TV per weekday	0.77[b]
FitzPatrick et al[14] (2007), United States	Special Supplemental Nutrition Program for Women, Infants, and Children; n = 1336; mean age: 2.8 y; 50% female; cross-sectional	Never vs sometimes per week	Healthy eating: fruits and vegetables (whether parents served fruits ≥2 times per day and vegetables≥ 2 times per day)	Race/ethnicity, parental education attainment	All: 1.15[c]
Fulkerson et al[20] (2006), United States	n = 99 462; mean age: ~14 y; 50% female; cross-sectional	5–7 vs 0–1 d/wk	Disordered eating: binge/purge, excessive weight loss	Gender, ethnicity, grade, maternal education, family structure, family support, family communication	0.65[c]
Fulkerson et al[1] (2008), United States	Project Eat II; n = 2516; middle and high school students; 55% female; cross-sectional/ longitudinal	≥3 d/wk vs never	Overweight: ≥85th percentile (BMI: self-reported)	Baseline overweight status, age, race, SES, physical activity, sedentary behavior, energy intake	Cross-sectional: 0.68; longitudinal (5-y follow-up): 0.55
Fulkerson et al[11] (2009), United States	n = 145; mean age: 17.2 y; 48% female; cross-sectional	5–7 d/wk vs never	Overweight: ≥85th percentile classified as overweight (BMI: collected by staff); disordered eating: unhealthy weight loss	Race/ethnicity, age, SES, gender, random effect of school	Overweight: 0.36; disordered eating: 0.38
Gable et al[12] (2007), United States	ECLS-K; n = 8000; mean age: 5.7 y; 52% female; longitudinal	Family meals per week (composite variable)	Overweight onset ≥95th percentile (BMI: collected)	Maternal education and occupation, household income, gender, race, ethnicity	Longitudinal (3-y follow-up): 0.93[c]
Gillman et al[15] (2000), United States	Growing Up Today Study; n = 16 202; 9- to 14-y-olds; 54% female; cross-sectional	Most days vs never/ some days	Healthy eating: eating fruits and vegetables (total of ≥5 per day), multivitamin use, soda consumption	Age and gender	Healthy: 1.24[c]; unhealthy: 0.73[c]
Haapalahti et al[18] (2003), Finland	n = 404; 10- to 11-y-olds; 49% female; cross-sectional	Daily/almost daily vs weekly/seldom/never	Healthy eating: eating bread, fat-containing milk, butter, sweets, fast food, sugar-containing juices; not eating vegetables; not eating fruits (composite index)	Gender, father's occupation, family dinner, total CBCL score	Unhealthy foods: 0.29[b]
Kusano-Tsunoh et al[5] (2001), Japan	n = 12 321; primary and junior high school students; 50% female; cross-sectional	Almost every day/3 or 4 times per week vs never/almost never/ once or twice a week	Healthy eating: vegetables/fruits; unhealthy eating: snacks and cakes/ soft drinks; almost everyday vs 3 or 4 times per week vs never or almost never and 1 or 2 per week	Unadjusted	Healthy foods: 1.09; unhealthy foods: 0.97

