Published in final edited form as:

Appetite. 2012 June ; 58(3): 1128–1135. doi:10.1016/j.appet.2012.03.008.

Family Meals: Associations with Weight and Eating Behaviors Among Mothers and Fathers

Jerica M. Berge, PhD, MPH, LMFT¹, Richard F. MacLehose, PhD^{2,3}, Katie A. Loth, MPH, RD³, Marla E. Eisenberg, ScD, MPH^{3,4}, Jayne A. Fulkerson, PhD⁵, and Dianne Neumark-Sztainer, PhD, RD, MPH³

¹University of Minnesota Medical School, Department of Family Medicine and Community Health

²University of Minnesota, Division of Biostatistics

³University of Minnesota, Division of Epidemiology and Community Health

⁴University of Minnesota, Division of Adolescent Health and Medicine

⁵University of Minnesota, School of Nursing

Abstract

Few studies have looked at the relationship between family meals and adult weight and health behaviors. The current study investigates the association between frequency of family meals and mothers' and fathers' body mass index (BMI), dietary intake, dieting behaviors and binge eating. Data from Project F-EAT (Families and Eating and Activity in Teens) were used for the current analysis. Socio-economically and racially/ethnically diverse mothers and fathers (n = 3,488) of adolescents participating in a multi-level population-based study (EAT 2010) completed surveys mailed to their homes. Predicted means or probabilities were calculated for each outcome variable at each level of family meal frequency. Interactions between race/ethnicity and marital status with family meals were evaluated in all models. Overall, results indicated that having more frequent family meals was associated with increased consumption of fruits and vegetables for mothers and fathers, after adjusting for age, educational attainment, marital status and race/ethnicity. Other findings including less fast food intake for fathers and fewer dieting and binge eating behaviors for mothers were significantly associated with family meal frequency, but not consistently across all family meal categories or with BMI. Interactions by race/ethnicity and marital status were non-significant, indicating that family meals may be important for more healthful dietary intake across race and marital status. Future research should confirm findings in longitudinal analyses to identify temporality and strength of associations.

© 2012 Elsevier Ltd. All rights reserved.

Address for correspondence: Jerica M. Berge, PhD, LMFT, Department of Family Medicine and Community Health, Phillips Wangenstein Building, 516 Delaware Street SE, Minneapolis, MN 55455, Voice: 612-626-3693, mohl0009@umn.edu.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Disclosures

None of the authors have conflicts of interest to declare.

The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Heart, Lung and Blood Institute, the National Institute of Child Health and Human Development, the National Cancer Institute or the National Institutes of Health.

Keywords

Family Meals; Parents; Weight; Dietary Intake; Dieting; Binge Eating

INTRODUCTION

The high prevalence of obesity and its related negative health outcomes has led to an increased interest by researchers to identify predictors of obesity (Keith, et al., 2006). Family meals have been suggested as one potential factor that may be protective against obesity (Chan & Sobal, 2011; McIntosh, 1999; McIntosh, et. al., 2009). This may be because family meals tend to be healthier than other meals because vegetables and fruits are commonly served during family meals (Chan & Sobal, 2011; McIntosh, 2009; Neumark-Sztainer, Hannan, Story, Croll, & Perry, 2003; Neumark-Sztainer, Larson, Fulkerson, Story, & Hannan, 2010; Neumark-Sztainer, et al. in press) and family meals provide an opportunity for family members to emotionally connect (Videon & Manning, 2003). To date the majority of research looking at the association between family meals and body weight has been conducted with children and adolescents. Several of these studies have shown an inverse relationship between the frequency of family meals and child and adolescent body mass index (BMI) (Anderson & Whitaker, 2010; Gable, Chang, & Krull, 2007; Gillman et al., 2000; Sen, 2006; Taveras et al., 2005; Yuasa et al., 2008), with some studies finding that the inverse relationship was specific to one gender (Fulkerson, Neumark-Sztainer, Hannan, & Story, 2008; Gundersen, Lohman, Eisenmann, Garasky, & Stewart, 2008; Mikkila, Lahti-Koski, Pietinen, Virtanen & Rimpela, 2003), race/ethnicity (Rollins, Belue, & Francis, 2010), or social class (Belue, Francis, & Colasco, 2009). Other studies have shown no association between family meal frequency and child BMI (Mamun, Lawlor, O'Callaghan, Williams, & Najman 2005; Utter, Scragg, Schaaf, & Mhurchu, 2008; Woodruff, Hanning, McGoldrick, & Brown, 2010; Wurback, Zellner, & Kromeyer-Hauschild, 2009).

Although there have been inconsistent findings related to child and adolescent BMI and family meals, numerous studies over the last decade have consistently shown that family meals are associated with more healthful dietary intake, higher levels of emotional well-being, and fewer weight control behaviors in youth. Cross-sectional and longitudinal studies with boys and girls from diverse ethnic/racial backgrounds have found that family meals are associated with increased fruit and vegetable intake, (Gable, & Lutz, S., 2000; Gillman et al., 2008; Neumark-Sztainer et al., 2003), calcium and whole grains (Larson, Neumark-Sztainer, Hannan, & Story, 2007; Neumark-Sztainer, Wall, Story, & van den Berg, 2008; Neumark-Sztainer, Story, Ackard, Moe, & Perry, 2000), lower levels of extreme weight control behaviors and binge eating, (Haines, Gillman, Rifas-Shiman, Field, & Austin, 2010; Neumark-Sztainer et al., 2008) and better psychosocial health independent of socio-economic status (Eisenberg, Olson, Neumark-Sztainer, Story & Bearinger, 2004).

Less is known about whether having frequent family meals is similarly associated with better dietary intake and other weight-related behaviors in adults, due to limited research and inconsistent findings across existing studies. One study found that there was no association between frequent family meals and mothers' dietary intake (e.g. fruit, vegetables, fat) (Boutelle, Birkeland, Hannan, Story & Neumark-Sztainer, 2007), while other studies have found that there was a significant inverse relationship between frequency of family meals and body mass index (BMI) for parents, (Sobal & Hanson, 2011) and for children and their parents (Chan & Sobal, 2011). In addition, a study primarily of mothers of adolescents, found that parents who purchased fast food for family meals three or more times per week were significantly heavier than parents who did not purchase fast food for family meals (Boutelle et al., 2007). Although these previous studies suggest that there is an association

between the frequency of family meals and lower BMI for parents, there are limitations with the studies including small sample sizes and low racial/ethnic and socio-economic diversity. In addition, limited outcomes (e.g. BMI) were measured in past studies, leaving important unanswered questions about the association between family meal frequency and other important outcomes such as dietary intake, fast food intake, and disordered eating behaviors which could provide a more comprehensive picture of parent weight-related health behavior outcomes.

