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Family Food Preparation and Its Effects on Adolescent Dietary Quality and Eating Patterns

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Abstract

Purpose—The purpose of the study was to describe parent and adolescent involvement in food preparation for the family, and to examine whether adolescents’ food preparation involvement was related to their dietary quality (e.g. fruit and vegetable intake, sugar-sweetened beverage consumption, and various common nutrients) and eating patterns (e.g., frequency of breakfast, family meals, fast food intake).

Methods—Data from two linked population-based studies, EAT 2010 and F-EAT were used in cross-sectional analyses. Mothers (n=1,875), step-mothers (n=18), fathers (n=977), step-fathers (n=105), and adolescents (n=2,108) from socio-economically and racially/ethnically diverse households participated in the study. Adolescents completed food frequency questionnaires and surveys in school. Parents individually completed surveys by mail or phone. Linear regression was used to estimate difference in adolescent dietary quality and eating patterns between those who do and do not engage in meal preparation.

Results—Parent and adolescent report of “usually preparing food for the family” was related to several sociodemographic characteristics, including race/ethnicity (minority populations), parent education (college or higher), parent employment status (part-time or stay-at-home caregiver), household size (3 children), and adolescent gender (female). Adolescent involvement in food preparation for the family was significantly associated with several markers of better dietary quality and better eating patterns. In contrast, parent involvement in food preparation for the family was unrelated to adolescent dietary intake.

Conclusions—Results suggest that involving adolescents in food preparation for the family is related to better adolescent dietary quality and eating patterns. Public health interventions and health care providers may want to encourage adolescents to help with food preparation for the family. Additionally, adolescents may benefit from interventions/programs that teach cooking skills in order to increase the likelihood of participating in food preparation for the family.

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Keywords

Parents; adolescents; food preparation; diet quality; obesity

INTRODUCTION

Studies have suggested that parent and adolescent involvement in at-home food preparation is associated with adolescent healthful dietary intake and more family meals,¹⁻³ although not all findings have been consistent.⁴ However, recent research suggests the involvement of U.S. families in at-home food preparation has been decreasing since the early 1960's and only recently leveled off.⁵ Additionally, low income households have experienced the greatest reductions in time spent in at-home food preparation, and subsequent increases have been seen in fast food consumption and other less healthful foods.⁵ Given the high potential public health significance of reduced number of hours spent in at-home food preparation over time and the resulting higher consumption of less healthful foods, it is important to conduct a present-day examination of what is occurring in the home environment with regard to food preparation. Specifically, it is important to examine the roles of different family members (e.g., mother, father, children) to obtain a more complete picture of who is involved with food preparation for the family. Furthermore, examining whether involvement in food preparation *for the family*, rather than food preparation in general, is associated with more healthful dietary intake and eating patterns (e.g., family meal occurrence) in adolescents is important and has not been done in previous research.

In addition, research has indicated that fathers have become more involved with childcare and other household responsibilities over the last two decades.⁶⁻¹² This increased involvement by fathers has been found to be associated with improvements in children's academic standing, emotional well-being and health behaviors (e.g., less drinking, smoking).⁷⁻¹⁵ An important extension of these findings is whether paternal involvement in food preparation for the family is associated with healthful outcomes for adolescents, such as markers of better dietary quality (e.g., fruit and vegetable consumption, nutrient intake) and more healthful eating patterns (e.g., less fast food, more family meals). Also, it would be useful to identify whether there are differences in adolescent dietary health outcomes depending on whether mothers, fathers or both are involved with food preparation for the family. Furthermore, it is important to know whether adolescent's involvement in food preparation for the family is associated with more healthful dietary outcomes, above and beyond parents' involvement in food preparation.¹ For example, if a mother or a father is involved in food preparation for the family, how important is it that an adolescent is also involved in food preparation for the family in relation to their overall dietary healthfulness or eating patterns? It is also critical to examine questions related to food preparation for the family within a sample with a variety of family structures (i.e., single parents, blended families) and with racially/ethnically and socio-economically diverse populations, given the national data indicating low income households have experienced the steepest reduction of hours of at-home food preparation over time.⁵ Answers to these questions will inform recommendations for family-based interventions regarding who in the family needs to be

involved with meal preparation for the family in order to have the greatest influence on adolescent health behaviors.

