

Fast food for family meals: relationships with parent and adolescent food intake, home food availability and weight status

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Abstract

Objective: The purpose of the present study was to examine the prevalence of fast-food purchases for family meals and the associations with sociodemographic variables, dietary intake, home food environment, and weight status in adolescents and their parents.

Design: This study is a cross-sectional evaluation of parent interviews and adolescent surveys from Project EAT (Eating Among Teens).

Subjects: Subjects included 902 middle-school and high-school adolescents (53% female, 47% male) and their parents (89% female, 11% male). The adolescent population was ethnically diverse: 29% white, 24% black, 21% Asian American, 14% Hispanic and 12% other.

Results: Results showed that parents who reported purchasing fast food for family meals at least 3 times per week were significantly more likely than parents who reported purchasing fewer fast-food family meals to report the availability of soda pop and chips in the home. Adolescents in homes with fewer than 3 fast-food family meals per week were significantly more likely than adolescents in homes with more fast-food family meals to report having vegetables and milk served with meals at home. Fast-food purchases for family meals were positively associated with the intake of fast foods and salty snack foods for both parents and adolescents; and weight status among parents. Fast-food purchases for family meals were negatively associated with parental vegetable intake.

Conclusions: Fast-food purchases may be helpful for busy families, but families need to be educated on the effects of fast food for family meals and how to choose healthier, convenient family meals.

Keywords
Family meals
Food intake
Body mass index
Food environment
Adolescent
Parent

The prevalence of obesity continues to rise, and the striking increases in childhood obesity over the past several decades are of particular concern. An estimated 4–5 million children and adolescents between the ages of 6 and 17 years in the USA are obese¹. Obesity is prevalent across gender, age and ethnic groups². Long-term follow-up studies of children and adolescents indicate that the risk of being overweight in adulthood is twice as high for people who were overweight as children than for individuals who were not overweight³. Adolescents who are obese are at increased risk for many negative health sequelae in adulthood, including immediate physical risks, such as orthopaedic and endocrine conditions, to long-term increased cardiovascular disease, cancer and all-cause mortality^{4–7}. Research shows that obesity is associated with a number of psychosocial consequences in childhood and adolescence, including poor self-esteem, teasing and verbal abuse^{8–10}, and overweight adolescents

are more likely to be socially isolated and to be peripheral to social networks¹¹. The rising prevalence of obesity has become a major public health concern.

The family provides an important context for the development of obesity. Parents have the potential to influence their children's eating and physical activity behaviours, and ultimately their risk for obesity, via factors such as role modelling of specific dietary practices and physical activity, support for these behaviours in their children, family meal frequency, purchasing different foods and serving them at meals, and other food socialisation practices. Epidemiological data show that parental weight is both cross-sectionally and prospectively related to childhood obesity^{12,13}. Parents model both exercise and eating habits^{14,15} and reinforce patterns of eating and exercise in the household¹⁶. Empirical evidence suggests that the eating behaviours of children and adolescents are shaped by parenting feeding

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behaviours¹⁷. Dietary intake aggregates within families and individual behaviours are greatly influenced by characteristics within the family, such as the number of meals eaten together^{18,19}. In addition, parents purchase the foods within the home and one of the strongest correlates of food intake is home availability of foods^{20–25}.

Recent attention in the literature has examined the relationship between family meals, dietary quality in parents and children, and psychosocial variables. Studies show that frequent family meals are associated with improved fruit and vegetable intake in adolescents and adults^{26,27} and fewer disordered eating behaviours in adolescents²⁸. Family meals are inversely associated with adolescent substance use, low grade point average, depressive symptoms and suicidal thoughts²⁹. Findings from Project EAT (Eating Among Teens) also showed that families may struggle with family meals due to time constraints and busy schedules of adolescents and their parents³⁰. Purchasing fast food for meals provides a convenient alternative for busy families; however, little is known about the impact of purchasing fast food for family meals on dietary intake of family members.

Fast food has become a significant part of the American diet, and continues to increase over time. The proportion of away-from-home food expenditures on fast food increased from 29% to 34% between 1982 and 1997³¹. Fast-food consumption may contribute to the growing level of obesity, through energy-dense foods, high fat content and large portion sizes³². Fast food is known to be high in energy density, and fast-food outlets have an average menu of more than twice the energy density of recommended healthy diets³³. Several studies have shown that eating fast food is associated with higher energy intake on those days than on days without fast food in both adults and children^{34,35}.