There is also limited research looking at the association between family meal frequency and weight and weight-related behaviors in parents across race/ethnicity or by parent marital status (LaVeist, Zeno & Fesahazion, 2010). Identifying whether there are differences by race/ethnicity or marital status (e.g. dual-headed vs. single-headed households) of the parent will provide important insights related to factors that may moderate the strength of the association between family meal frequency and parent weight and weight-related health outcomes. Although previous research on family meals and parent weight and weight-related outcomes has not looked specifically at racial/ethnic differences, studies using child and adolescent samples have. These studies have shown that the association between the frequency of family meals and more healthful dietary intake and less disordered eating behaviors in adolescents holds above and beyond racial/ethnic differences in youth (Gable & Lutz, 2000; Gillman et al., 2008; Neumark-Sztainer et al., 2003; Dianne Neumark-Sztainer et al., 2000), while other research has shown differences in family meal frequency and obesity across race/ethnicity in children (Rollins, Belue & Francis, 2010). In addition, the majority of research on dual-headed versus single-headed households and family meal frequency has focused on perceived barriers to family meals. This research has shown that married mothers report lack of time, limited cooking skills, and the effort involved in carrying out the meal (e.g. children's picky eating, family conflict) as barriers to family meals, whereas single mothers report the cost of the meal as a major barrier and lack of time and cooking skills as secondary barriers (Berge, Arikian, Neumark-Sztainer & Doherty, in press; Fulkerson, Story, Neumark-Sztainer & Rydell, 2008; Fulkerson et al., 2011). Thus, research looking at whether the association between family meal frequency and parent weight and weight-related outcomes differs across race/ethnicity or by dual-headed versus single-headed households would be a next step in furthering the family meals literature.

In addition, more research is needed to examine both mothers' and fathers' weight and weight-related health behavior outcomes in connection with family meal frequency because very few studies have included data on fathers (Sobal & Hanson, 2011). Research on male and female adolescents suggests that family meal frequency benefits males and females equally in relation to certain dietary behaviors (Fulkerson et al., 2006; Gillman et al., 2000; D. Neumark-Sztainer et al., 2008), but not disordered eating behaviors (Neumark-Sztainer, Wall, Story & Fulkerson, 2004), thus it would be important to identify whether the same associations hold for mothers and fathers.

Thus, given the increase in prevalence of obesity for adults in the US over the last two decades (Ogden, Carroll, Curtin, McDowell, Tabak & Flegal, 2006) and the limited state of the research related to family meals and parent weight and weight-related health outcomes, investigating whether family meals are associated with parent weight and a variety of weight-related health behaviors is of high importance. In addition, given the evidence to-date showing positive weight and weight-related health outcomes (e.g. more healthful dietary intake) for youth, identifying whether family meal frequency is associated with more positive health-related measures in parents will be a first step in identifying whether family meals may benefit the entire family. The current study, therefore, aims to test the following hypotheses: (1) More frequent family meals will be associated with lower body mass index (BMI), more healthful dietary intake (fruit and vegetable intake), less unhealthful dietary

intake (fast food consumption), and less dieting and binge eating behaviors in mothers and fathers; (2) Does race/ethnicity or marital status of parent modify the association between family meal frequency and parent weight and weight-related outcomes?

METHODS

Study sample and design

Data for the current study were drawn from Project F-EAT (Families and Eating and Activity in Teens), a population-based study of parents of adolescents. Project F-EAT surveys were completed by a sample of 3,709 parents or other caregivers of adolescents enrolled in EAT 2010 (Eating and Activity in Teens). The EAT 2010 study sample included 2,793 adolescents from 20 public middle and high schools in the Minneapolis/St Paul metropolitan area of Minnesota. Adolescent participants completed surveys during the 2009–2010 school year. As part of this survey process, adolescents were asked to provide contact information for up to two parents or other persons whom they perceived to be their main caregivers (e.g., grandparent, foster parent, aunt or uncle). Approximately 30% of the adolescents provided contact information for one parent/caregiver and 70% provided information for two parents/caregivers. The response rate among parents was high; 85% of the adolescents had at least one parent respond and 68% of the adolescents who provided information on two parents had both parents respond.

The majority of Project F-EAT respondents were mothers (58.0%), stepmothers (0.8%), fathers (32.9%), or stepfathers (3.3%), but other types of adolescent caregivers (e.g. grandparent, aunt) also made up a small percentage of our total sample (5%). For analyses, given that the majority of respondents were parents or step-parents, we dropped other caregivers (e.g. grandparents) from the sample and used only male or female parents/step-parents, referred to as “mothers” or “fathers”. Respondents had a mean age of 42.4 years (SD=8.6) and were ethnically and socioeconomically diverse. Specifically, the sample was 29.7% white, 26.1% African American, 21.4% Asian, 17.4% Hispanic, and 5.4% mixed or other race/ethnicity. The sample was well distributed across categories of socioeconomic status: 21.9% low, 21.4% low-middle, 27.6% middle, 18.4% upper-middle, and 10.7% high.

Data collection

Parents were initially mailed an invitation letter describing the Project F-EAT study and a phone number to call if they preferred to complete the survey over the telephone. A follow-up mailing included the Project F-EAT survey, a consent form, a two-dollar bill, and a postage-paid return envelope. To enhance participant response, parents were mailed a reminder postcard after two weeks and a second copy of the survey if they did not respond within one month. Finally, non-responders were contacted by telephone and offered the opportunity to complete the survey via telephone with trained study staff. The majority (78%) of parent surveys were completed by mail. To meet the needs of the diverse sample, both mailed surveys and phone interviews were available in English, Spanish, Hmong, and Somali, and the phone interview was additionally offered in Oromo, Amharic, and Karen. Participants who completed the mailed or phone survey were sent a \$25 gift card. Data collection ran from October 2009–October 2010 and was conducted by the Wilder Research Foundation (www.wilderresearch.org). The University of Minnesota Institutional Review Board approved all study procedures.

Survey development

The Project F-EAT survey was designed to assess parent reports of their own eating and physical activity behaviors, food-specific parenting practices, the home food environment, the home physical activity environment, and the emotional atmosphere at home. A multi-

disciplinary research team developed the Project F-EAT survey with guidance from several sources, including the previous Project EAT parent survey, (Neumark-Sztainer, Wall, Story & van den Berg, 2008) corresponding measures from the EAT 2010 student survey, and existing surveys from the scientific literature. New questions were also developed by the research team as needed to address the study aims.