The main research questions in the current study include: (1) who (i.e., mother, father, adolescent) is involved with food preparation for the family across sociodemographic characteristics; (2) is meal preparation by different family members (i.e., mother, father, adolescent) associated with adolescent dietary quality (i.e., eat more fruits and vegetables, consume less sugar-sweetened beverages, have healthful nutrient intake) and eating patterns (e.g., eat breakfast daily, eat frequent family meals, consume less fast food)?; (3) does adolescent involvement in food preparation for the family modify the association between mother or father involvement in food preparation and adolescent dietary quality and eating patterns?

METHODS

Sample and Study Design

Data for this analysis were drawn from two coordinated, population-based studies including, EAT 2010 (Eating and Activity in Teens)¹⁶ and Project F-EAT (Families and Eating and Activity among Teens).¹⁷ EAT 2010 was designed to examine dietary intake, physical activity, weight control behaviors, weight status and factors associated with these outcomes in adolescents. Project F-EAT (Families and Eating and Activity among Teens)¹⁷ was designed to examine factors within the family and home environment of potential relevance to weight-related behaviors. All study procedures were approved by the University of Minnesota's Institutional Review Board Human Subjects Committee.

For EAT 2010,¹⁶ surveys and anthropometric measures were completed by 2,793 adolescents from 20 public middle schools and high schools in the Minneapolis/St. Paul metropolitan area of Minnesota during the 2009–2010 academic year. The mean age of the study population was 14.4 years (SD=2.0) and adolescents were approximately equally divided by gender (46.8% boys, 53.2% girls). The racial/ethnic backgrounds of adolescent participants were as follows: 18.9% white, 29.0% African American or Black, 19.9% Asian American, 16.9% Hispanic, 3.7% Native American, and 11.6% mixed or other. Approximately 71% of adolescents qualified for free or reduce-price school meals. As part of the 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.

For Project F-EAT,¹⁷ data were collected by surveying up to two parents/caregivers of the adolescents that participated in EAT 2010 separately. Parent surveys were mailed individually to each parent and if the participant preferred, they could complete the survey over the phone. The majority of Project F-EAT respondents were mothers (57.9%), 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 (5.1%). The 3,709 parent participants had a mean age of 42.3 years (SD=8.6) and 62% were

mothers, step-mothers or other female guardians. The socioeconomic status (SES) of participants included: 39.0% low SES (<\$35,000), 21.7% low-middle SES (\$35,000–49,999), 17.4% middle SES (\$50,000–79,999), 13.7% upper-middle SES (\$80,000–99,999), and 8.2% high SES (> \$100,000). Participating families of adolescents were ethnically and socioeconomically diverse. Specifically, the parent sample was 29.7% white, 26.1% African American, 21.4% Asian, 17.4% Hispanic, 2.6% Native American, and 2.5% mixed or other race/ethnicity.

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, which we refer to as “mothers” or “fathers”. In addition, due to the specific research questions examined in these analyses, same sex parents were dropped from the sample (n=192). Furthermore, in order to examine meal preparation behaviors across the week we only included children and parents who lived together 100% of the time. Our final analytic sample consisted of 2,029 adolescents and 2,976 parents.

Survey Development

The EAT 2010 student survey¹⁸ and parent F-EAT survey¹⁹ are self-report instruments that assess a range of factors of potential relevance to weight-related variables among adolescents and parents. Survey development was initially guided by a review of pre-existing instruments and surveys in the field of adolescent obesity^{20,21} and a theoretical framework, which integrates Family Systems Theory,²² Social Cognitive Theory²³ and an ecological perspective.²⁴ The survey was pilot tested with a sample of 129 middle school and high school students and 102 parents to examine the test-retest reliability of measures over a period of one to two weeks. Reliability results were used to make final changes to the survey.

Independent Variables

Involvement in food preparation for the family—Mothers, fathers and adolescents each independently self-reported involvement in food preparation for the family. Involvement in food preparation for the family was assessed separately for each parent using a single item: ‘Who usually prepares food for your family? (Choose more than one if the task is split evenly.) [Me, Spouse/partner, Child/children, Other adult in the home, Other (please describe)]?’^{6,25} Parents who indicated that they “usually prepare food for the family” were coded as being involved in food preparation for the family. Adolescents were asked “In the past week, how many times did you help make dinner or supper for your family?” Adolescents who indicated they prepared dinner or supper on three or more days/week were coded as being involved with food preparation for the family.

