# Are Parents of Young Children Practicing Healthy Nutrition and Physical Activity Behaviors?

**AUTHORS:** Jerica M. Berge, PhD, LMFT,[a] Nicole Larson, PhD, MPH, RD,[b] Katherine W. Bauer, PhD,[b] and Dianne Neumark-Sztainer, PhD, MPH, RD[b]

[a]*Department of Family Medicine and Community Health, University of Minnesota Medical School, Minneapolis, Minnesota; and* [b]*Division of Epidemiology and Community Health, University of Minnesota, Minneapolis, Minnesota*

**KEY WORDS**

parents, healthy eating, physical activity

**ABBREVIATIONS**

Project EAT—Eating and Activity in Teens and Young Adults
MVPA—moderate-to-vigorous physical activity
SES—socioeconomic status

All the authors made a substantial contribution to the article. Dr Berge conceptualized the article, assisted with data analysis and interpretation, and wrote all drafts; Dr Neumark-Sztainer is the primary investigator on the grant/study from which this article was written, assisted in conceptualizing the article, contributed to the design of the study, and critically revised the article and gave final approval of the version to be published; Dr Larson assisted with the acquisition of data, conducted the data analysis, critically revised the article, and gave final approval of the version to be published; and Dr Bauer assisted with the conceptualization of the article and interpretation of the data and also critically revised the article and gave final approval of the version to be published.

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

www.pediatrics.org/cgi/doi/10.1542/peds.2010-3218

doi:10.1542/peds.2010-3218

Accepted for publication Feb 1, 2011

Address correspondence to Jerica M. Berge, PhD, LMFT, Department of Family Medicine and Community Health, Phillips Wangensteen Building, 516 Delaware St SE, Minneapolis, MN 55455. E-mail: mohl0009@umn.edu

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



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

Funded by the National Institutes of Health (NIH).

**COMPANION PAPER:** A companion to this article can be found on page 888 and online at www.pediatrics.org/cgi/doi/10.1542/peds.2010-1712.

**WHAT'S KNOWN ON THIS SUBJECT:** Becoming a parent is a common life event in early adulthood, but little is known about the connection between parenthood and weight-related health. Understanding parents' health behaviors is important, because health habits may be perpetuated into adulthood and transmitted to children.

**WHAT THIS STUDY ADDS:** Results of this study shed light on the relationship between parenthood and weight status, dietary intake, and physical activity in both mothers and fathers and indicate that mothers may be at greater risk for overweight and other negative health behaviors than fathers.

## abstract

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**BACKGROUND:** Although parenthood is a common life event in early adulthood, little is known about whether parenthood is associated with weight and weight-related health behaviors, including dietary intake and physical activity.

**OBJECTIVE:** In this article we examine whether parents of young children (aged ≤5 years) report different dietary intake, physical activity, and BMIs compared with young adults without children.

**METHODS:** Data for this analysis were drawn from the second and third waves of Project EAT (Eating and Activity in Teens and Young Adults), a longitudinal population-based cohort study. Young adults (838 women, 682 men) from diverse ethnic and socioeconomic backgrounds were included. Gender-stratified linear regression models were used to examine associations between parental status and dietary intake, hours of physical activity, and BMI. Results were adjusted for each health behavior outcome level 5 years earlier (time 2).

**RESULTS:** Results indicate that although many dietary behaviors were the same between parents and nonparents, mothers reported greater consumption of sugar-sweetened beverages, total energy, and percent saturated fat compared with women without children. Both mothers and fathers had lower amounts of physical activity compared with nonparents. Mothers had higher mean BMIs than women without children. No difference was observed in BMIs between fathers and men without children.