After a draft of the Project F-EAT survey was prepared, several steps were undertaken to ensure the questions were appropriate for the intended audience and to inform decisions about reducing the overall length of the survey. For example, survey appropriateness for the major cultural groups participating in the study (i.e., Native American, Hmong, Latino, Somali and African American groups) was addressed by having bi-cultural staff from the Wilder Research Foundation in St Paul, Minnesota review the survey and provide feedback on the appropriateness and relevance of the survey items. Further, focus groups were conducted to pre-test an initial draft of the Project F-EAT survey and feedback from the diverse parent participants was used to identify and change problematic survey items. An additional sample of 102 parents completed the Project F-EAT survey twice in a two-week time period to examine test-retest reliability of survey questions. Finally, the survey was additionally tested within the F-EAT sample of parents (n=102) to examine the test-retest reliability of measures over a two-week period. Once a final version of the survey was developed in English, the written survey was professionally translated into Spanish, Somali and Hmong.

Measures

To assess *family meal frequency*, parents were asked, “During the past seven days, how many times did all, or most, of your family living in your house eat a meal together?” Response options included: never, 1–2 times, 3–4 times, 5–6 times, 7 times, and more than 7 times (Test-retest $r=.72$) (Fulkerson, Neumark-Sztainer & Story, 2006). Responses were categorized into 0 times a week, 1–2 times a week, 3–4 times a week, 5–6 times a week or 7 or more times a week. This allowed for meaningful comparisons between parents who had infrequent or occasional family meals with families who had regular family meals. For analyses testing linear trends family meal frequency was treated as a continuous variable. Responses of 0 times a week was coded as 0, 1–2 times a week was coded as 1.5, 3–4 times a week as 3.5 5–6 times a week as 5.5, 7 times a week as 7 and more than 7 times a week as 10.

Body Mass Index (BMI) was assessed using parent self-report of height and weight (Test-retest $r=.97$). Self-reported height and weight has been shown to be highly correlated with objectively measured values in adults. (Kuczmarski, Kuczmarski & Najjar, 2001; Palta, Prineas, Berman & Hannan, 1982; Stewart, 1982; Tehard, van Liere, Com Nougue & Clavel-Chapelon, 2002) BMI was calculated using the standard formula, weight (kg)/height (meters)².

Fruit and vegetable intake was assessed by asking parents the following two questions, based on a reliable/valid measure used in a previous study (Boutelle, et al., 2007; Hanson, et. al., 2005): “Thinking back over the past week, how many servings of fruit did you usually eat on a typical day? (A serving is a half cup of fruit or 100% fruit juice, or a medium piece of fruit)” and “Thinking back over the past week, how many servings of vegetables did you usually eat on a typical day? (A serving is half a cup of cooked vegetables or one cup of raw vegetables)”. For both items there were seven response options (0, <1, 1, 2, 3, 4, 5 servings/day) (Test-retest $r=0.69$ [fruit]; $r=0.57$ [vegetables]). Responses for fruit and vegetable intake were summed together to create one variable.

Fast food intake was assessed with one item. Parents were asked: “In the past week, how often did you eat something from a fast food restaurant, such as McDonald’s, Burger King, Domino’s or similar places (pizza counts)?” There were six response options ranging from never to more than seven times (Test-retest $r=.55$). Responses were coded numerically as 0, 1.5, 3.5, 5.5, 7 and 9.

Dieting was assessed by self-report using the following question, “How often have you gone on a diet during the last year? By ‘diet’ we mean changing the way you eat so you can lose weight.” (Neumark-Sztainer, et. al., 2003) Responses included: never, one to four times, five to 10 times, more than 10 times, and I am always dieting (Test-retest % agreement=70%). To distinguish dieters from non-dieters, responses were dichotomized into no (never) and yes (other responses). Sensitivity analyses indicated that collapsing the dieting variable produced similar results as the original 5-item scale. *Binge eating* was assessed using the following item, (Yanovski, Nelson, Dubbert & Spitzer, 1993) “In the past year, have you ever eaten so much food in a short period of time that you would be embarrassed if others saw you (binge-eating)?” [Yes/No] (Yanovski, 1993) (Test-retest % agreement=95%).

Race/ethnicity, educational attainment, age and marital status were assessed by self-report. *Race/ethnicity* was assessed with one survey item: ‘Do you think of yourself as 1) white, 2) black or African-American, 3) Hispanic or Latino, 4) Asian-American, 5) Hawaiian or Pacific Islander, or 6) American Indian or Native American’ and respondents were asked to check all that apply. Participants who checked ‘white’ and another option were included in the other category. Those who checked two non-white options were categorized as ‘mixed/other race’. Additionally, those checking Hawaiian/Pacific Islander or Native American were also categorized as ‘mixed/other race’ due to their small numbers in this dataset. *Educational attainment* was assessed using the following question, “What is the highest level of education that you have completed?” Response options included: less than high school, high school/GED, vocational/technical/trade school, associate degree, bachelor degree, graduate or professional degree (Horacek et al., 2002). *Age* was calculated using self-reported birth date and survey completion date. *Marital status* was assessed using the following question, “What is your marital status?” Response options included: married or committed relationship, divorced/separated, single, widowed, or other (write-in response). We collapsed this variable to currently married versus not currently married.

Statistical analysis

Crude differences in the distribution of categorical variables by parent gender were assessed with chi-square tests. T-tests were used to test for crude parent gender differences between means for continuous variables. To estimate the association between family meals and parent BMI and dietary intake, separate regression models were fit. The independent effect of interest, family meals, was included as a categorical variable. We chose the highest number of family meals (7 or more) as the referent category because previous research suggests that more family meals are beneficial for healthful dietary outcomes, thus allowing us to estimate the effect of deviating from this best case scenario (Neumark-Sztainer et al., 2003; Neumark-Sztainer et al., 2010; Dianne Neumark-Sztainer et al., 2000). All models were fit separately for mothers and fathers because of statistically significant differences found between mothers and fathers in the preliminary analyses (e.g., obesity, dieting, binge eating) (Table 1), and adjusted for age as a continuous variable, educational attainment as categorical using indicator variables, marital status as a categorical variable, and race/ethnicity as categorical using indicator variables when appropriate. Continuous dependent variables (BMI, fruit and vegetable intake, and fast food consumption) were modeled using linear regression. Dichotomous dependent variables (binge eating and dieting) were modeled using logistic regression. Following the regression models, predicted means (linear regression) or probabilities (logistic regression) were calculated for each observation in the

dataset at the observed level of the adjustment variables. The average of these predictions is reported as the adjusted mean or percentage. Prevalence differences and confidence intervals were calculated following the logistic regression using a bootstrap procedure to estimate the standard error of the prevalence difference (Localio, Margolis & Berlin, 2007). Tests of linear trend were conducted by treating family meals as a continuous predictor in an ordinary least squares model adjusted for the same set of covariates as above. Interactions between both race and marital status (i.e. dual-headed households vs. single-headed households) with family meals were evaluated in all models; none were statistically significant and were dropped from final models. All analyses were conducted using Stata (version 10.1, 2009, College Station, TX).