Dependent Variables

Dietary quality—A semi-quantitative food frequency questionnaire (FFQ) was used to assess usual past year dietary intake.²⁶ Specific foods and beverages included in each category are described in Table 2. Daily servings were defined as the equivalent of one-half cup for fruits (excluding fruit juice) and vegetables (excluding potatoes French fries). A serving of sugar-sweetened beverages was defined as the equivalent of one glass, bottle, or

can. In addition, the FFQ was used to assess usual daily intakes of total energy (calories), total fat (percent of total calories), calcium (mg), folate (mcg), fiber (g), vitamin C (mg), and vitamin D (IU). Nutrient intakes were determined in 2010 by the Nutrition Questionnaire Service Center at the Harvard School of Public Health, using a database from the United States Department of Agriculture's Nutrient Database for Standard Reference (release 19). The reproducibility and validity of the FFQ were previously evaluated in youth ages nine to 18 years by comparing intake determined from the average of three 24-hour recalls and intake determined from two FFQs administered over one year.^{27,28} One-year reproducibility coefficients for energy-adjusted nutrient intake had a mean of 0.41.²⁸ The average correlation coefficient between energy-adjusted nutrient intake determined from the recalls and the average of the two FFQs was 0.45.²⁷

Eating patterns—To assess *family meal frequency*, adolescents 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?”²⁹ Response options included: never, 1–2 times, 3–4 times, 5–6 times, 7 times, and more than 7 times (Test-retest $r=0.72$). A continuous variable was created using the midpoint of each response category and 10 for the highest category.

Fast food intake was assessed by asking adolescents: “In the past month, how often did you eat something from the following types of restaurants (include take-out and delivery)?” Separate responses were queried for “traditional ‘burger-and-fries’ fast food restaurants” “Mexican fast food restaurants” “Fried chicken” “Sandwich or sub shop” and “Pizza place.”³⁰ There were six response options ranging from never to multiple times per day (Test-retest $r = 0.49$). Responses to these items were recoded and summed to reflect the total number of fast food meals per week. A small proportion of individuals ($n=37$) reported more than 90 fast food meals per month; these individuals were truncated at 90.

Breakfast consumption was assessed with one item. Adolescents were asked: “During the past week, how many days did you eat breakfast?”²⁹ Response options ranged from never to every day (Test-retest $r = 0.76$). A continuous variable was created from this question for analytic purposes.

Covariates

Age, sex, race/ethnicity, parent education, household size—Adolescent and parent gender, race/ethnicity and socioeconomic status (SES) were assessed by self-report. Parent and adolescent race/ethnicity was assessed with the 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, or 7) Other?,” and respondents were asked to check all that apply. Participants who checked “white” and another option were included in the non-white category. Those who checked two non-white options were categorized as “mixed/other race”. Additionally, those checking “Hawaiian/Pacific Islander” or “American Indian/Native American” were categorized as “mixed/other race” due to their limited sample. Highest level of parent educational attainment was used as a proxy for SES.^{31,32} Parents were asked, “What is the highest level of education that you have completed?”. Response options included: less than high school, high school/GED,

some college, finished college or advanced degree. Those who finished college or received an advanced degree were combined for the analysis. Parent and adolescent age was calculated using self-reported birth date and survey completion date. Parent and adolescent sex was assessed with the item, “Are you...[male/female]?”. Adolescent grade level was assessed by asking the adolescent what grade they were in. Household size was assessed with the item, “How many children (under the age of 18 years) live in your household. This variable was dichotomized as less than or equal to 3 or greater than 3, a cutpoint that approximates the average number of children in a family in the US (2.5 children).

Statistical Analysis

To address research question one, crude associations between meal preparation involvement and demographic characteristics were estimated using bivariate statistics and chi-square tests. To address research question two, adjusted associations between family meal preparation involvement and each of the outcomes were estimated using separate linear regression models. Regression models were fit separately for mothers, fathers and adolescents. The dichotomous meal preparation variable was included as the independent variable of prime interest in the respective regression models. All regression models were adjusted for adolescent gender, age, and race, as well as parental education (the maximum of either parent’s education), household size, and household structure (1 if the child reported they lived with their mom and dad, mom and step dad; dad and step mom in the same house and 0 otherwise). Dietary outcome regressions were additionally adjusted for family meal frequency. Regression models examining the association between adolescent involvement in meal preparation and dietary intake adjusted for all factors listed above and for any parent involvement in meal preparation were estimated. For the final research question, regression models were also fit with interaction terms between adolescent meal preparation and parental meal preparation (separate models for mothers and fathers). None of these interactions were statistically significant and were excluded from final models. Statistical analysis was done using Stata (version 13, 2013, College Station, TX).