**CONCLUSIONS:** Our findings suggest that pediatricians and health care providers may want to consider discussing dietary intake and physical activity with new parents to identify ways to engage in healthful behaviors given the daily demands of parenthood, both to improve parents' own health and to help them model healthful behavior for their children. *Pediatrics* 2011;127:881–887

Given the increased prevalence of obesity in young adults over the last 2 decades[1] and the health risks associated with obesity during young adulthood,[2] it is important to identify factors in young adults' lives that contribute to excess weight gain and decreased participation in weight-related behaviors, including healthy eating and physical activity. Although becoming a parent is a common life event in early adulthood, little is known about the transition to parenthood with regard to weight-related health, dietary intake, and physical activity. Because caring for young children is time-consuming and oftentimes stressful,[3] parents may choose to sacrifice taking care of their own health in exchange for prioritizing their children's health. Alternatively, parents may recognize the importance of developing or maintaining healthy habits for their own long-term health and to model positive behaviors for their children, and therefore may engage in healthful weight-related behavior regardless of the demands of parenthood.

Research assessing the association between parenthood and young adult health outcomes has primarily focused on physical activity, maternal dietary intake during pregnancy, and chronic disease management. A meta-analysis of 31 studies found consistent negative associations between parenthood and being regularly physically active (effect sizes ranged from $d = 0.41$ to 0.48).[4] The review also found that mothers were generally less active than fathers, although there were differences according to race and ethnicity. Research on dietary intake indicates that pregnant women increase their healthful dietary intake (eg, fruits and vegetables, calcium, whole grains),[5] although little is known about whether women maintain these eating behaviors after their child is born. Research assessing chronic disease outcomes and parenthood has shown that parents with diabetes report healthier dietary intake, more physical activity, and more consistent blood sugar monitoring compared with nonparents with diabetes.[6]

Overall, there is a paucity of research related to the connection between parenthood and young adult health behaviors. In particular, there are few studies that have examined associations between parenthood and men's health behavior outcomes.[7] Understanding parents' health behaviors during this new phase of life is important because positive, as well as negative, health habits may become ingrained and perpetuated into later adulthood, and may be transmitted to children. Furthermore, this research is important because parenthood is a time when there is more consistent connection to the medical community through well-child checkups and children's sick visits, thus allowing many opportunities for intervention. This article aims to fill the gap in the existing literature by examining whether parents of young children (aged ≤5 years) report different dietary intake, physical activity, and BMIs compared with young adults without children.

## METHODS

### Sample and Study Design

Data for this analysis were drawn from the second and third waves of Project EAT (Eating and Activity in Teens and Young Adults), a population-based study designed to examine dietary intake, physical activity, weight control behaviors, and weight status in young people. The analytic sample includes 1593 young adults (55% women, 45% men) who responded at all 3 time points. In Project EAT-I (time 1, 1998–1999), junior and senior high school students at public schools in the Minneapolis/St Paul metropolitan area of Minnesota completed surveys and anthropometric measures during the school year.[8,9] For Project EAT-II (time 2, 2003–2004), original participants were mailed follow-up surveys to examine changes in their eating patterns, weight control behaviors, and weight status as they progressed through adolescence.[10,11] Five years later, for Project EAT-III (time 3, 2008–2009), participants were again asked to complete surveys as they progressed into young adulthood. Of the original 4746 participants, 1304 (27.5%) were lost to follow-up for various reasons, primarily missing contact information at baseline ($n = 411$) and no address found at follow-up ($n = 712$). The University of Minnesota's Institutional Review Board Human Subjects Committee approved all protocols used in Project EAT at each time point. Details of the survey development process are described elsewhere.[12]

A total of 1030 men (45%) and 1257 women (55%) returned complete surveys for Project EAT-III, representing 66.4% of participants who could be contacted. The mean age of the sample at EAT-III was 25.3 years (range: 19.8–31.2 years). For this analysis ($n = 1520$), young adults who reported having children but who did not live with their children the majority of the past year were dropped from the sample. In addition, young adults who were parents of children older than 5 years or who reported having a child at time 2 were excluded to help in establishing a temporal association between parenthood and health outcomes examined at time 3.