RESULTS

Descriptive analysis of F-EAT parent characteristics

Mothers and fathers were in their mid-forties and from diverse socio-economic and racial/ethnic backgrounds. Descriptive results showed statistically significant differences between fathers and mothers with regards to age, marital status, race/ethnicity and educational attainment, with mothers being younger, less educated, more likely to be single and more likely to be African American (Table 1). In addition, mothers and fathers were significantly different in their fruit and vegetable consumption, fast food intake, and their report of dieting and binge eating behaviors, with mothers generally reporting healthier dietary intake but more dieting and binge eating than fathers. Furthermore, mothers were significantly higher in percent obesity as compared to fathers.

Associations between family meal frequency and parent outcomes

For both mothers and fathers, there were no statistically significant differences in BMI between parents who ate seven or more meals per week and parents who ate fewer than seven meals per week [Table 2 and 3]. When looking at percent obesity, fathers who ate three-four family meals per week were significantly less likely to be obese compared to fathers who ate seven or more family meals per week ($Z=-2.07$, $p=0.039$) [Table 3].

Overall, mothers who ate fewer family meals per week reported eating significantly fewer servings of fruits and vegetables each week as compared to mothers who ate seven or more family meals per week. For example, mothers who ate no family meals per week consumed one less serving of fruit and vegetables than mothers who ate seven or more family meals per week ($t=-4.56$, $p<0.001$) [Table 2]. The association between family meal frequency and mothers' and fathers' dietary intake became more attenuated as more family meals were reported each week (test for trend $p < 0.001$; Table 2). Mothers who ate one-two meals per week consumed 0.6 fewer servings of fruit and vegetables and mothers who ate three-four meals per week consumed 0.4 fewer servings than did mothers who ate seven or more family meals each week.

Among fathers, similar trends were seen for associations between frequency of family meals per week and fruit and vegetable intake. Fathers who ate no family meals per week consumed 1.1 fewer servings of fruit and vegetables than fathers who ate seven or more family meals per week ($t=-4.71$, $p<0.001$). Significantly decreased fruit and vegetable consumption was also observed for fathers eating one-two, three-four, or five-six family meals per week relative to fathers eating seven or more meals per week [test for trend $p < 0.001$; Table 3].

Other findings, including less fast food intake for fathers and fewer dieting and binge eating behaviors for mothers, were significantly associated with family meal frequency, but not consistently across all family meal categories [Table 3]. For example, fathers who ate no

family meals per week ate significantly more fast food per week compared to fathers who had seven or more family meals per week ($t=2.64$, $p=0.009$), but no other family meal frequency category was significantly different from seven or more family meals per week. In addition, mothers who ate one-two family meals per week reported significantly more binge eating behaviors in the past year compared to mothers who ate seven or more family meals per week ($Z=2.78$, $p=0.005$), but no other family meal frequency category was significantly different from seven or more family meals per week. There were no statistically significant differences in consumption of fast food for mothers or dieting and binge eating for fathers at each level of family meal frequency.

Interactions by race/ethnicity and dual-headed versus single-headed households were non-significant, which may indicate that family meals may be important for more healthful dietary intake across race and marital status.

DISCUSSION

The main aim of this study was to investigate whether family meals were associated with parent weight and a variety of weight-related health behaviors. Overall, findings suggest significant positive associations between family meal frequency and parent fruit and vegetable intake. Other significant negative associations between family meal frequency categories and eating patterns (e.g. less fast food consumption, dieting and binge eating behaviors) were found, but not consistent across family meal frequency categories. In addition, there were no significant results observed between family meal frequency and parent BMI.

These results corroborate findings from child and adolescent studies showing significant associations between frequent family meals and healthier dietary intake (e.g. fruits, vegetables, calcium, whole grains) (Gillman et al., 2000; Larson et al., 2007; Larson, et al., 2008; Larson, Story, Wall & Neumark-Sztainer, 2006; Neumark-Sztainer et al., 2003; Videon & Manning, 2003). In addition, these results support the limited existing literature on family meals and adult health behaviors (Boutelle et al., 2007; Boutelle et al., 2003; Chan & Sobal, 2011; Sobal & Hanson, 2011). Taken together, these results indicate that the frequency of family meals is associated with more healthful dietary intake for both parents and children. However, because research findings suggesting the protective nature of family meals for adults is less well established, and mostly cross-sectional, compared to findings for children and adolescents, it is important to replicate these findings in order to assess consistency of findings and conduct longitudinal studies to establish a clear temporality of associations.

Dietary intake results from the current study indicate that parents who had no family meals per week had approximately one less serving of fruits and vegetables per day compared to parents who had seven or more family meals per week. This finding is important in that it may inform interventions aimed at helping parents meet dietary guidelines of eating five or more fruits and vegetables per day (Krauss et al., 2000). In addition, health promotion interventions for families that target adding even one or two more family meals per week may increase parent fruit and vegetable intake as well as child dietary intake through parent modeling of these behaviors at family meals. Recent research supports this finding, in that the study found that parents who had more frequent family meals served salads, vegetables and more healthful food at family meals (Neumark-Sztainer et al., in press).

Interaction analyses in the current study showed a lack of significant interactions by race/ethnicity and marital status (e.g. dual-headed versus single-headed households). These

results may suggest the importance of family meals for parents across all race/ethnicities and family structures for outcomes that were found to be significant in the main analyses.

Results did not show an association between the frequency of family meals and BMI for mothers or fathers. These findings mirror the adolescent literature (Fulkerson, et. al., 2008; Jacobs & Fiese, 2007; Moens, Braet & Soetens, 2007) and limited adult research (Boutelle et al., 2007; Boutelle et al., 2003; Chan & Sobal, 2011; Sobal & Hanson, 2011) on family meals, which has shown mixed results when investigating the association between family meal frequency and obesity. Furthermore, the inability to identify an association between BMI and family meal frequency for adolescents or adults demonstrates the complexity of disentangling the many potential multi-level contributors of BMI.

Study strengths and limitations should be taken into account when interpreting the study findings. The current study had several strengths, including: the use of a large, diverse, population-based sample; the high response rate of participating parents; statistical adjustments for potential confounders (age, SES, race/ethnicity); inclusion of data on fathers; and the ability to look at interactions by race/ethnicity and marital status. Although the cross-sectional nature of this study is appropriate for addressing the question of whether parents having more family meals have better eating patterns and a healthier weight status, we can not determine causality or temporality of associations. For example, the higher fruit and vegetable intake found among parents who had more frequent family meals may be related to the fact that parents who like healthful foods are more likely to have family meals, or that parents who eat healthfully are more likely to enforce family meals at home. Thus, future research should further examine associations longitudinally to assess temporality of associations. Measurement limitations include potential self-report bias, particularly socially desirable responses to questions about family meals and body weight. Furthermore, the study did not use a comprehensive measure of dietary intake, such as a food frequency questionnaire or multiple 24-hour dietary recalls. Thus, the measurement of dietary intake may not be a complete representation of parent dietary intake. Finally, the generalizability of study findings is also limited to the geographical location of St. Paul and Minneapolis, MN.