Considering the prevalence of fast food, little research has been published on the associations between fast-food consumption and weight or nutritional status. Five studies^{34–38} have shown that an increase in fast-food consumption is associated with higher intakes of energy and dietary fat, and lower intakes of fruits, vegetables and healthy food, in children, adolescents and adults. In adults more frequent fast-food consumption was also associated with higher weight^{36,38}. It is evident from the limited literature in this area that fast-food consumption may lead to excess energy intake and, in turn, increase risk of overweight and obesity. Considering the strong impact of family and home environment on childhood obesity, and the high prevalence of fast food, it is important to evaluate the potential impact of the inclusion of fast food in family meals on both parents and children. To our knowledge, there are no published studies to date that explore the purchase of fast food for family meals and the relationship with dietary quality and family food environment.

Thus the aims of the present study were: (1) to examine the prevalence of purchases of fast food for family meals;

and (2) to examine the associations between purchases of fast food for family meals and sociodemographic characteristics, dietary intake, home food availability, and weight status in adolescents and their parents. We hypothesised that more frequent purchases of fast food for family meals would be associated with higher energy intake, lower fruit and vegetable intake, a less healthful food environment, and higher body mass index (BMI) for both parents and adolescents.

Methods

Procedures

Project EAT is a comprehensive study of obesity and nutrition among adolescents in the Minneapolis/St. Paul metropolitan area. Out of the 4746 adolescents from 31 middle and high schools who completed the school survey (82% participation rate), a random sample of 943 adolescents was selected to have a parent interviewed with a total of 902 parent interviews completed (87% participation rate). The present study findings are based on the sample of adolescents ($n = 902$) whose parents also completed an interview. Study procedures were approved by the University of Minnesota Human Subjects' Committee and by the participating schools districts' research boards. Detailed descriptions of participant recruitment and study procedures have been given in other publications related to the study^{39–41}.

Subjects

The 902 adolescents in the study were split evenly by gender (47% male, 53% female) and 60% were in high school. The percentage of adolescents reporting in each of the racial/ethnic groups was as follows: 29% white, 24% black, 21% Asian American, 14% Hispanic and 12% other. Of the 902 parents/guardians, 89% were female, 63% were married, 43% were white, and socio-economic status (SES) was equally represented in low, medium and high groups (based on highest level of education by either parent). The percentage of parents reporting in each of the racial/ethnic groups was as follows: 43% white, 22% black, 18% Asian American, 10% Hispanic and 7% other.

Measures

Parent report

Parents' demographics and weight status. Parents reported their marital status, race/ethnicity, SES, and current height and weight during a telephone interview. SES was calculated by classification and regression tree analyses⁴² in which indicators of education, work status and receipt of public assistance were used in a series of decision rules to separate cases into homogeneous subgroups. Analyses revealed five approximately equally distributed categories (low, low/medium, medium, medium/high and high) and were primarily reflective of

the education level of the highest educated parent in a household. Parents' BMI was calculated from their self-reported height and weight.

Purchases of fast food for family meals. Parents responded to the following question: 'In the past week, how many times was a family meal purchased from a fast-food restaurant, and eaten either at the restaurant or at home?' Responses included never, 1–2 times, 3–4 times, 5–6 times, 7 times, more than 7 times. For analyses, response categories were collapsed to reflect 'none', '1–2 per week' and '3 or more per week'.

Fast-food intake. Parents responded to the following question: 'In the past week, how many times did you eat something from a fast-food restaurant, such as McDonald's, Burger King, Domino's, or similar places? (Pizza counts)'. Responses included never, 1–2 times, 3–4 times, 5–6 times, 7 times, more than 7 times. For analyses, response categories were recoded as follows: never = 0, 1–2 times = 1.5, 3–4 times = 3.5, 5–6 times = 5.5, 7 times = 7 and more than 7 times = 8.

Food availability at home. Parent report of food availability in the home was assessed with items regarding how often the following foods were available in their home: fruits and vegetables, 100% fruit juice, soda pop, potato chips and other salty snack foods, and chocolate and other candy. Response options included always, usually, sometimes and never. Frequency of serving vegetables for dinner and milk with meals was also queried in the same manner. For analyses, responses were recoded to always/usually or sometimes/never.

Parent food intake. Parent dietary intake was assessed with measures modified from the 5-a-Day Power Plus Program parent survey⁴³. Parental intake was assessed with a survey that queried intake of the following items: usual daily servings of fruits, vegetables and dairy; and consumption of salty snacks in the past month. The question regarding fruits, vegetables and dairy was phrased as: 'Thinking back over the past week, how many servings of fruit/vegetables/dairy did you usually eat on a typical day... zero; less than 1 serving; 1 serving; 2 servings; 3 servings; 4 servings; or 5 or more servings?' The question regarding salty snacks was phrased: 'And now thinking about the past month, how often did you eat any type of salty snack food, such as potato chips, tortilla chips and cheese curls? Would you say never, 1 to 3 times, about once a week, 2 to 4 times a week, or 5 or more times a week?' The question regarding breakfast/lunch consumption was phrased as: 'During the past week, how many days did you eat breakfast/lunch? Never, 1–2 days, 3–4 days, 5–6 days or every day?'