RESULTS

Descriptive results—Descriptive results indicated that 88.3% of mothers and 40.4% of fathers reported usually preparing food for the family (table 1). Involvement in food preparation for the family was also associated with race, with African American and Hispanic mothers and African American, White and mixed/other race fathers most likely to report that they usually prepared food for the family. Fathers with some college and parents/caregivers and fathers who were stay-at-home caregivers were most likely to report that they usually prepared food for the family. Furthermore, mothers and fathers with three or less children in the household were more likely to report that they usually prepared food for the family compared to those with more than 3 children in the house. There were no significant differences in parent reports of food preparation for the family across SES.

For adolescents, 42.2% of female adolescents and 28.4% of male adolescents reported usually preparing food for the family (table 1). Adolescents race/ethnicity was also associated with reporting involvement in food preparation, with Asian American and mixed/

other race adolescents most likely to report that they usually prepared food for the family. There were no statistically significant differences in adolescent reports of preparing food for the family by adolescent grade level or by parent involvement in food preparation for the family.

Associations between meal preparation for the family and adolescent dietary quality and eating patterns—Results indicated significant associations between adolescent involvement in food preparation for the family in the last week and more adolescent fruit and vegetable consumption, healthful nutrient intake (i.e., iron, calcium, folate, vitamin D, vitamin C, fiber), and more family meals per week compared to adolescents with no involvement in food preparation for the family (table 2). For example, adolescents who usually (3+ times/week) participated in food preparation for the family had an additional 0.4 servings (i.e., equivalent to almost ¼ cup) of vegetables per day ($p < 0.001$) compared to adolescents who did not participate in food preparation for the family. Additionally, adolescents who usually participated in food preparation for the family had an additional one to two family meals per week ($p < 0.001$) compared to adolescents who did not participate in food preparation for the family.

There were no statistically significant associations between mother or father involvement in food preparation for the family and adolescent fruit and vegetable consumption, nutrient or fat intake, breakfast frequency, family meal frequency, fast food intake, or sugar-sweetened beverage consumption (table 3). Additionally, there was no effect modification by adolescent involvement in food preparation for the family.

DISCUSSION

Results of the current study confirm prior study findings indicating that involving adolescents in food preparation is associated with better adolescent dietary quality and eating patterns, such as participation in family meals.^{1–3,33,35–39} Additionally, study findings extend previous research by showing that adolescent involvement in food preparation *for the family* versus just being involved with food preparation activities in general within the home environment is associated with more healthful dietary quality and eating patterns. These findings are important because they suggest that adolescents are preparing and eating food with their family versus just making food for themselves. Given that eating family meals has been found to be associated with numerous health benefits for adolescents including, fewer unhealthy weight control behaviors, psychosocial problems, risk taking behaviors and more healthful dietary intake, family communication and connection,^{29, 40} it is important to identify factors that increase the occurrence of family meals.

Another new finding was related to mother and father involvement in food preparation for the family. Specifically, mother and father reported involvement in food preparation for the family was not associated with adolescent dietary quality and eating patterns. This new finding was unexpected. However, it is important to consider that the parent and adolescent survey question regarding meal preparation was slightly different, thus this finding could be a result of measurement error or not capturing the same construct in parents and adolescents. It would be important for future research to use identical validated survey questions with

parents and adolescents to confirm study results. In addition, this result may be due to social desirability bias by parents when answering the survey question. On the other hand, this finding may be indicating that mothers' and fathers' were engaging in food preparation of less healthful foods and thus, did not contribute to adolescents' overall healthful dietary intake. If this is the case, it would be important for future research to develop family-based meal preparation interventions in which parents are taught food preparation skills around healthful foods.

Findings from the current study may have implications for future intervention research. For example, it may be important for interventions targeting adolescent healthful dietary intake and eating patterns (e.g., family meals) to include meal preparation skills focused on preparing food for the family as part of the intervention. Additionally, it may be important for meal preparation interventions to be family-based in order to promote meal preparation of healthful foods with multiple family members (e.g., mothers, fathers, siblings, adolescents), given that results from the current study may be suggesting that healthful foods may not be the focus of parental food preparation behaviors.