### Measures

#### *Parent Status*

Parent status was assessed by self-report at times 2 and 3. Young adults were asked, "How many children do you have (including stepchildren and adopted children)?" Response options ranged from none to ≥3. Those who

reported having 1 or more children were asked to write their children's ages in years. In addition, participants were asked, "During the past year, with whom did you live the majority of the time?" One of the response options included "my child(ren)." Participants who lived with their children at time 3, had a child 5 years old or younger, and who were not parents at time 2 were defined as parents for the current study.

### *BMI*

Height and weight were assessed by self-report at times 2 and 3. Self-reported height and weight have been shown to be highly correlated with objectively measured values in adults.[13–16] BMI was calculated by using the standard formula (weight in kilograms divided by height in meters squared).[2] Among a subsample of 125 Project EAT-III participants, the correlation between measured and self-reported BMI values was $r = 0.95$ for men and $r = 0.98$ for women.

### *Dietary Intake*

A food-frequency questionnaire was used to assess usual past year intake of fruit, vegetables, dark-green and orange vegetables, whole grains, milk products, and sugar-sweetened beverages at time 3.[17] Specific foods and beverages included in each category are described in the results table. Daily servings were defined as the equivalent of ½ cup for fruits (excluding fruit juice) and vegetables (excluding French fries), 1 ounce for whole grains, and 1 cup for milk products. A serving of sugar-sweetened beverages was defined as the equivalent of 1 glass, bottle, or can. In addition, the food-frequency questionnaire was used to assess usual daily intakes of total energy (calories), total fat (percentage of total calories), saturated fat (percentage of total calories), calcium (milligrams), folate (micrograms), and fiber (grams). Nutrient intakes were determined in 2009 by the Nutrition Questionnaire Service Center at the Harvard School of Public Health from a database from the US Department of Agriculture's Nutrient Database for Standard Reference (release 19). Previous studies have examined and reported on the reliability and validity of intake estimates.[18,19] A youth form of the food-frequency questionnaire was used to assess dietary intake at time 2.[20,21]

### *Physical Activity*

Physical activity questions were adapted from the Godin Leisure-Time Exercise Questionnaire.[22,23] At times 2 and 3, young adults were asked, "In a usual week, how many hours do you spend doing the following activities:" (1) strenuous exercise (eg, biking fast, aerobics, jogging, basketball, swimming laps, soccer, rollerblading); (2) moderate exercise (eg, walking quickly, easy bicycling, volleyball, skiing, dancing, skateboarding, snowboarding); and (3) mild exercise (eg, walking slowly, bowling, golf, fishing, snowmobiling). Response options ranged from none to $\geq$6 hours a week. Items were summed to determine the total weekly hours of physical activity. Responses to the strenuous and moderate exercise items were summed to determine weekly hours of moderate-to-vigorous physical activity (MVPA).

## Covariates

### *Gender, Age, Race and Ethnicity, and Socioeconomic Status*

Gender, race and ethnicity, and socioeconomic status (SES) were assessed by self-report at time 1. Classification tree methods[24] were used to generate 5 categories of SES (low SES, low to middle SES, middle SES, middle to high SES, and high SES).[25] SES categories were grouped into low, middle, and high for descriptive purposes.

## Statistical Analyses

Descriptive statistics and $\chi^2$ tests were calculated to examine demographic differences between parents and nonparents. Gender-stratified linear regression models were used to examine associations between parental status and each outcome variable (measures of dietary intake, hours of physical activity, and BMI). Gender stratification was done a priori because of knowledge from other research showing differences in health outcomes for men and women (eg, BMI, fruit and vegetable intake, physical activity).[4,7,26,27] All regression models were adjusted for age, race and ethnicity, and SES. To account for potential differences in the outcome measures between parents and nonparents previous to when the parents had children (in adolescence or young adulthood), regression models were adjusted for each health behavior outcome level at time 2. Models used to investigate associations between parental status and dietary intake outcomes were examined with and without adjustment for total energy intake using the nutrient-density method.[25] When the outcome variable of interest exhibited positive skewness, testing was conducted using the square root transformation. A 95% confidence level was used to interpret the statistical significance of probability tests, corresponding to a $P$ value of $<.05$.