Responses were coded as described below for each set of response options:

- For questions on fruit, vegetable and dairy intake, response options were coded to zero = 0, less than

1 = 0.5, 1 serving = 1, 2 servings = 2, 3 servings = 3, 4 servings = 4, 5+ servings = 5.

- For the item assessing salty snack over the past month, response options were coded to never = 0, 1–3 times = 2, about once a week = 4, 2–4 times a week = 12, 5+ times a week = 20.
- For the items regarding days eating breakfast and days eating lunch over the past week, response options were coded to never = 0, 1–2 days = 1.5, 3–4 days = 3.5, 5–6 days = 5.5, every day = 7.

Adolescent report

Adolescents' demographics and weight status.

Adolescents reported their age, grade in school, gender and race/ethnicity on the Project EAT student survey. Height and weight were measured by trained Project EAT staff, and BMI was calculated with age- and gender-corrected values.

Food availability at home. Adolescent report of food availability in the home was assessed on the student survey with five items regarding the availability in the home of fruits and vegetables, soda pop, junk food, fruit juice, chocolate and other candy, and salty snacks. Two additional items assessed the frequency of milk served with meals and vegetables served with dinner. Response options included always, usually, sometimes and never. For analyses, responses were recoded to always/usually or sometimes/never.

Adolescent food intake. Adolescent intake was assessed with the Youth and Adolescent Questionnaire. Psychometric properties of this instrument have been published elsewhere^{43,44}. Servings per day of the following foods were assessed: fruit, vegetables, calcium-rich foods, grains, soda pop, fried foods, snacks and milk. Estimates of daily energy intake, grams of carbohydrates and percentage energy from fat and saturated fat were calculated based on reported intake.

Fast-food intake. Adolescents responded to the following question: 'In the past week, how many times did you eat something from a fast-food restaurant, such as McDonald's, Burger King, Domino's, or similar places? (Pizza counts)'. Responses included never, 1–2 times, 3–4 times, 5–6 times, 7 times, more than 7 times. For analyses, response categories were recoded to never = 0, 1–2 times = 1.5, 3–4 times = 3.5, 5–6 times = 5.5, 7 times = 7 and more than 7 times = 8.

Statistical analysis

All analyses were conducted using the Statistical Analysis System (SAS Version 8.2; SAS Institute). Chi-square analyses were conducted to examine the relationships between purchases of fast food for family meals and parent- and adolescent-reported demographics.

Demographic variables that were significantly associated with purchases of fast food for family meals in the chi-square analyses were included as covariates in the multivariate regression models to evaluate the relationships between purchases of fast food for family meals and parents' and adolescents' perceptions of the home food availability, dietary intake and weight status. For analyses of continuous outcomes (i.e. dietary intake and BMD), linear regressions were conducted using the PROC MIXED procedure. For dichotomous outcomes (e.g. home food availability, overweight status), logistic regressions were conducted. In the logistic regression analyses, families reporting 3 or more fast-food family meals per week were the referent group, and were compared via odds ratios to families who did not report any fast-food family meals and families who reported 1–2 fast-food family meals per week. We chose 3 or more fast-food family meals per week based on previous research regarding the positive health and psychosocial benefits of frequent family meals^{26,28,29,45}. Due to the number of comparisons in this study, a $P < 0.01$ significance level was used to reduce interpreting findings that were significant by chance alone.

Results

Frequency of fast-food purchases for family meals

The distribution of parental responses to the frequency of purchasing fast food for family meals was as follows: never = 40%; 1–2 times/week = 51%; 3–4 times/week = 7.1%; 5–6 times/week = 1%; 7 times/week = <1%; 7+ times/week = <1%.

As shown in Table 1, there was a suggestive association for female parents to report more purchases of fast food for family meals than male parents. The distribution by parent race/ethnicity was significant, with Asian American parents less likely to report purchases of fast-food meals for dinner, and Hispanic parents reporting more frequent purchases of fast food for family meals than other parents. Similarly, Asian American adolescents were less likely than other adolescents to report purchasing fast food for family meals, and Hispanic and other race adolescents were more likely to report frequent purchases of fast food for family meals. There were no significant differences found in

fast-food frequency by marital status of the parent (% married: 0 meals, 42.0; 1–2 meals, 49.8; 3+ meals, 8.2) or by cohort of the child (% grades 7–9: 0 meals, 39.5; 1–2 meals, 50.6; 3+ meals, 9.9).