IMPLICATIONS FOR FAMILY PROFESSIONALS, INTERVENTION RESEARCH AND POLICY

Findings from the current study, in conjunction with other studies on family meals can be useful in guiding interventions around family meals. It may be useful for dietitians, health care professionals, and other professionals who work with families to discuss the potential value of family meals for the entire family. Pointing out that family meals have been found to be associated with better eating patterns in children, (Ackard & Neumark-Sztainer, 2001; Jacobs & Fiese, 2007; Moens, et al., 2007) adolescents, (Gillman, et. al., 2000; Larson, et. al., 2007; Larson, et. al., 2008; Larson, et. al., 2006; Neumark-Sztainer, et. al., 2003; Videon, & Manning, 2003) and parents (Boutelle, et al., 2007; Boutelle, et. al., 2003; Sobal & Hanson, 2011) may motivate parents to make the effort to have regular family meals.

In addition, public health interventions may want to target family meals as a modifiable family home environment factor that may increase better dietary intake in both parents and youth. Targeting both parents and children with the same intervention would be an efficient use of resources. Gradual changes in the frequency of family meals could be encouraged as a reasonable approach.

Furthermore, results from this study may have implications for workplace policies. Specifically, changes in workplace policies and procedures that allow for parents to have more flexible hours (Breagh & Frye, 2008), benefits for less than full time employment

(Charlesworth, Keen, & Whittenbury, 2009), and providing employees greater control over where and when their work is done (Kelly, Moen, & Tranby, 2011) may increase the likelihood that parents will have more frequent family meals.

CONCLUSIONS

Having frequent family meals, seven or more per week, was associated with increased fruit and vegetable intake for both mothers and fathers; however, no relation was observed between family meal frequency and parent BMI. Associations were not as strong or consistent as those found in previous studies on children and adolescents suggesting that youth may be more dependent on family meals for good nutrition than their parents (Anderson & Whitaker, 2010; Gable, Chang, & Krull, 2007; Gillman, Rifas-Shiman, Frazier, Rockett, Camargo, et al., 2000; Sen, 2006; Taveras, Rifas-Shiman, Berkey, Rockett, Field, et al., 2005; Yuasa, et al., 2008). Nevertheless, findings from the current study and results from previous studies suggest that family meals may be beneficial for the entire family in relation to eating patterns.

Highlights for Family Meals: Associations with Weight and Eating Behaviors Among Mothers and Fathers

- Frequent family meals were associated with increased consumption of fruits and vegetables for mothers.
- Frequent family meals were associated with increased consumption of fruits and vegetables for fathers.
- Family meals may be protective for the entire family in relation to dietary intake.

Acknowledgments

Research is supported by grant number R01 HL093247 from the National Heart, Lung, and Blood Institute (PI: Dianne Neumark-Sztainer). Dr. Berge's time is supported by a grant from Building Interdisciplinary Research Careers in Women's Health (BIRCWH) grant Number K12HD055887 from the National Institutes of Child Health and Human Development, administered by the Deborah E. Powell Center for Women's Health at the University of Minnesota.

References

- Ackard D, Neumark-Sztainer D. Family mealtime while growing up: Associations with symptoms of bulimia nervosa. *Eating Disorders: The Journal of Treatment and Prevention*. 2001; 9:239–249.
- Anderson SE, Whitaker RC. Household routines and obesity in US preschool-aged children. *Pediatrics*. 2010; 125(3):420–428. [PubMed: 20142280]
- Belue RZ, Francis LA, Colasco B. One size does not fit all. Identifying risk profiles for overweight in adolescent population subsets. *Journal of Adolescent Health*. 2009; 45(5):517–524. [PubMed: 19837359]
- Berge JM, Arikian A, Neumark-Sztainer D, Doherty W. Healthful eating and physical activity in the home environment: Results from multi-family family groups. *Journal of Nutritional Education and Behavior*. (in press).
- Boutelle K, Fulkerson JA, Neumark-Sztainer D, Story M, French SA. Fast food for family meals: Relationships with parent and adolescent food intake, home food availability and weight status. *Public Health Nutrition*. 2007; 10:16–23. [PubMed: 17212838]
- Boutelle KN, Birkeland RW, Hannan PJ, Story M, Neumark-Sztainer D. Associations between maternal concern for healthy eating and maternal eating behaviors, home food availability, and

- adolescent eating behaviors. *Journal of Nutrition Education and Behavior*. 2007; 39:248–256. [PubMed: 17826344]
- Boutelle KN, Birnbaum AS, Lytle LA, Murray DM, Story M. Associations between perceived family meal environment and parent intake of fruit, vegetables, and fat. *Journal of Nutritional Education and Behavior*. 2003; 35(1):24–29.
- Breaugh JA, Frye NK. Work-Family Conflict: The Importance of Family-Friendly Employment Practices and Family-Supportive Supervisors. *Journal of Business and Psychology*. 2008; 22(4): 345–353.
- Chan JC, Sobal J. Family meals and body weight. Analysis of multiple family members and family units. *Appetite*. 2011; 57:517–524. [PubMed: 21763740]
- Charlesworth S, Keen M, Whittenbury K. Integrating part-time work in policing services: policy, practice, and potential. *Police Practice and Research*. 2009; 10(1):31–47.
- Eisenberg ME, Olson RE, Neumark-Sztainer D, Story M, Bearinger LH. Correlations between family meals and psychosocial well-being among adolescents. *Archives of Pediatrics and Adolescent Medicine*. 2004; 158:792–796. [PubMed: 15289253]
- 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*. 2008; 16(11): 2529–2534. [PubMed: 18719674]
- Fulkerson JA, Neumark-Sztainer D, Story M. Adolescent and parent views of family meals. *Journal of the American Dietetic Association*. 2006; 106:526–532. [PubMed: 16567147]
- 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. *Journal of Adolescent Health*. 2006; 39:337–345. [PubMed: 16919794]
- 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. *Journal of the American Dietetic Association*. 2008; 108(4):706–709. [PubMed: 18375230]
- Fulkerson JA, Yubik M, Rydell S, Boutelle KN, Garwick A, Story M, et al. Focus groups with working parents of school-aged children: What's needed to improve family meals? *Journal of Nutritional Education and Behavior*. 2011; 43:189–193.
- Gable S, Lutz S. Household, parent and child contributions to childhood obesity. *Family Relations*. 2000; 49(3):293–300.
- 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-aged children. *Journal of the American Dietetic Association*. 2007; 107(1):53–61. [PubMed: 17197271]
- Gillman MW, Rifas-Shiman SL, Frazier AL, Rockett HR, Camargo CA Jr, Field AE, et al. Family dinner and diet quality among older children and adolescents. *Archives of Family Medicine*. 2000; 9(3):235–240. [PubMed: 10728109]
- Gundersen C, Lohman B, Eisenmann J, Garasky S, Stewart S. Child-specific food insecurity and overweight are not associated in a sample of 10- to 15-year old low-income youth. *Journal of Nutrition*. 2008; 138(2):371–378. [PubMed: 18203906]
- Haines J, Gillman MW, Rifas-Shiman S, Field AE, Austin AB. Family dinner and disordered eating behaviors in a large cohort of adolescents. *Eating Disorders*. 2010; 18(1):10–24. [PubMed: 20390605]
- Hanson NI, Neumark-Sztainer D, Eisenberg ME, Story M, Wall M. Associations between parental report of the home food environment and adolescent intakes of fruits, vegetables, and dairy foods. *Public Health Nutrition*. 2005; 8:77–85. [PubMed: 15705248]
- Horacek TM, White A, Betts NM, Hoerr S, Georgiou C, Nitzke S, et al. Self-efficacy, perceived benefits, and weight satisfaction discriminate among stages of change for fruit and vegetable intakes for young men and women. *Journal of the American Dietetic Association*. 2002; 102(10): 1466–1470. [PubMed: 12396169]
- Jacobs MP, Fiese BH. Family mealtime interactions and overweight children with asthma: Potential for compounded risks? *Journal of Pediatric Psychology*. 2007; 32(1):64–68. [PubMed: 16951307]