This study has a number of strengths one of which is the use of a large, diverse, population-based sample. The size and gender, race/ethnicity, and socioeconomic diversity of the study sample allows for generalizability of study findings to other populations of adolescents. In addition, this study included data from mothers, fathers and adolescents individually, which is rarely done. Findings from the present study must also be interpreted in light of certain limitations. One limitation is that the survey item used to measure usual involvement in food preparation for the family was a one item measure taken from previous research and was asked slightly different for parents (i.e., Who usually prepares food for your family?) compared to adolescents (i.e., In the past week, how many times did you help make dinner or supper for your family).^{6,25} This may have contributed to the differing study findings. It would be important for future research to include a more thorough assessment of meal preparation including hours spent, and broken down by task (e.g., food preparation, carrying out meal, cleaning up the meal) and to use the same item with both parents and adolescents. In addition, it may also be important for future research to examine the influence of family structure (e.g., blended families, single-, dual-parent households) on meal preparation behaviors in the home. A further limitation of the study is that the FFQ utilized in the current study measures food intake over the last year and could have resulted in participant recall bias.

IMPCATIONS AND CONTRIBUTIONS

Results of the current study have implications for future research and health care providers. Family-based obesity prevention studies may want to consider including meal preparation for the family as a target in interventions and intentionally include adolescents in the training. Additionally, intervention research conducted in the community or within schools may want to consider targeting family meal preparation at the individual-level with adolescents. For example, results from the current study may reinforce efforts by schools who are teaching adolescent students cooking skills and home economics. Furthermore, healthcare providers that work with adolescents and parents may want to educate parents

and adolescents about the importance of adolescent involvement in food preparation for the family and discuss ways in which adolescents can be incorporated into food preparation tasks for the family.

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Implications and Contribution

Results indicated that adolescents' involvement in food preparation for the family resulted in more healthful dietary intake and eating patterns (e.g., more family meals). Public health interventions and health care providers may want to educate adolescents about the importance of being involved with food preparation for the family.

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Table 1 Mother, Father and Adolescent Report of Meal Preparation by Demographic Characteristics

Mothers (n=1893)			Fathers (n=1082)		Adolescents (n=2029)	
Demographic Characteristics	% (N) reporting they “usually” prepare food for the family	p-value	% (N) reporting they “usually” prepare food for the family	p-value	Demographic Characteristics	% (N) reporting they “usually” prepare food for the family
Total	88.3 (1662)		40.4 (434)		Total	35.9 (719)
Race/Ethnicity						
White	88.3 (482)	<0.01	46.1 (154)	<0.01	White	21.8 (89)
African American	90.9 (477)		45.9 (95)		African American	37.8 (213)
Hispanic/Latino	91.0 (292)		29.4 (65)		Hispanic/Latino	33.9 (121)
Asian American	84.0 (304)		36.7 (91)		Asian American	46.5 (185)
Mixed/Other	81.4 (79)		52.4 (22)		Mixed/Other	40.7 (109)
Education						
No high school	87.9 (500)	0.43	34.4 (100)	<0.01	Male	28.4 (259)
High school	88.4 (334)		36.6 (87)		Female	42.2 (460)
Some college	90.5 (457)		50.0 (136)		--	--
Finished college/Advanced degree	87.3 (352)		41.2 (108)		--	--
Employment Status						
Full-time	87.0 (739)	0.08	37.4 (254)	<0.01	Grade Level	
Part-time	91.2 (291)		42.1 (48)		Grades 6–8	34.5 (375)
At-home caregiver	91.3 (241)		58.5 (24)		Grades 9–12	37.6 (343)
Unemployed	87.2 (355)		47.3 (105)		--	--
Household Income						
< \$20,000	89.1 (598)	0.66	41.3 (102)	0.04	Parent Involvement in Food Preparation for the Family	
\$20,000–\$34,999	88.9 (367)		36.7 (84)		Yes	35.7 (638)
\$35,000–\$49,999	86.6 (233)		33.7 (63)		No	38.8 (76)
\$50,000–\$74,999	90.3 (187)		39.9 (61)		--	--
\$75,000 or more	87.0 (201)		47.7 (105)		--	--

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Mothers (n=1893)		Fathers (n=1082)		Adolescents (n=2029)	
Demographic Characteristics	% (N) reporting they "usually" prepare food for the family	p-value	% (N) reporting they "usually" prepare food for the family	p-value	% (N) reporting they "usually" prepare food for the family
Household Size (no. children)					
3	89.7 (1,187)	0.04	43.0 (316)	0.01	35.6 (437)
4 or more	86.3 (433)		34.5 (101)		36.5 (282)
					0.66

Table 2

Associations between Adolescent Meal Preparation Involvement and Adolescent Dietary Intake and Eating Patterns*