Because attrition from the baseline sample did not occur at random, in all analyses, the data were weighted using the response propensity method.[28] Response propensities (ie, the probability of responding to the Project EAT-III survey) were estimated using a logistic regression of response at time 3 on a large number of predictor variables from Project EAT-I. The weighting method resulted in estimates representative of the demographic makeup of the original school-based

**TABLE 1** Demographic Characteristics of Young Adult Parents From Project EAT-III Versus Nonparents

| | Parent | Nonparent | *P* |
|---|---|---|---|
| Female, *n* (%) | 100 (67) | 738 (54) | .002 |
| SES, *n* (%) | | | |
| Low | 83 (50) | 320 (27) | <.001 |
| Middle | 43 (26) | 314 (27) | |
| High | 40 (24) | 547 (46) | |
| Race, *n* (%) | | | |
| White | 66 (38) | 703 (58) | <.001[a] |
| Black | 51 (30) | 160 (13) | |
| Hispanic/Latino | 9 (5) | 62 (5) | |
| Asian-American | 31 (18) | 216 (18) | |
| Native American | 6 (4) | 37 (3) | |
| Mixed/other | 6 (4) | 38 (3) | |
| Age, mean (SD), y | 25 (1.79) | 25 (1.50) | .50 |

Participants were defined as parents if they lived with their children and if their children were 5 years of age or younger. Parents lived with their children at time 3, had a child 5 years of age or older, and were not parents at time 2.

[a] Significance analysis for the race variable compared white versus nonwhite participants.

sample, thereby allowing results to be more fully generalizable to the population of young people in the Minneapolis/St Paul metropolitan area. Analyses were conducted by using SAS 9.1 (2002–2003) (SAS Institute, Inc, Cary, NC).

## RESULTS

Young adult parents ($n = 149$) and nonparents ($n = 1371$) were significantly different in terms of gender, SES, and race (Table 1). Parents were more likely to be female, of lower SES, and black. The majority of parents (92%) reported that their youngest child was 1 year old or younger. No significant difference was observed in the mean age of parents compared with nonparents.

### Associations Between Parenthood and Dietary Intake

Young adult mothers had significantly higher daily intakes of sugar-sweetened drinks (mean: 1.03 vs 0.57 servings; $P < .001$), folate (mean: 1090 vs 840 $\mu$g; $P < .001$), total energy (mean: 2360 vs 1992 kcal; $P < .001$), and saturated fats (mean: 10.3% vs 9.5% of total calories; $P < .003$) compared with women without children (Table 2). After adjusting for total energy intake, the association between folate and parenthood was attenuated ($P = .15$) and the association with dark vegetables was significant ($P = .03$); women without children ate more dark vegetables (mean: 0.57 serving per 1000 cal) than mothers (mean: 0.52 serving per 1000 cal). Mothers did not differ from women without children in terms of fruit, dairy, whole grains, calcium, or fiber intake. Among young adult men, there were no statistically significant differences in dietary intake in fathers compared with men without children.

### Associations Between Parenthood and Physical Activity Patterns

Young adult mothers reported participating in less total physical activity and MVPA compared with young adult