TABLE 1 Continued

Authors, Year of Study, Country	Sample Characteristics	Frequency Measurement	Outcome Measurement (Obesity, Healthy Eating, Disordered Eating)	Control Variables	Calculated OR (95% CI)[a]
Mamun et al[2] (2005), Australia	Mater University Study of Pregnancy; $n = 2335$; 14-y-olds; 48% female; cross-sectional	At least once per day vs a few times/once/ less than once per week	Overweight: ≥85th percentile (BMI measured); healthy eating: fast food and soft drinks	Age, gender, being overweight at 5 y of age, maternal parity, gross family income, maternal education, race, maternal attitude toward child's consumption of fatty foods and consumption of fast food, soft drinks, and red meat, amount of TV-watching and participation in sports and exercise	Overweight: 1.05; healthy eating: 0.96
Neumark-Sztainer et al[21] (2008), United States	Project Eat I and II; $n = 2516$; mean age of those starting out in middle school: 12.8 y, time 1, 17.2 y, time 2; starting out in high school: 15.8 y, time 1, and 20.4 y, time 2; 55% female; longitudinal	≥5 vs ≤5 family meals per week	Disordered eating: extreme weight-control behaviors, unhealthy weight-control behavior, binge-eating, chronic dieting	Gender, grade level in school, SES, BMI, ethnicity/race, family connectedness, parental encouragement to diet, specific behaviors being examined at time 1	Longitudinal (5-y follow-up): 0.98
Neumark-Sztainer et al[19] (2004), United States	Project EAT; $n = 4746$; mean age: 14.9 y; 50% female; cross-sectional	≥5 vs no family meals per week	Disordered eating: extreme weight control, less extreme weight control, binge with loss of control, chronic dieting	Family-connectedness, weight-specific pressures within the home, grade level, ethnicity/race, SES and BMI	0.67
Sen[10] (2006), United States	National Longitudinal Survey of Youth 1997; $n = 5014$; mean age: 13.33 y; cross-sectional/ longitudinal	5–7 vs 0 d/wk	Obesity: ≥95th percentile; at risk of overweight: BMI between 85th and 95th percentile (self-reported)	Age, gender, race/ethnicity, height, attainment of puberty, SES, family connectedness, family structure, maternal education, computer in the household	Cross-sectional: 0.81; longitudinal (5-y follow-up): 1.28
Taveras et al[8] (2005), United States	Growing Up Today Study; $n =$ 14 431; 9- to 14-y-olds; 54% female cross-sectional/ longitudinal	Most vs never/some days	Obesity: >85th percentile, age- and gender-specific (self-report)	Age, race, baseline, and follow-up menstrual status and Tanner stage, baseline height, annual change in height, BMI *z* score, physical activity, inactivity, gender	Cross-sectional: 0.85[b]; longitudinal (2-y follow-up): 0.99
Utter et al[16] (2008), New Zealand	Pacific Obesity Prevention in Communities Study; $n =$ 3119; 13- to 17-y-olds; mean age: 14.8 y; 52% female; cross-sectional	5 d vs none, 3–4 d vs none	Healthy eating: soda, fast food, fried food, chocolate, fruits and vegetables (≥5/d), eat breakfast	Age and gender	Healthy foods: 1.55[b]; unhealthy foods: 0.96
Videon and Manning[17] (2003), United States	Add Health; $n = 18\,177$; mean age: 15.9 y; 49% female; cross-sectional	4–5 d vs 3 or fewer; 6–7 d vs 3 or fewer d/wk	Healthy eating: skip breakfast, not eat ≥2 vegetables, not eat ≥2 fruits	Gender, race/ethnicity, age, parental education, body-weight perception	0.66[c]
Woodruff and Hanning[13] (2009), Canada	$n = 3025$; grades 6, 7, and 8; 51% female; cross-sectional	3–5 d vs 0–2 d per week	Healthy eating: eat breakfast, soda and fast food consumption; obesity: self-reported	Gender, grade level, body-weight status	Healthy eating: 1.40; overweight: 1.04

EAT indicates Eating Among Teens; ECLS-K, Early Childhood Longitudinal Study, Kindergarten Class of 1998–1999; CBCL, Child Behavior Checklist.

[a] An OR of <1 indicates a protective factor for obesity, unhealthy eating, and eating disorders, and an OR of >1 indicates a protective factor for healthy eating.

[b] $P < .01$.

[c] $P < .001$.

TABLE 2 Summary

No. of Meals	% Increase (% Decrease)	Outcome
≥3 vs <3	(12)	Overweight
≥3 vs <3	(20)	Eating unhealthy foods
≥3 vs <3	24	Eating healthy foods
≥5 vs ≤1	(35)	Disordered eating

least 3 meals per week had children and adolescents who had an increased odds of 24% of eating healthy foods and maintaining healthy dietary habits than those whose families shared few or no family meals together. The fail-safe *N* revealed that there would have to be 101 studies located for these results to be nullified. Similar to unhealthy eating, the result of the test of heterogeneity was significant, so we tested age as a potential moderator. There were 2 studies that examined younger children (one which included infants[14])[5] and 3 that examined older children (middle school– and high school–aged).[13,15,16] The difference between groups was marginally significant ($Q_B = 6.75$; $df = 1$; $P = .06$); older children had a larger effect (OR: 1.26 [95% CI: 1.20–1.33]) than the younger children (OR: 1.14 [95% CI: 1.07–1.21]).