Fast-food purchases for family meals and home food availability

As shown in Table 2, after adjusting for the effects of parental race/ethnicity, the odds of having soda pop available in the home were significantly lower for parents reporting no purchases of fast food for family meals or 1–2 fast-food meals per week than for parents reporting 3 or more fast-food meals per week. Similarly, the odds of having chips available in the home were significantly lower for parents reporting no purchases of fast food for family meals compared with parents reporting 3 or more fast-food meals per week. There were suggestive associations between purchases of fast food for family meals and parent reports of less candy in the home, more frequent vegetables served at meals and more frequent milk served at meals.

For adolescents, after adjusting for adolescent race/ethnicity, the odds of reporting vegetables served at dinner were significantly higher for families reporting 1–2 fast-food meals per week than families reporting 3 or more fast-food meals per week. The odds of adolescents reporting milk served at meals were 2.5 times higher for families who reported fewer than 3 fast-food family meals compared with families who reported 3 or more fast-food family meals per week.

Fast-food purchases for family meals and dietary intake of parents and adolescents

Parents who reported more frequent fast-food purchases for family meals consumed more fast food in general in the past week (see Table 3). Frequency of purchases of fast food for family meals was negatively associated with parent-reported usual consumption of servings of vegetables per day ($P < 0.01$), and positively associated with parent consumption of salty snacks ($P < 0.01$).

Frequency of fast-food purchases for family meals was positively associated with adolescent reports of fast-food consumption in general in the past week ($P < 0.001$) and

Table 1 Parent-reported frequency of fast-food family meals by parent and adolescent demographic characteristics

	Gender		Race/ethnicity					Socio-economic status		
	Female	Male	White	Black	Asian	Hispanic	Other	Low	Medium	High
<i>Parents</i>	<i>n</i> = 478	<i>n</i> = 424	<i>n</i> = 387	<i>n</i> = 196	<i>n</i> = 162	<i>n</i> = 88	<i>n</i> = 62	<i>n</i> = 319	<i>n</i> = 267	<i>n</i> = 290
None	37.5	43.4	36.4	41.8	58.0	25.0	32.3	41.1	35.6	41.4
1–2/week	54.4	46.2	54.0	50.5	35.2	59.1	58.1	48.6	54.3	51.0
3+/week	8.1	10.4*	9.6	7.7	6.8	15.9	9.6**	10.3	10.1	7.6
<i>Adolescents</i>	<i>n</i> = 478	<i>n</i> = 424	<i>n</i> = 261	<i>n</i> = 212	<i>n</i> = 189	<i>n</i> = 127	<i>n</i> = 113	<i>n</i> = 336	<i>n</i> = 243	<i>n</i> = 307
None	37.4	43.4	36.8	42.9	54.0	32.3	29.2	41.7	37.0	41.0
1–2/week	54.4	46.2	55.2	48.6	38.1	56.7	57.5	49.4	52.3	50.5
3+/week	8.2	10.4	8.0	8.5	7.9	11.0	13.3**	8.9	10.7	8.5

*, $P < 0.05$; **, $P < 0.01$.

Table 2 Parent and adolescent reports of family food availability by parent report of frequency of fast-food family meals†

	Parent report: Fast food purchased for dinner meal	
	None (<i>n</i> = 363)	1–2/week (<i>n</i> = 456)
<i>Parent report of family food availability‡</i>		
Fruits and vegetables available in home	0.9 (0.3–2.7)	1.2 (0.4–3.5)
100% juice available in home	1.5 (0.7–3.0)	1.6 (0.8–3.2)
Soda pop available in home	0.3 (0.2–0.7)	0.4 (0.2–0.9)
Chips available in home	0.5 (0.3–0.9)	0.7 (0.4–1.3)
Chocolate or other candy available in home	0.6 (0.3–1.2)	0.5 (0.3–1.1)
Vegetables served at dinner at home	2.2 (0.9–5.1)	1.6 (0.7–3.5)
Milk served with meals at home	1.5 (0.7–3.0)	1.7 (0.8–3.3)
<i>Adolescent report of family food availability§</i>		
Fruits and vegetables available in home	1.7 (0.8–3.7)	1.6 (0.7–3.5)
Fruit juice available in home	0.6 (0.3–1.5)	0.7 (0.3–1.7)
Soda pop available in home	0.7 (0.4–1.5)	0.9 (0.5–1.9)
Chips available in home	0.8 (0.4–1.4)	1.0 (0.5–1.9)
Chocolate or other candy available in home	0.7 (0.4–1.4)	0.9 (0.5–1.6)
Junk food available in home	0.5 (0.3–1.1)	0.8 (0.4–1.5)
Vegetables served at dinner at home	1.9 (0.9–3.7)	2.0 (1.1–3.9)
Milk served with meals at home	2.6 (1.3–5.2)	2.6 (1.3–5.2)

† Values are odds ratio (95% confidence interval); referent group is 3+ meals per week (*n* = 83).