**TABLE 2** Mean Dietary Intake Among Young Adults With or Without Children From Project EAT-III

| | Women | | | | Men | | | |
|---|---|---|---|---|---|---|---|---|
| | Parents ($N = 88$) | Nonparents ($N = 681$) | *P* | kcal, Adjusted *P*[a] | Parents ($N = 43$) | Nonparents ($N = 568$) | *P* | kcal, Adjusted *P* |
| Food servings, *n* | | | | | | | | |
| Fruit (no juice)[b] | 1.77 | 1.71 | .45 | .12 | 1.08 | 1.09 | .94 | .73 |
| Vegetables (no potatoes)[c] | 4.37 | 4.05 | .11 | .38 | 2.21 | 2.05 | .82 | .55 |
| Dark vegetables[d] | 1.40 | 1.31 | .84 | .03[g] | 0.56 | 0.55 | .94 | .46 |
| Dairy foods[e] | 1.92 | 1.66 | .01 | .68 | 2.08 | 1.80 | .29 | .30 |
| Whole grains[f] | 2.21 | 1.9 | .05 | .87 | 2.00 | 1.98 | .43 | .64 |
| Sugar-sweetened drinks[f] | 1.03 | 0.57 | <.001 | .001 | 0.65 | 0.70 | .79 | .51 |
| Nutrients | | | | | | | | |
| Energy, kcal | 2360 | 1992 | <.001 | — | 2367 | 2235 | .30 | — |
| Energy from fat, % | 30.1 | 29.6 | .35 | — | 32.4 | 31.7 | .49 | — |
| Energy from saturated fat, % | 10.3 | 9.5 | .003 | — | 11.1 | 10.4 | .07 | — |
| Folate, $\mu$g | 1090 | 840 | <.001 | .15 | 803 | 864 | .55 | .16 |
| Calcium, mg | 1133 | 1004 | .005 | .55 | 1068 | 1040 | .71 | .98 |
| Fiber, g | 26.1 | 24.0 | .04 | .06 | 20.2 | 19.6 | .79 | .46 |

All models were weighted and adjusted for race, SES, age, and time 2 of the outcome. Energy adjustments were made by using the nutrient-density method.

[a] Adjusted for total energy intake.

[b] Fruit = raisins (1 oz), grapes (½ cup), prunes (6), bananas (1), cantaloupe (¼ melon), fresh apples or pears (1), oranges (1), grapefruit (½), strawberries (½ cup), blueberries (½ cup), peaches or plums (1 fresh or ½ canned), and apricots (1 fresh or 5 dried).

[c] Vegetables = tomatoes (2 slices), tomato sauce (½ cup), string beans (½ cup), beans/lentils (½ cup), peas/lima beans (½ cup), broccoli (½ cup), cauliflower (½ cup), cabbage/coleslaw (½ cup), brussel sprouts (½ cup), carrots (½ cup raw, ½ cooked), corn (½ cup), mixed vegetables (½ cup), yams (½ cup), spinach (1 cup raw, ½ cup cooked), iceberg lettuce (1 serving), romaine/leaf lettuce (1 serving), celery (2–3 sticks), peppers (3 slices), and onions (½ cup).

[d] Dark vegetables = broccoli (½ cup), kale/mustard greens/chard (½ cup), spinach (1 cup raw, ½ cup cooked), romaine/leaf lettuce (1 serving), carrots (½ cup raw, ½ cup cooked), and yams/sweet potatoes (½ cup).

[e] Dairy foods = milk (8 oz), skim, 1% or 2%, whole; yogurt, low carbohydrate, plain, sweetened (1 cup); hard cheeses (1 oz or 1 slice); cottage or ricotta cheese (½ cup); frozen yogurt/sherbet/low-fat ice cream (1 cup); regular ice cream (1 cup); pizza (2 slices); and dairy coffee drink (16 oz).

[f] Sugar-sweetened drinks = carbonated beverage with caffeine and sugar (1 glass or bottle), other carbonated beverage with sugar (1 glass or bottle), and other sugared beverage (eg, lemonade, sports drink) (1 glass or bottle).

[g] The direction of the relationship flipped, and parents had lower intakes of dark vegetables.