- Keith SW, Redden DT, Katzmarzyk PT, Boggiano MM, Hanlon ED, Benca RM. Putative contributors to the secular increase in obesity. Exploring the roads less traveled. *International Journal of Obesity*. 2006; 30(11):1585–1594. [PubMed: 16801930]
- Kelly EL, Moen P, Tranby E. Changing Workplaces to Reduce Work-Family Conflict: Schedule Control in a White-Collar Organization. *American Sociological Review*. 2011; 76(2):265–290. [PubMed: 21580799]
- Krauss RM, Eckel RH, Howard B, Appel LJ, Daniels SR, Deckelbaum RJ, et al. AHA dietary guidelines revision 2000: A statement for healthcare professionals from the nutrition committee of the American Heart Association. *Stroke*. 2000; 31(11):2751–2766. [PubMed: 11062305]
- Kuczmarski MF, Kuczmarski RJ, Najjar M. Effects of age on validity of self-reported height, weight, and body mass index: Findings from the Third National Health and Nutrition Examination Survey, 1988–1994. *Journal of the American Dietetic Association*. 2001; 101(1):28–34. [PubMed: 11209581]
- Larson NI, Neumark-Sztainer D, Hannan PJ, Story M. Family meals during adolescence are associated with higher diet quality and healthful meal patterns during young adulthood. *Journal of the American Dietetic Association*. 2007; 107:1502–1510. [PubMed: 17761227]
- Larson NI, Neumark-Sztainer D, Harnack L, Wall M, Story M, Eisenberg ME. Fruit and vegetable intake correlates during the transition to young adulthood. *American Journal of Preventive Medicine*. 2008; 35(1):33–37. [PubMed: 18482818]
- Larson NI, Story M, Wall M, Neumark-Sztainer D. Calcium and dairy intakes of adolescents are associated with their home environment, taste preferences, personal health beliefs, and meal patterns. *Journal of the American Dietetic Association*. 2006; 106:1816–1824. [PubMed: 17081833]
- LaVeist TA, Zeno TL, Fesahazion RG. The effects of mother's marital status on adolescent and young adult health and economic well-being among African Americans. *Journal of Family Issues*. 2010; 31(8):1065–1080.
- Localio A, Margolis D, Berlin J. Relative risks and confidence intervals were easily computed indirectly from multivariate logistic regression. *Journal of Clinical Epidemiology*. 2007; 60(9): 874–882. [PubMed: 17689803]
- 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. *Obesity Research*. 2005; 13(8): 1422–1430. [PubMed: 16129725]
- McIntosh, WA. The family meal in global times. In: Grew, R., editor. *Food in Global History*. Boulder, CO: Westview Press; 1999. p. 271–239.
- McIntosh, WA.; Dean, W.; Torres, CC.; Anding, J.; Kubena, KS.; Nyga, R. The American family meal. In: Meiselman, HL., editor. *Meals in Science and Practice*. New York: CRC Press; 2009. p. 190–218.
- Mikkila V, Lahti-Koski M, Pietinen P, Virtanen SM, Rimpela M. Associates of obesity and weight dissatisfaction among Finnish adolescents. *Public Health Nutrition*. 2003; 6:49–56. [PubMed: 12581465]
- Moens E, Braet C, Soetens B. Observation of family functioning at mealtime: A comparison between families of children with and without overweight. *Journal of Pediatric Psychology*. 2007; 32(1): 52–63. [PubMed: 16801324]
- Neumark-Sztainer D, Eisenberg ME, Fulkerson JA, Story M, Larson NI. Family meals and disordered eating in adolescents: Longitudinal findings from Project EAT. *Archives of Pediatrics and Adolescent Medicine*. 2008; 162:17–22. [PubMed: 18180407]
- Neumark-Sztainer D, Hannan PJ, Story M, Croll J, Perry C. Family meal patterns: Associations with sociodemographic characteristics and improved dietary intake among adolescents. *Journal of the American Dietetic Association*. 2003; 103(3):317–322. [PubMed: 12616252]
- Neumark-Sztainer D, Larson N, Fulkerson J, Story M, Hannan P. Family meals and adolescents: What have we learned from Project EAT (Eating Among Teens)? *Public Health Nutrition*. 2010; 13:1113–1121. [PubMed: 20144257]