Disordered Eating

Three studies examined shared family meals in relation to disordered eating.[11,19,20] The studies included 104 353 adolescents (range: 145–99 462 per study). Mean ages ranged from 12.8 to 17.2 years. Each of the studies compared 5 or more versus ≤1 shared family meals per week. The pooled OR was significant (0.65 [95% CI: 0.58–0.73]) with a test of heterogeneity ($Q = .98$; $df = 2$; $P =$ not significant; $I^2 = 0$), which suggests that adolescents from families that share at least 5 meals per week are 35% less likely to engage in disordered eating than those that do not. The fail-safe *N* revealed that there would have to be 28 studies located for the results to be nullified.

Quantity of Meals

There were 8 studies that measured shared family mealtime frequency as 5 or more meals versus ≤1 meal per week.[8–11,16,18–20] We choose to run these analyses to contrast the extremes of eating the majority of meals versus virtually no meals together as a family. Five studies examined overweight, 2 examined disordered eating, and 2 examined unhealthy eating (1 study[11] examined both overweight and disordered eating and, therefore, contributed a single effect). Outcomes from the 8 studies were pooled for this analysis to produce an overall summary effect. The question we asked is, "Does having regular shared family meals (≥5 per week) versus not having them influence nutritional health?" The answer is yes; the pooled OR was 0.75 (95% CI: 0.65–0.87). The odds are 25% less for children and adolescents that have 5 or more shared family meals together per week. The fail-safe *N* revealed that there would have to be 103 studies located for the results to be nullified. The result of the test for heterogeneity was significant ($Q = 19.34$; $df = 7$; $P < .01$; $I^2 = 64.28\%$). Because the result of the test for heterogeneity was significant, we ran a moderator analysis to examine the 3 outcome categories as a possible moderator. One study[11] that examined both overweight and disordered eating contributed a separate effect size for both categories. The difference among groups was not significant ($Q_B = 1.90$; $df = 2$; $P =$ not significant) (see Fig 2 for the forest plot, which graphically displays effect sizes for this analysis).

Longitudinal Studies

Five studies reported longitudinal results.[1,8,10,12,21] Four of these studies examined overweight, and 1 examined disordered eating. Because just 1 study examined disordered eating, analyses were conducted only on the studies that examined overweight. Two of the studies had 5-year follow-ups,[1,21] whereas the others reported on 3-year[12] and 2-year[8] follow-ups. In general, longitudinal studies were, individually, suggestive of little association between shared family mealtimes and outcomes. Of the 4 studies that re-

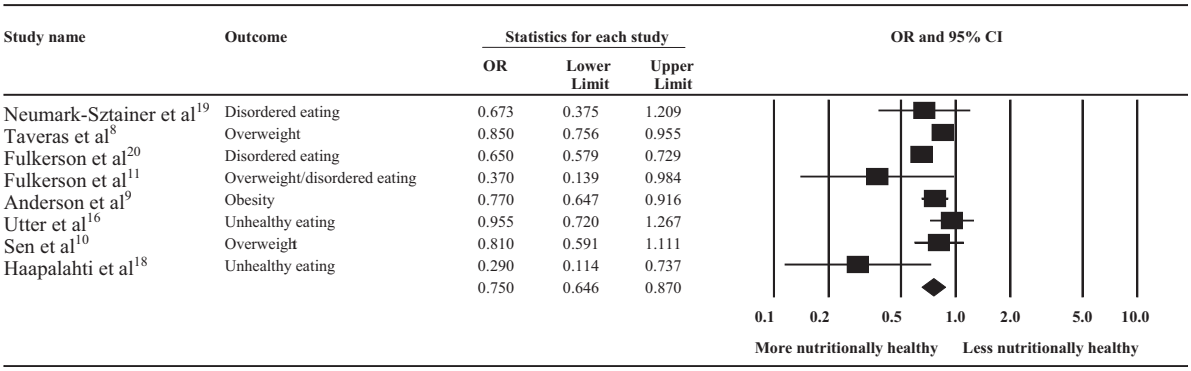

FIGURE 2
Studies that examined ≥5 versus ≤1 meals.