‡ Adjusted for parent/guardian race/ethnicity.

§ Adjusted for adolescent race/ethnicity.

consumption of salty snacks in the past month ($P < 0.001$). There were suggestive associations between purchases of fast food for family meals and higher percentage energy from fats, percentage energy from saturated fats, and reports of the number of days eating breakfast and lunch in the past week.

Parents who reported purchasing fast food for family meals at least 3 times per week had higher mean BMI ($P < 0.01$) and were more likely to be overweight ($P < 0.01$) than parents who reported less frequent fast-food purchases. Results stratified by gender indicated that the relationship was statistically significant ($P < 0.01$) for female parents only (mean parent BMI (standard error) kg m^{-2} : males – none = 26.3 (0.56), 1–2/week = 25.8 (0.62), 3+ /week = 26.4 (1.4); females – none = 26.1 (0.33), 1–2/week = 26.7 (0.29), 3+ /week = 28.6 (0.67)). The overall significance of this association across all parents is most likely due to the large percentage of female parents who participated in the interview (89% female). No significant associations were found between the frequency of purchases of fast food for family meals and adolescent BMI or weight status; *post hoc* analyses also indicated that there were no significant associations when analyses were stratified by gender (mean adolescent BMI (standard error) kg m^{-2} : males – none = 23.7 (0.37), 1–2/week = 22.7 (0.36), 3+ /week = 24.1 (0.79); females – none = 23.2 (0.38), 1–2/week = 23.6 (0.31), 3+ /week = 23.7 (0.81)).

Discussion

The purpose of the current study was to evaluate family purchase of fast food for meals and its associations with home food availability, dietary intake, and BMI among

adolescents and their parents. The study findings showed that more frequent fast-food purchases for family meals was associated with overweight among female parents, the availability of less nutritious foods in the home, fewer vegetables and higher salty snack intake among parents, and trends for higher fat, higher saturated fat and less frequent breakfast consumption in adolescents. To the best of our knowledge, this study is the first to extend beyond mere fast-food consumption by individuals to examine factors associated with purchases of fast food for family meals.

Not surprisingly, purchasing fast food for family meals was associated with several potentially unhealthy elements within the home food environment and could be considered a marker for a less optimal food environment in the home. This study showed that increased purchases of fast food for family meals was associated with higher consumption of salty snack foods and decreased intake of vegetable servings among adults, and higher levels of salty snack foods among adolescents. The following trends were also apparent in relation to purchases of fast food for family meals among adolescents: percentage energy from total fat and saturated fat (positive associations), and number of days in the previous week eating breakfast and lunch (negative associations). One hypothesis is that fast food for family meals may be displacing other healthier foods in the diet. Another hypothesis is that both fast food and unhealthy dietary practices could be associated with an overall less healthy eating pattern in the home.

Among both adolescents and parents, home food availability of less nutritious foods (e.g. chips and soda pop) was associated with more frequent purchases of fast

Table 3 Parent and adolescent food intake and BMI by parent report of fast-food purchases for family meals