**TABLE 3** Physical Activity and BMI Among Young Adults With or Without Children From Project EAT-III

| | Women | | | Men | | |
|---|---|---|---|---|---|---|
| | Parents ($N = 100$) | Nonparents ($N = 738$) | $P$ | Parents ($N = 49$) | Nonparents ($N = 633$) | $P$ |
| Physical activity | | | | | | |
| Total physical activity, h/wk | 4.66 | 5.72 | .05 | 8.34 | 9.95 | .10 |
| MVPA, h/wk | 2.36 | 3.19 | .002 | 5.33 | 6.89 | .01 |
| BMI | 26.5 | 25.6 | .01 | 25.0 | 24.8 | .472 |

All models were weighted and adjusted for race, SES, age, and time 2 of the outcome. Parents lived with their children at time 3, had a child 5 years of age or older, and were not parents at time 2.

women without children. For example, mothers reported engaging in 2.36 hours of MVPA per week whereas women without children reported engaging in 3.19 hours of MVPA per week ($P = .002$). Young adult fathers did not differ from men without children on total physical activity but did differ on MVPA. Fathers reported engaging in 5.33 hours of MVPA per week whereas men without children reported engaging in 6.89 hours of MVPA per week ($P = .01$) (Table 3).

### Associations Between Parenthood and BMI

Young adult mothers had significantly higher BMIs compared with young adult women without children (mean: 26.5 vs 25.6; $P = .01$) (Table 3). There were no differences in BMI between fathers and men without children (mean: 25 vs 24.8; $P = .472$). Parents' lived with their children at time 3, had a child 5 years of age or older, and were not parents at time 2.

## DISCUSSION

Our results indicate that parenthood was associated with a number of negative outcomes, particularly for mothers. Young adult mothers had poorer dietary intake and higher BMI compared with women without children, and both mothers and fathers had lower amounts of physical activity compared with young adult nonparents, despite adjustment for potential confounding variables (including SES). Young adult fathers had similar BMIs and dietary intake compared with nonfathers.

Our finding that mothers differed significantly from women without children in intake of total energy, percent saturated fat, vegetables, and sugar-sweetened beverages but not in fruit, dairy, whole grains, calcium, or fiber intake may suggest that mothers have conflicting factors that influence their dietary intake outcomes. These factors may include wanting to be good role models of healthy dietary intake (eg, eating fruits, dairy) but, at the same time, having less available time to eat healthy. For example, mothers may find it easier and less time-consuming to cook more palatable, yet high-fat, food for children (eg, macaroni and cheese, chicken nuggets) and to eat more snack foods with children. Another potential explanation for the higher energy intake and BMI for mothers is that they may modify their milk consumption habits, including drinking the higher fat milk that their children drink (eg, whole milk).

The finding of decreased physical activity for parents is consistent with previous research reporting cross-sectional and longitudinal associations between parenthood and decreased physical activity.[4,7] Possible explanations for lower physical activity levels among parents versus nonparents is that parents may have difficulty finding time to engage in physical activity. Many parents find caring for young children to be physically and emotionally demanding, and therefore may either not be able to find the time to exercise or, if they have time, they are often too tired to do so. Another possible explanation for the differences in physical activity observed between parents and nonparents is that the measures of physical activity in our study may not adequately capture the types of activities in which parents engage. Rather than purposefully exercising during their leisure time, parents of young children may have many short bursts of physical activity when chasing or playing with their child, carrying their child, walking to the park with their child, or wrestling with their child.

Our findings suggest that mothers of young children are at increased risk for higher BMIs but fathers are not. Weight differences in parents versus nonparents have not previously been identified in research, and fathers have not been analyzed separately. This finding regarding BMIs may be related to primary caregiver status. Typically, mothers take the role of primary caregiver in the home, regardless of whether they work outside the home (part- or full-time) or are stay-at-home mothers. Taking primary responsibility to feed, nurture, and provide overall care for the children may put mothers at increased risk for weight gain and poorer dietary intake because they have less time for physical activity, eat more of the palatable foods children prefer (eg, high in saturated fat and calories), and have more interrupted sleep patterns (eg, responsible for night feedings or wakeups). Mothers in our study may also have postpartum weight retention because the majority of parents had children 1 year old or younger. The nonsignificant BMI findings for fathers may be related to the fact that fathers in this study are

young and are early in their establishment of dietary and physical activity patterns. Therefore, the weight implications of being less physically active may not yet have come to fruition (eg, chronic disease risk).