ported on longitudinal findings, only 1 reported significant findings.[12] However, the OR for the meta-analysis is significant (0.93 [95% CI: 0.90–0.95]), which suggests that shared family meals are associated with 7% odds of reduction of overweight and disordered eating. The result of the test for heterogeneity was not significant ($Q = 1.94$; $df = 3$; $P =$ not significant; $I^2 = 0$). The fail-safe N revealed that there would have to be 6 studies located for the results to be nullified.

DISCUSSION

To our knowledge, this is the first study to examine pooled estimates of risk across studies that have examined the association between shared family meals and various nutritional health outcomes for children and adolescents. The authors of 1 study[22] performed a systematic review on healthy eating, but to our knowledge, none have performed a meta-analysis. Overall, families that eat 5 or more meals together have children who are ~25% less likely to encounter nutritional health issues than children who eat ≤1 meal with their families. Shared family meals seem to operate as a protective factor for overweight, unhealthy eating, and disordered eating. Although cross-sectional studies have revealed a stronger reduction in unhealthy behaviors relative to longitudinal studies, the longitudinal studies included in this meta-analysis were few and focused mainly on overweight; more longitudinal studies need to be conducted to shed light on the potential long-term relationship between family meals and nutritional health.

Although the mechanisms for how shared family meals relate to positive outcomes have not yet been empirically revealed, researchers have suggested several possibilities. It is not surprising that eating family dinners together is inversely associated with eating ready-made dinners, which feature lower nutrient values.[15] For children or adolescents with disordered eating, mealtimes may provide a setting in which parents can recognize early signs and take steps to prevent detrimental patterns from turning into full-blown eating disorders. Indeed, dieting has been recognized as a precursor for the development of eating disorders.[23] In addition, family meals are predictive of family-connectedness,[24] which may encourage adolescents to talk about such issues within their families.

Adolescents themselves associate shared family meals with healthier eating.[25] In a focus-group study, adolescents believed that they would eat healthier if they ate more meals with their families.[25] This result is consistent with the age effects found in this meta-analysis, which demonstrate that adolescents who eat with their families eat healthier foods. In a study that asked adolescents about their interest in having their parents participate with them in a health-promotion program, adolescents stated that they would most like their parents to prepare healthy meals at home.[26] It seems that there is interest by adolescents as well as receptivity in participating in family mealtimes, eating healthy foods, and learning about nutrition.

Four of the 8 studies that examined overweight children and adolescents reported nonsignificant findings. All 4 of these studies examined adolescents. Fulkerson et al[1] suggested that shared family mealtimes may be more nutritionally beneficial for younger children because they are normative events, whereas for adolescents, shared family mealtimes decrease. We tested age as a potential moderator, but it was not significant, which may be because of the large variability we had in age. Two of our studies examined preschool/kindergarten-aged children, whereas the others overlapped middle school– and high school–aged children and adolescents. Similarly, 4 of the 5 longitudinal studies examined adolescents, whereas only 1 examined younger children. The study that examined younger children seemed to be pulling the longitudinal studies in a significant direction. The longitudinal finding was quite small and not consistent with the findings of the studies overall. More longitudinal studies are needed, specifically with younger children, to determine if the risk persists over time.