	Parent report: Fast food purchased for family meal			P-value
	None (n = 363)	1–2/week (n = 456)	3+ /week (n = 83)	
<i>Parental food intake</i> †				
Times eating fast food in past week (M)	0.7 ^a	1.7 ^b	3.3 ^c	<0.001
Usual servings of fruit/day in past week (M)	2.0	1.9	1.8	0.405
Usual servings of vegetables/day in past week (M)	2.3 ^a	2.0 ^b	2.0 ^{ab}	0.003
Usual servings of dairy/day in past week (M)	1.7	1.9	1.9	0.303
Times eating salty snacks past month (M)	6.8 ^a	8.5 ^b	8.6 ^{ab}	0.007
Past week days eating breakfast (M)	4.2	4.3	4.1	0.803
Past week days eating lunch (M)	5.5	5.5	5.2	0.490
<i>Adolescent food intake</i> ‡				
Times eating fast food in past week (M)	1.5 ^a	2.0 ^b	2.1 ^b	<0.001
Servings of fruit/day (M)	2.5	2.5	2.4	0.768
Servings of vegetables/day (M)	2.1	2.0	1.9	0.653
Servings of calcium/day (M)	3.3	3.2	3.3	0.849
Servings of grains/day (M)	6.2	6.1	5.9	0.777
Servings of soda/day (M)	1.4	1.4	1.4	0.971
Servings of fried foods/day (M)	0.6	0.6	0.6	0.993
Servings of snacks/day (M)	2.9	3.2	2.9	0.231
Servings of milk/day (M)	1.4	1.4	1.3	0.811
Total calories/day (kcal) (M)	2254	2239	2119	0.642
Carbohydrates (g) (M)	318	319	293	0.445
Percentage energy from fat	30	30	32	0.043
Percentage energy from saturated fat	10.6	10.7	11.5	0.017
Past week, number of days eating breakfast (M)	3.8	3.7	3.1	0.067
Past week, number of days eating lunch (M)	5.7	5.4	6.0	0.039
Number of times snacked yesterday (M)	2.1	2.2	2.3	0.311
Salty snacks in past month (M)	10.2 ^a	12.2 ^b	11.4 ^{ab}	<0.001
<i>Parental weight status</i>				
BMI (kg m ⁻²) (M)	26.1 ^a	26.6 ^a	28.5 ^b	0.004
Overweight (%)	48.8	51.3	67.5	0.008
<i>Adolescent weight status</i>				
BMI (kg m ⁻²) (M)	23.4	23.3	23.9	0.573
Overweight (%)	32.5	37.3	40.0	0.206

BMI—body mass index; M—mean.

Mean values with unlike superscript letters were significantly different: $P < 0.01$.

† Adjusted for parent/guardian race/ethnicity.

‡ Adjusted for adolescent race/ethnicity.

food for family meals. The poorer home food environment reported by parents and adolescents could be due to a number of pervasive attitudes within the home, including a lack of education about the nutritional content of fast food and its association with weight gain or regarding obesity risk, a lack of interest/motivation to eat healthier foods, or limited resources (time or money) to provide a healthier food environment. Previous findings from Project EAT suggest that time constraints and busy schedules may be a key factor leading to the purchase of fast food for family meals³⁰. More research on the reasons for purchasing fast food for family meals is needed to fully understand the best way to ensure that families are eating together more frequently and making healthful food selections.

This study supports a growing body of literature indicating that there is a positive association between fast-food consumption and negative health sequelae in adults. The relationship between fast-food purchases for family meals and health behaviours and weight among

adolescents is unclear. Since purchases of fast food for family meals was not associated with BMI among adolescents in the present study, we hypothesise that BMI in adolescents may be more distal and less influenced by fast food than in adults. It is possible that the adolescent's need for calories to grow may outweigh the negative effects of including high-calorie fast foods in his/her diet. In addition, since this is a cross-sectional study, it is possible that frequent fast-food consumption at family meals could increase the risk of obesity as these teens approach adulthood.

Strengths of this study that enhance our ability to draw conclusions from the findings include the large and diverse sample in terms of race/ethnicity and SES, the collection of data from both adolescents and their parents, and the assessment of a broad array of dietary data. However, the limitations of this study such as the self-reported data and the cross-sectional design should also be considered when interpreting these results. In addition, the types of foods

purchased were not assessed; thus we could not conclude that all purchases were unhealthful.

The consumption of fast food for family meals is an example of the conveniences of modern life. However, the increasing prevalence of obesity in adults and adolescents is of significant concern. Limiting fast food as a family meal might be one way that families can attempt to improve dietary intake to reduce the risk of obesity. The results of this study suggest that health professionals need to assess and educate families on how to intervene on the influx of fast food in family meals, how to choose healthier fast-food meals, and how to prepare quick and easy meals that are healthy. Further research is needed with more comprehensive measurements of fast-food consumption and purchase behaviours.

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Authorship responsibilities: K.N.B. led the research project and participated in all phases of this study, including conceptualisation of the study, design and analysis, and manuscript preparation. J.A.F. participated in conceptualisation of the study design, conducted the analyses and collaborated on the manuscript preparation. D.N.-S., the Principal Investigator on Project EAT, participated in conceptualisation of the study and collaborated on the manuscript. M.S., a Co-Investigator on Project EAT, participated in conceptualisation of the study and collaborated on the manuscript. S.A.F. conducted work integral to the study design and collaborated on the manuscript.