- Neumark-Sztainer D, MacLehose RF, Loth K, Fulkerson J, Eisenberg ME, Berge JM. Types of foods served at family dinner differ across parent and family characteristics. *Journal of the American Dietetic Association*. (in press).
- Neumark-Sztainer D, Story M, Ackard D, Moe J, Perry C. Family meals among adolescents: Findings from a pilot study. *Journal of Nutritional Education*. 2000; 32:335–340.
- Neumark-Sztainer D, Wall M, Story M, Fulkerson JA. Are family meal patterns associated with disordered eating behaviors among adolescents? *Journal of Adolescent Health*. 2004; 35(5):350–359. [PubMed: 15488428]
- Neumark-Sztainer D, Wall M, Story M, van den Berg P. Accurate parental classification of their overweight adolescents' weight status: Does it matter? *Pediatrics*. 2008; 121:e1495–e1502. [PubMed: 18519453]
- Neumark-Sztainer D, Wall MM, Hannan PJ, Story M, Croll J, Perry C. Correlates of fruit and vegetable intake among adolescents: Findings from Project EAT. *Preventive Medicine*. 2003; 37(3):198–208. [PubMed: 12914825]
- Ogden CL, Carroll MD, Curtin LR, McDowell MA, Tabak CJ, Flegal KM. Prevalence of overweight and obesity in the United States, 1999–2004. *JAMA*. 2006; 295(13):1549–1555. [PubMed: 16595758]
- Palta M, Prineas RJ, Berman R, Hannan P. Comparison of self-reported and measured height and weight. *American Journal of Epidemiology*. 1982; 115(2):223–230. [PubMed: 7058781]
- Rollins BY, Belue RZ, Francis LA. The beneficial effect of family meals on obesity differs by race, sex, and household education. The National Survey of Children's Health 2003–2004. *Journal of the American Dietetic Association*. 2010; 110:1335–1339. [PubMed: 20800125]
- 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. [PubMed: 17189555]
- Sobal J, Hanson K. Family meals and body weight in US adults. *Public Health Nutrition*. 2011; 14(9):1555–1562. [PubMed: 21356147]
- Stewart A. The reliability and validity of self-reported weight and height. *Journal of Chronic Diseases*. 1982; 35:295–309. [PubMed: 7061685]
- Taveras E, Rifas-Shiman S, Berkey C, Rockett H, Field A, Frazier A. Family dinner and adolescent overweight. *Obesity Research*. 2005; 13(5):900–906. [PubMed: 15919844]
- Tehard B, van Liere MJ, Com Nougue C, Clavel-Chapelon F. Anthropometric measurements and body silhouette of women: Validity and perception. *Journal of the American Dietetic Association*. 2002; 102(12):1779–1784. [PubMed: 12487540]
- 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. [PubMed: 18947431]
- Videon TM, Manning CK. Influences on adolescent eating patterns: The importance of family meals. *Journal of Adolescent Health*. 2003; 32:365–373. [PubMed: 12729986]
- Woodruff SJ, Hanning RM, McGoldrick K, Brown KS. Healthy eating index-C is positively associated with family dinner frequency among students in grades 6–8 from Southern Ontario, Canada. *European Journal of Clinical Nutrition*. 2010; 64:1272–1279. [PubMed: 20717128]
- Wurback A, Zellner K, Kromeyer-Hauschild K. Meal patterns among children and adolescents and their associations with weight status and parental characteristics. *Public Health Nutrition*. 2009; 12(8):71–77.
- Yanovski SZ. Binge eating disorder: Current knowledge and future directions. *Obesity Research*. 1993; 1(4):306–324. [PubMed: 16350580]
- Yanovski SZ, Nelson JE, Dubbert BK, Spitzer RL. Association of binge-eating disorder and psychiatric comorbidity in obese patients. *American Journal of Psychiatry*. 1993; 150:1472–1479. [PubMed: 8379549]
- Yuasa K, Sei M, Takeda E, Ewis A, Munakata H, Onishi C, et al. Effects of lifestyle habits and eating meals together with the family on the prevalence of obesity among school children in Tokushima, Japan: A cross-sectional questionnaire-based survey. *The Journal of Medical Investigation*. 2008; 55:71–77. [PubMed: 18319548]

Table 1

Demographic Characteristics, Body Mass Index (BMI), and Eating Patterns: Parents or other Caregivers in the F-EAT study.

	Fathers n=1330	Mothers n = 2,158
Age (mean $\pm$ sd) *	45.0 (8.0)	41.6 (7.3)
Marital Status (n, %) *		
Married	1086 (82.4)	1305 (61.1)
Divorced	112 (8.5)	324 (15.2)
Single	107 (8.1)	447 (20.9)
Other	13 (1.0)	59 (2.8)
Parents (n, %) *		
Biological parent	1210 (91.0)	2129 (98.7)
Step parent	120 (9.0)	29 (1.3)
Race (n, %) *		
White	404 (31.1)	642 (30.3)
Black	288 (22.2)	580 (27.3)
Hispanic	251 (19.3)	354 (16.7)
Asian	300 (23.1)	433 (20.4)
Mixed/Other	57 (4.4)	113 (5.3)
Educational Attainment (n, %) *		
< High school	358 (27.2)	646 (30.4)
High school or GED	303 (23.0)	431 (20.3)
Some college	337 (25.6)	573 (26.9)
Finished college	208 (15.8)	344 (16.2)
Advanced degree	111 (8.4)	133 (6.3)
BMI (mean $\pm$ sd)	28.0 (5.2)	28.5 (6.4)
Obese (n/%) *	351 (27.6)	672 (33.0)
Fruit and Vegetable (servings/day) (mean $\pm$ sd) *	3.4 (2.0)	3.7 (2.0)
Fast food (times/wk) (mean $\pm$ sd) *	1.5 (1.6)	1.2 (1.3)
Dieting in past year (n, % yes) *	480 (36.4)	1176 (54.9)
Binge Eating in past year (n, % yes) *	88 (6.7)	196 (9.2)

* Statistically significant at $p < 0.05$

Table 2
Mothers: Associations Between Family Meal Frequency and Weight and Eating Behaviors *