Our discussion assumes that family time is quality time. For some families, shared time is another opportunity for conflict. Indeed, observational studies of mealtime suggest that effective affect management, interpersonal involvement, and communication in families relate to child health.[27] In a focus-group study, some adolescents reported not having shared family meals together because of dissatisfaction with family relations.[25] Other barriers to sharing family meals together include parent work schedules, difficulty in planning ahead, and dealing with picky eaters.[28,29] Health professionals are advised to tailor their recommendations on the basis of their knowledge about particular family situations. The families that do sit down to meals together may be more likely to be families that get along and thus contribute to the positive relations presented in this study, in both the short-term and long-term. However, there is emerging evidence to suggest that mealtime interactions that include positive forms of communication are not solely markers of overall family functioning but may represent a unique contribution to children's health and well-being.[30]

There is a large amount of variability in the studies conducted on family mealtimes. In particular, 5 studies did not

report any information on SES. Investigating ethnic and gender differences was determined to be beyond the scope of this study. However, study results have indicated that this is an area that warrants further attention.[10,19,21] The way in which nutritional outcomes were measured in the studies also varied. For example, some studies that examined obesity would classify a child with a BMI at the >85th percentile as being obese, whereas others would classify a child with a BMI at the >95th percentile as obese (eg,[9,11]). Furthermore, the question of how to measure family mealtimes has also varied from study to study. Some studies examined the extremes of shared family meal frequency, whereas others compared smaller increments, such as having 3 shared family meals per week versus less than 3. Several studies specifically asked about the frequency of shared family dinners, whereas others asked about shared family breakfasts and dinners, and others just asked more generally about shared family "meals." In addition, even the definition of what constitutes "family" and who is present at the meal are frequently overlooked. Future research should include more precision in the measurement of not only the frequency of family mealtimes but structural aspects of the family and who is present during meals.

CONCLUSIONS

The results of this study suggest that shared family mealtimes offer nutritional benefits to family members. Health professionals are advised to encourage families to eat meals together. Future studies should further develop interventions for families that struggle with health issues such as obesity and disordered eating and add focus on family mealtimes as a setting in which to promote better nutrition habits. In addition, longitudinal studies can reveal any long-term potential that family meals may have in influencing nutritional health. Specific mechanisms of how family mealtimes influence related nutritional outcomes should be investigated.

ACKNOWLEDGMENT

This research was supported, in part, by the US Department of Agriculture National Institute of Food and Agriculture (Hatch Project number 793 328, to Dr Fiese).