References

- 1 Troiano RP, Flegal KM. Overweight children and adolescents: description, epidemiology, and demographics. *Pediatrics* 1998; **101**(3 Pt 2): 497–504.
- 2 Ogden CL, Flegal KM, Carroll MD, Johnson CL. Prevalence and trends in overweight among US children and adolescents, 1999–2000. *Journal of the American Medical Association* 2002; **288**(14): 1728–32.
- 3 Must A, Jacques PF, Dallal GE, Bajema CJ, Dietz WH. Long-term morbidity and mortality of overweight adolescents. A follow-up of the Harvard Growth Study of 1922 to 1935. *New England Journal of Medicine* 1992; **327**(19): 1350–5.
- 4 Must A, Strauss RS. Risks and consequences of childhood and adolescent obesity. *International Journal of Obesity and Related Metabolic Disorders* 1999; **23**(Suppl. 2): S2–11.
- 5 Dietz WH. Health consequences of obesity in youth: childhood predictors of adult disease. *Pediatrics* 1998; **101**(3 Pt 2): 518–25.
- 6 Key TJ, Schatzkin A, Willett WC, Allen NE, Spencer EA, Travis RC. Diet, nutrition and the prevention of cancer. *Public Health Nutrition* 2004; **7**(1A): 187–200.
- 7 Micic D. Obesity in children and adolescents – a new epidemic? Consequences in adult life. *Journal of Pediatric Endocrinology & Metabolism* 2001; **14**(Suppl. 5): 1345–52.
- 8 Thompson JK, Covert MD, Stormer SM. Body image, social comparison, and eating disturbance: a covariance structure modeling investigation. *International Journal of Eating Disorders* 1999; **26**(1): 43–51.
- 9 Strauss RS. Childhood obesity and self-esteem. *Pediatrics* 2000; **105**(1): e15.
- 10 Jackson TD, Grilo CM, Masheb RM. Teasing history, onset of obesity, current eating disorder psychopathology, body dissatisfaction, and psychological functioning in binge eating disorder. *Obesity Research* 2000; **8**(6): 451–8.
- 11 Strauss RS, Pollack HA. Social marginalization of overweight children. *Archives of Pediatrics & Adolescent Medicine* 2003; **157**(8): 746–52.
- 12 Gallaher MM, Hauck FR, Yang-Oshida M, Serdula MK. Obesity among Mescalero preschool children. Association with maternal obesity and birth weight. *American Journal of Diseases of Children* 1991; **145**(11): 1262–5.
- 13 Charney E, Goodman HC, McBride M, Lyon B, Pratt R. Childhood antecedents of adult obesity. Do chubby infants become obese adults? *New England Journal of Medicine* 1976; **295**(1): 6–9.
- 14 Birch LL. The relationship between children's food preferences and those of their parents. *Journal of Nutrition Education and Behavior* 1980; **12**: 14–18.
- 15 Sallis JF, Patterson TL, Buono MJ, Atkins CJ, Nader PR. Aggregation of physical activity habits in Mexican-American and Anglo families. *Journal of Behavioral Medicine* 1988; **11**(1): 31–41.
- 16 Klesges RC, Malott JM, Boschee PF, Weber JM. Parental influences on children's food intake, physical activity and relative weight: an extension and replication. *International Journal of Eating Disorders* 1986; **5**: 335–46.
- 17 Birch LL, Davison KK. Family environmental factors influencing the developing behavioral controls of food intake and childhood overweight. *Pediatrics Clinics of North America* 2001; **48**(4): 893–907.
- 18 Vauthier JM, Lluch A, Lecomte E, Artur Y, Herbeth B. Family resemblance in energy and macronutrient intakes: the Stanislas Family Study. *International Journal of Epidemiology* 1996; **25**(5): 1030–7.
- 19 Fisher JO, Mitchell DC, Smiciklas-Wright H, Birch LL. Parental influences on young girls' fruit and vegetable, micronutrient, and fat intakes. *Journal of the American Dietetic Association* 2002; **102**(1): 58–64.
- 20 Neumark-Sztainer D, Wall M, Perry C, Story M. Correlates of fruit and vegetable intake among adolescents. Findings from Project EAT. *Preventive Medicine* 2003; **37**(3): 198–208.
- 21 Young EM, Fors SW, Hayes DM. Associations between perceived parent behaviors and middle school student fruit and vegetable consumption. *Journal of Nutrition Education and Behavior* 2004; **36**(1): 2–8.
- 22 Cullen KW, Baranowski T, Owens E, Marsh T, Rittenberry L, de Moor C. Availability, accessibility, and preferences for fruit, 100% fruit juice, and vegetables influence children's dietary behavior. *Health Education & Behavior* 2003; **30**(5): 615–26.
- 23 Grimm GC, Harnack L, Story M. Factors associated with soft drink consumption in school-aged children. *Journal of the American Dietetic Association* 2004; **104**(8): 1244–9.