	Mothers n=2,158					
	0 meals/wk (n=130)	1-2 meals/wk (n=468)	3-4 meals/wk (n=591)	5-6 meals/wk (n=375)	7+ meals/wk (n=590)	Test of linear trend p-value ****
BMI						
Mean (95% CI)	27.8 (26.7, 29.0)	28.5 (27.9, 29.1)	28.6 (28.1, 29.2)	28.8 (28.1, 29.4)	28.3 (27.8, 28.8)	0.846
Difference (95% CI) **	-0.5 (-1.7, 0.8)	0.2 (-0.6, 1.0)	0.4 (-0.4, 1.1)	0.5 (-0.3, 1.3)	Ref	
p-value ***	0.478	0.590	0.361	0.249		
Obese						
Percent (95% CI)	30.9 (21.8, 40.0)	31.0 (26.4, 35.6)	35.0 (30.9, 39.0)	34.0 (28.8, 39.2)	33.4 (29.6, 37.3)	0.354
Difference (95% CI) **	-2.6 (-12.5, 7.4)	-2.5 (-8.5, 3.6)	1.5 (-4.0, 7.1)	0.6 (-5.9, 7.0)	Ref	
p-value ***	0.613	0.422	0.588	0.862		
Dietary Intake:						
Fruit & vegetable intake (servings/day)						
Mean (95% CI)	3.1 (2.7, 3.5)	3.5 (3.3, 3.7)	3.6 (3.5, 3.8)	3.9 (3.7, 4.1)	4.0 (3.9, 4.2)	<0.001
Difference (95% CI) **	-1.0 (-1.4, -0.5)	-0.6 (-0.8, -0.3)	-0.4 (-0.6, -0.1)	-0.2 (-0.4, 0.1)	Ref	
p-value ***	<0.001	<0.001	<0.001	0.264		
Fast food consumption (per week)						
Mean (95% CI)	1.1 (0.8, 1.3)	1.3 (1.2, 1.4)	1.3 (1.2, 1.4)	1.2 (1.1, 1.4)	1.2 (1.1, 1.3)	0.340
Difference (95% CI) **	-0.1 (-0.3, 0.2)	0.1 (0.0, 0.3)	0.1 (0.0, 0.3)	0.1 (-0.1, 0.2)	Ref	
p-value ***	.514	.135	.162	.511		
Weight Control Behaviors:						
Binge Eating (%)						
Prevalence	12.0 (5.7, 18.2)	13.0 (9.7, 16.2)	9.1 (6.7, 11.5)	7.6 (4.9, 10.3)	7.2 (4.9, 9.4)	0.003
Difference (95% CI) **	4.8 (-1.9, 11.5)	5.8 (1.8, 9.8)	1.9 (-1.5, 5.3)	0.4 (-3.1, 4.0)	Ref	
p-value ***	0.160	0.005	0.274	0.805		
Gone on a diet during the last year (%)						

Mothers n=2,158						
	0 meals/wk (n=130)	1-2 meals/wk (n=468)	3-4 meals/wk (n=591)	5-6 meals/wk (n=375)	7+ meals/wk (n=590)	Test of linear trend p-value ****
Prevalence	47.7 (38.2, 57.2)	55.4 (50.9, 60.0)	59.7 (55.4, 63.9)	54.9 (49.8, 60.1)	50.9 (46.7, 55.1)	0.133
Difference (95% CI) **	-3.2 (-0.1, 0.1)	4.5 (-1.5, 10.6)	8.8 (2.8, 14.8)	4.0 (-2.7, 10.8)	Ref	
p-value ***	0.539	0.142	0.004	0.242		

* Adjusted for age, race, educational attainment, marital status, employment status

** Difference = Difference between the mean (or prevalence) of the outcome in the comparison groups and referent group (7+ meals/wk).

*** P-values are for differences described above, i.e., between the comparison groups and referent group (7+ meals/wk).

**** Test of linear trend is estimated from ordinary least squares model with family meal frequency included as a continuous covariate.

Table 3
Fathers: Associations Between Family Meal Frequency and Weight and Eating Behaviors*

Fathers n=1,330						
	0 meals/wk (n=96)	1-2 meals/wk (n=303)	3-4 meals/wk (n=329)	5-6 meals/wk (n=221)	7+ meals/wk (n=375)	Test of linear trend p-value ****
BMI						
Mean (95% CI)	27.5 (26.4, 28.6)	28.0 (27.4, 28.6)	28.0 (27.4, 28.5)	28.0 (27.3, 28.7)	28.1 (27.5, 28.6)	0.712
Difference (95% CI) **	-0.6 (-1.8, 0.6)	-0.1 (-0.9, 0.8)	-0.1 (-0.9, 0.7)	-0.1 (-1.0, 0.8)	Ref	
p-value ***	0.350	0.902	0.774	0.840		
Obese						
Percent (95% CI)	24.7 (15.8, 33.6)	25.9 (20.4, 31.4)	23.5 (18.7, 28.3)	29.8 (23.9, 35.8)	30.9 (26.0, 35.8)	0.058
Difference (95% CI) **	-6.2 (-16.5, 4.1)	-5.0 (-12.3, 2.3)	-7.4 (-14.4, -0.4)	-1.1 (-8.8, 6.5)	Ref	
p-value ***	0.237	0.179	0.039	0.777		
Dietary Intake:						
Fruit and vegetable intake (servings/day)						
Mean (95% CI)	2.8 (2.4, 3.3)	3.0 (2.8, 3.2)	3.3 (3.1, 3.5)	3.3 (3.1, 3.6)	4.0 (3.8, 4.2)	<0.001
Difference (95% CI) **	-1.1 (-1.6, -0.7)	-1.0 (-1.3, -0.7)	-0.7 (-1.0, -0.4)	-0.7 (-1.0, -0.3)	Ref	
p-value ***	<0.001	<0.001	<0.001	<0.001		
Fast food consumption (per/week)						
Mean (95% CI)	1.8 (1.5, 2.1)	1.5 (1.3, 1.7)	1.5 (1.3, 1.7)	1.5 (1.3, 1.7)	1.3 (1.2, 1.5)	0.026
Difference (95% CI) **	0.5 (0.1, 0.9)	0.2 (-0.1, 0.4)	0.2 (-0.1, 0.4)	0.2 (-0.1, 0.4)	Ref	
p-value ***	0.009	0.210	0.138	0.159		
Weight Control Behaviors:						
Binge Eating (%)						
Prevalence	7.8 (1.6, 14.0)	8.0 (4.7, 11.3)	5.2 (2.6, 7.8)	6.1 (2.9, 9.3)	6.9 (4.3, 9.5)	0.952
Difference (95% CI) **	0.9 (-5.9, 7.7)	1.1 (-3.1, 5.4)	-1.7 (-5.4, 2.1)	-0.7 (5.0, 3.4)	Ref	
p-value ***	0.798	0.598	0.373	0.709		
Gone on a diet during the last year (%)						

Fathers n=1,330						
	0 meals/wk (n=96)	1-2 meals/wk (n=303)	3-4 meals/wk (n=329)	5-6 meals/wk (n=221)	7+ meals/wk (n=375)	Test of linear trend p-value ****
Prevalence	39.7 (29.2, 50.3)	40.0 (34.1, 45.9)	36.7 (31.4, 42.1)	34.4 (27.9, 40.8)	34.7 (29.9, 39.6)	0.120
Difference (95% CI) **	5.0 (-6.5, 16.5)	5.3 (-2.5, 13.0)	2.0 (-5.2, 9.2)	-0.3 (-8.7, 7.9)	Ref	
p-value ***	0.397	0.183	0.588	0.928		

* All models are adjusted for age, race, educational attainment, marital status, employment status, except Binge eating which is only adjusted for age and race due to the model instability caused by the small number of men who binge eat

** Difference = Difference between the mean (or prevalence) of the outcome in the comparison groups and referent group (7+ meals/wk).

P-values are for differences described above, i.e., between the comparison groups and referent group (7+ meals/wk).

Test of linear trend is estimated from ordinary least squares model with family meal frequency included as a continuous covariate.