REFERENCES

1. Fulkerson JA, Neumark-Sztainer D, Hannan PJ, Story M. Family meal frequency and weight status among adolescents: cross-sectional and 5-year longitudinal associations. *Obesity (Silver Spring)*. 2008;16(11):2529–2534
2. Mamun AA, Lawlor DA, O'Callaghan MJ, Williams GM, Najman JM. Positive maternal attitude to the family eating together decreases the risk of adolescent overweight. *Obes Res*. 2005;13(8):1422–1430
3. American Academy of Pediatrics. Prevention and treatment of childhood overweight and obesity. Available at: www.aap.org/obesity/families.html. Accessed March 29, 2010
4. Centers for Disease Control and Prevention. Growth charts. Available at: http://www.cdc.gov/growthcharts. Accessed March 29, 2010
5. Kusano-Tsunoh A, Nakatsuka H, Satoh H, et al. Effects of family-togetherness on the food selection by primary and junior high school students: family-togetherness means better food. *Tohoku J Exp Med*. 2001;194(2):121–127
6. Borenstein M, Hedges LV, Higgins JPT, Rothstein HR. *Introduction to Meta-analysis*. West Sussex, United Kingdom: Wiley; 2009
7. Rosenthal R. The file drawer problem and tolerance for null results. *Psychol Bull*. 1979;86(3):638–641
8. Taveras EM, Rifas-Shiman SL, Berkey CS, et al. Family dinner and adolescent overweight. *Obes Res*. 2005;13(5):900–906
9. Anderson SE, Whitaker RC. Household routines and obesity in US preschool-aged children. *Pediatrics*. 2010;125(3):420–428
10. Sen B. Frequency of family dinner and adolescent body weight status: evidence from the National Longitudinal Survey of Youth, 1997. *Obesity*. 2006;14(12):2266–2276
11. Fulkerson JA, Kubik MY, Story M, Lytle L, Arcan C. Are there nutritional and other benefits associated with family meals among at-risk youth? *J Adolesc Health*. 2009;45(4):389–395
12. Gable S, Chang Y, Krull JL. Television watching and frequency of family meals are predictive of overweight onset and persistence in a national sample of school-age children. *J Am Diet Assoc*. 2007;107(1):53–61
13. Woodruff SJ, Hanning RM. Associations between family dinner frequency and specific food behaviors among grade six, seven, and eight students from Ontario and Nova Scotia. *J Adolesc Health*. 2009;44(5):431–436
14. FitzPatrick E, Edmunds LS, Dennison BA. Positive effects of family dinner are undone by television viewing. *J Am Diet Assoc*. 2007;107(4):666–671
15. Gillman MW, Rifas-Shiman SL, Frazier LA, et al. Family dinner and diet quality among older children and adolescents. *Arch Fam Med*. 2000;9(3):235–240
16. Utter J, Scragg R, Schaaf D, Mhurchu CN. Relationships between frequency of family meals, BMI and nutritional aspects of the home food environment among New Zealand adolescents. *Int J Behav Nutr Phys Act*. 2008;5:50–57
17. Videon TM, Manning CK. Influences on adolescent eating patterns: the importance of family meals. *J Adolesc Health*. 2003;32(5):365–373
18. Haapalahti M, Mykkänen H, Tikkanen S, Kokkonen J. Meal patterns and food use in 10- to 11-year-old Finnish children. *Public Health Nutr*. 2003;6(4):365–370
19. Neumark-Sztainer D, Wall M, Story M, Fulkerson JA. Are family meal patterns associated with disordered eating behaviors among adolescents? *J Adolesc Health*. 2004;35(5):350–359
20. Fulkerson JA, Story M, Mellin A, Leffert N, Neumark-Sztainer D, French SA. Family dinner meal frequency and adolescent development: relationships with developmental assets and high-risk behaviors. *J Adolesc Health*. 2006;39(3):337–345
21. Neumark-Sztainer D, Eisenberg ME, Fulkerson JA, Story M, Larson NI. Family meals and disordered eating in adolescents: longitudinal findings from project EAT. *Arch Pediatr Adolesc Med*. 2008;162(1):17–22
22. Woodruff SJ, Hanning RM. A review of family meal influence on adolescents' dietary

intake. *Can J Diet Pract Res*. 2008;69(1):14–22

23. Neumark-Sztainer DR, Wall MM, Haines JI, Story MT, Sherwood NE, van den Berg PA. Shared risk and protective factors for overweight and disordered eating in adolescents. *Am J Prev Med*. 2007;33(5):359–369
24. Resnick MD, Bearman PS, Blum RW, et al. Protecting adolescents from harm: findings from the National Longitudinal Study on Adolescent Health. *JAMA*. 1997;278(10):823–832
25. Neumark-Sztainer, Story M, Ackard D, Moe J, Perry C. The "family meal": views of adolescents. *J Nutr Educ*. 2000;32(6):329–334
26. Kelsey, Campbell M, Vanata D. Parent and adolescent girls' preferences for parental involvement in adolescent health promotion programs. *J Am Diet Assoc*. 1998;98(8):906–907
27. Jacobs MP, Fiese BH. Family mealtime interactions and overweight children with asthma: potential for compounded risks? *J Pediatr Psychol*. 2007;32(1):64–68
28. Fulkerson JA, Story M, Neumark-Sztainer D, Rydell S. Family meals: perceptions of benefits and challenges among parents of 8- to 10-year-old children. *J Am Diet Assoc*. 2008;108(4):706–709
29. Neumark-Sztainer D, Story M, Ackard D, Moe J, Perry C. Family meals among adolescents: findings from a pilot study. *J Nutr Educ*. 2000;32(6):335–340
30. Fiese BH, Winter MA, Botti JC. The ABC's of family mealtimes: observational lessons for promoting healthy outcomes for children with persistent asthma. *Child Dev*. 2011;82(1):133–145

Is Frequency of Shared Family Meals Related to the Nutritional Health of Children and Adolescents?

Amber J. Hammons and Barbara H. Fiese

Pediatrics 2011;127;e1565; originally published online May 2, 2011;
DOI: 10.1542/peds.2010-1440