### Strengths and Limitations

This study has a number of strengths, one of which is the use of a large, diverse, population-based sample. The size, gender, race and ethnicity, and socioeconomic diversity of the study sample allows for generalizability of these study findings to other populations of young adults from US metropolitan areas. This research builds on previous studies that primarily used participant samples from clinical settings or university classrooms. In addition, this study included data from both mothers and fathers. The majority of the research on parenthood has focused on mother self-report. Furthermore, this sample is part of a longitudinal cohort study. Thus, analyses were adjusted for outcomes at time 2, which accounted for behavior and weight differences that may have existed before the parents had their children, therefore allowing for a better understanding of the temporal relationship between having children and individuals' weight and dietary and physical activity behaviors.

Our findings must also be interpreted in light of certain limitations. One limitation is that participants were not asked about barriers to healthy eating and exercise that they experience as a parent. Thus, little information is available to help understand these barriers. Another limitation is that these results are not generalizable to parents with older children. Future research is needed to understand how parents' diet and activity habits are associated with having older children and how parents' health habits may change as their children grow older.

### Implications for Health Care Professionals

Results of our study have implications for pediatricians and other health care providers who have regular contact with parents of young children. Providers may find benefit in talking with new parents about their personal barriers to eating healthy and being physically active, and work with them to identify ways to overcome these barriers and incorporate physical activity and healthy eating into their new lifestyle. New parents may be particularly receptive to ideas to increase their physical activity and healthful dietary intake that allow them to model healthful behavior for their children, such as attending parent/child exercise classes or going for walks together. Future research is needed to explore the effectiveness of these types of discussions between health care providers and new parents.

## CONCLUSIONS

Our results suggest that parenthood may be contributing to poorer dietary intake and higher BMI in young adult mothers and lower physical activity in both young adult mothers and fathers. These findings are important because young adults may continue these behaviors into adulthood, putting them at high risk for obesity. In addition, the modeling of poor dietary intake and physical activity may influence children's health behavior.

## ACKNOWLEDGMENTS

This research was supported by National Heart, Lung, and Blood Institute grant R01HL084064 (principal investigator, Dr Neumark-Sztainer). Dr. Berge's time was supported by a grant from Building Interdisciplinary Careers in Women's Health (BIRCWH) from the Eunice Kennedy Shriver National Institute of Child Health and Human Development (grant K12HD055887) administered by the Deborah E. Powell Center for Women's Health at the University of Minnesota.

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***WISDOM WITH AGE:*** *We were driving along a dirt track in Murchison Falls National Park in northern Uganda. Just after we turned a corner, our guide immediately brought the vehicle to a stop. Approximately 200 yards ahead was a large group of elephants many of whom were babies. Two of the older elephants were immediately adjacent to the track. "Very, very dangerous" said the guide. I thought this was pretty interesting given that the previous day we had been chased by an exceeding large solitary male elephant and the guide had not said much about how dangerous he was. "They are very smart, quite hostile, and very protective of their young" said the guide. Of course, he knew what he was talking about. According to an article in* The New York Times *(Science: March 16, 2011), elderly female elephants may be the smartest of them all. In a study conducted in Kenya, 1300 elephants in 39 groups were bombarded with recorded lion roars and the group actions recorded. The groups were led by matriarchs ranging in age from 24- to 70-years-old. Groups led by matriarchs older than 60 were not only better able to localize the roar, but also determine if the roar was from a male or female and organize themselves into a protective or aggressive united group. Researchers speculate that the matriarchs maintain superb hearing and cognitive abilities (and their leadership role) until their death. The adage, "with age comes wisdom" seems quite applicable to the elephants. For us, as we patiently waited for the elephants to leave the track and move the infants toward the shade of a tree, we admired their grace, intelligence, and remarkable social skills.*

Noted by WVR, MD