Adolescent Dietary Quality & Eating Patterns:	Adolescent Involvement with Meal Preparation** (n=2029)			p-value	Difference 95% CI
	Helped Prepare Dinner <3 times/week (n = 1283)	Helped Prepare Dinner 3+ times/week (n=719)			
I usually prepare food for the family:					
Dietary Quality:					
Fruit/servings per day (1/2 cup)	1.19	1.49		<0.01	0.30 (0.13, 0.47)
Vegetables/per day (1/2 cup)	1.25	1.68		<0.01	0.42 (0.28, 0.57)
Sugar-sweetened beverages/per day (1 glass)	0.81	0.76		0.32	-0.05 (-0.15, 0.05)
Iron intake/per day (mg)	12.2	13.7		<0.01	1.5 (0.7, 2.3)
Calcium/per day (mg)	912	1040		<0.01	128 (66, 189)
Folate/per day (meg)	563	616		<0.01	54 (18, 90)
Vitamin D/per day (IU)	192	215		<0.01	24 (9, 38)
Vitamin C/per day (mg)	121	138		0.03	17 (2, 33)
Fiber intake/per day (g)	14.4	17.1		<0.01	2.8 (1.7, 3.8)
Fat (% energy)	30.0	29.7		0.30	-0.2 (-0.8, 0.3)
Eating Patterns:					
Breakfast consumption per week	4.11	4.41		0.08	0.31 (-0.04, 0.65)
Fast Food consumption per week	3.27	3.79		<0.01	0.52 (0.19, 0.86)
Family meal frequency per week	3.98	5.60		0.00	1.62 (1.35, 1.90)

* Adjusted for adolescent gender, age, and race/ethnicity; parental education; family meal frequency (except for eating pattern variables) household size and structure.

** Adjusted for variables listed above as well as parent involvement in meal preparation.

Table 3

Associations between Mother and Father Meal Preparation Involvement and Adolescent Dietary Intake and Eating Patterns*

Adolescent Dietary Quality & Eating Patterns:	Mother Involvement with Meal Preparation (n=1893)			Father Involvement with Meal Preparation (n=1082)				
	Yes (n=1662)	No (n=220)	p-value	Difference (95% CI)	Yes (n=434)	No (n=640)	p-value	Difference (95% CI)
I usually prepare food for the family:								
Dietary Quality:								
Fruit/servings per day (1/2 cup)	1.38	1.29	0.21	-0.09 (-0.24, 0.05)	1.35	1.22	0.06	-0.12 (-0.25, 0.01)
Vegetables/per day (1/2 cup)	1.42	1.40	0.91	-0.01 (-0.25, 0.23)	1.44	1.34	0.35	-0.10 (-0.33, 0.12)
Sugar-sweetened beverages/per day (1 glass)	0.77	0.79	0.74	0.02 (-0.11, 0.15)	0.72	0.77	0.42	0.05 (-0.07, 0.17)
Iron intake/per day (mg)	12.4	12.8	0.31	.43 (-.43, 1.28)	12.3	12.5	0.53	0.27 (-0.63, 1.18)
Calcium/per day (mg)	943	966	0.54	22 (-52, 96)	974	928	0.30	-46 (-135, 43)
Folate/per day (mcg)	573	584	0.61	10 (-31, 52)	577	573	0.80	-5 (-46, 36)
Vitamin D/per day (IU)	195	203	0.47	7.6 (-13.9, 29.1)	212	197	0.11	-15 (-34, 4)
Vitamin C/per day (mg)	130	127	0.63	-3.0 (-15.4, 9.5)	125	116	0.08	-10 (-21, 1.3)
Fiber intake/per day (g)	15.1	15.4	0.66	0.3 (-1.0, 1.5)	15.2	14.9	0.56	-0.3 (-1.4, 0.8)
Fat (% energy)	29.5	30.0	0.25	0.5 (-0.4, 1.3)	29.3	29.8	0.08	0.5 (-0.1, 1.0)
Eating Patterns:								
Breakfast consumption per week	4.1	4.2	0.47	0.2 (-0.3, 0.7)	4.5	4.4	0.70	0.0 (-0.3, 0.2)
Fast Food consumption per week	3.5	3.4	0.64	-0.1 (-0.8, 0.5)	2.8	3.2	0.08	0.4 - (-0.1, 0.8)
Family meal frequency per week	4.3	4.6	0.19	0.3 (-0.2, 0.7)	4.8	4.9	0.52	0.1 (-0.3, 0.5)

* Adjusted for adolescent gender, age, and race/ethnicity; parental education; family meal frequency (except for eating pattern variables) household size, household structure.