- 24 Johnson SL, Birch LL. Parents' and children's adiposity and eating style. *Pediatrics* 1994; **94**(5): 653–61.
- 25 Costanzo PR, Woody EZ. Domain specific parenting styles and their impact on the child's development of particular deviance: the example of obesity proneness. *Journal of Social Clinical Psychology* 1985; **3**: 425–45.
- 26 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): 317–22.
- 27 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 Nutrition Education and Behavior* 2003; **35**(1): 24–9.
- 28 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): 350–9.
- 29 Eisenberg ME, Olson RE, Neumark-Sztainer D, Story M, Bearinger LH. Correlations between family meals and psychosocial well-being among adolescents. *Archives of Pediatrics & Adolescent Medicine* 2004; **158**(8): 792–6.
- 30 Neumark-Sztainer D, Story M, Ackard DM, Moe J, Perry C. The ‘family meal’: views of adolescents. *Journal of Nutrition Education* 2000; **32**: 1–6.
- 31 Jekanowski M. Causes and consequences of fast food sales growth. *Food Review* 1999; (Jan–Apr): 11–6.
- 32 World Health Organization (WHO). *Diet, Nutrition, and the Prevention of Chronic Diseases*. Report of a Joint WHO/Food and Agriculture Organization Expert Consultation. Geneva: WHO, 2003.
- 33 Prentice AM, Jebb SA. Fast foods, energy density and obesity: a possible mechanistic link. *Obesity Reviews* 2003; **4**(4): 187–94.
- 34 Paeratakul S, Ferdinand DP, Champagne CM, Ryan DH, Bray GA. Fast-food consumption among US adults and children: dietary and nutrient intake profile. *Journal of the American Dietetic Association* 2003; **103**(10): 1332–8.
- 35 Bowman SA, Gortmaker SL, Ebbeling CB, Pereira MA, Ludwig DS. Effects of fast-food consumption on energy intake and diet quality among children in a national household survey. *Pediatrics* 2004; **113**(1 Pt 1): 112–8.
- 36 French SA, Harnack L, Jeffery RW. Fast food restaurant use among women in the Pound of Prevention study: dietary, behavioral and demographic correlates. *International Journal of Obesity and Related Metabolic Disorders* 2000; **24**(10): 1353–9.
- 37 French SA, Story M, Neumark-Sztainer D, Fulkerson JA, Hannan P. Fast food restaurant use among adolescents: associations with nutrient intake, food choices and behavioral and psychosocial variables. *International Journal of Obesity and Related Metabolic Disorders* 2001; **25**(12): 1823–33.
- 38 Pereira MA, Kartashov AI, Ebbeling CB, Van Horn L, Slattery ML, Jacobs DR Jr, *et al*. Fast-food habits, weight gain, and insulin resistance (the CARDIA study): 15-year prospective analysis. *Lancet* 2005; **365**(9453): 36–42.
- 39 Neumark-Sztainer D, Falkner N, Story M, Perry C, Hannan PJ, Mulert S. Weight-teasing among adolescents: correlations with weight status and disordered eating behaviors. *International Journal of Obesity and Related Metabolic Disorders* 2002; **26**(1): 123–31.
- 40 Neumark-Sztainer D, Croll J, Story M, Hannan PJ, French SA, Perry C. Ethnic/racial differences in weight-related concerns and behaviors among adolescent girls and boys: findings from Project EAT. *Journal of Psychosomatic Research* 2002; **53**(5): 963–74.
- 41 Fulkerson JA, McGuire MT, Neumark-Sztainer D, Story M, French SA, Perry CL. Weight-related attitudes and behaviors of adolescent boys and girls who are encouraged to diet by their mothers. *International Journal of Obesity and Related Metabolic Disorders* 2002; **26**(12): 1579–87.
- 42 Breiman L, Friedman JH, Olshen RA, Stone CJ. *Classification and Regression Trees*. Belmont, CA: Wadsworth, 1984.
- 43 Rockett HR, Breitenbach M, Frazier AL, Witschi J, Wolf AM, Field AE, *et al*. Validation of a youth/adolescent food frequency questionnaire. *Preventive Medicine* 1997; **26**(6): 808–16.
- 44 Rockett HR, Wolf AM, Colditz GA. Development and reproducibility of a food frequency questionnaire to assess diets of older children and adolescents. *Journal of the American Dietetic Association* 1995; **95**(3): 336–40.
- 45 Mellin AE, Neumark-Sztainer D, Patterson J, Sockalosky J. Unhealthy weight management behavior among adolescent girls with type 1 diabetes mellitus: the role of familial eating patterns and weight-related concerns. *Journal of Adolescent Health* 2004; **35**(4): 278–89.