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Changes in Diet Behavior when Adults become Parents

Helena H Laroche, MD[1,2], **Robert B Wallace, MD**[3], **Linda Snetselaar, RD, PhD**[3], **Stephen L Hillis, PhD**[2,4], and **Lyn M Steffen, RD, PhD**[5]

[1]Department of Internal Medicine, University of Iowa, Iowa City, Iowa

[2]Comprehensive Access & Delivery Research and Evaluation (CADRE), Iowa City VA Medical Center, Iowa City, Iowa

[3]Department of Epidemiology, University of Iowa, Iowa City, Iowa

[4]Departments of Radiology and Biostatistics, University of Iowa, Iowa City, Iowa

[5]Division of Epidemiology and Community Health, University of Minnesota School of Public Health, Minneapolis, Minnesota

Abstract

Background—Cross-sectional studies suggest that parents eat more saturated fat than non-parents. Few studies exist on other dietary factors or using longitudinal data.

Objective—To compare change in daily dietary intake of selected foods and nutrients over 7 years between adults who have children enter the home and those who do not.

Design—Analysis of data from the Coronary Artery Risk Development in Young Adults (CARDIA) cohort study. Dietary intake was assessed by the CARDIA diet history. The main dependent variables were change from baseline (1985–86) to year 7 (1992–3) for intake of: percent saturated fat (PSF), calories, daily servings of fruits and vegetables (FV), and sugar-sweetened beverages (SSB), and frequency of fast food intake. The primary independent variable was whether or not participants had children in their home by year 7.

Participants—2563 black and white adults who did not have children at baseline from 4 urban centers.

Statistical Analyses performed—Linear regression adjusting for baseline demographics, energy intake, physical activity and smoking status.

Key Results—Parents were more likely to be female, full-time workers, married, and older. Diet did not differ at baseline. Seven year change in diet for parents and non-parents did not differ for FV, SSB or fast food. PSF decreased among both groups but parents showed a smaller decrease in PSF (1.59 vs 2.10 PSF; $p<0.001$). Compared to non-parents, parents increased calorie intake by 79 calories/day ($p=0.058$), but this difference did not reach statistical significance..

Conclusion—Parenthood does not have unfavorable effects on parents' diets but neither does it lead to significant improvements. In fact, parents lag behind their childless counterparts in

Corresponding author and contact for reprints: Helena H. Laroche MD, Assistant Professor, Internal Medicine and Pediatrics, University of Iowa, VA Medical Center, mailstop 152, 601 Highway 6 West, Iowa City, IA 52246, phone: (319) 338-0581 ext 7700, fax: (319) 887-4932.

decreasing their intake of saturated fat and overall their diets still remain poor. Nutrition education programs and health practitioners should develop strategies to support and motivate healthy eating habits in parents.

Keywords

Parent-Child relations; Diet; Food Habits; Adult

The rates of obesity and life-style related chronic diseases among adults and children in the US continue to climb.[1–5] Meanwhile the diet of the average American remains poor.[6] While correlations between the dietary habits of parents and children have been largely interpreted as parental influence on children's diets,[7,8] these findings may also reflect reciprocal influences of children on adults that may be both indirect (e.g. effects on family finances and time management) and direct (e.g. children's food requests).[9–15] Previous studies of the effect of having children on adults' diets have been limited in number[14] and have yielded conflicting results. One study of new mothers found that most planned to improve their diet to benefit their children,[16] and another reported that women in Finland with pre-school age children had better eating habits than other women.[17] However, two prior studies, one using a nationally representative sample from NHANES III and another using a predominantly white sample of US manufacturing employees, observed that adults with children reported higher fat intake than adults without children.[18,19] An Australian study of 211 women found that those with children consumed more calories than those without but fat intake was similar between the two groups.[20] Most prior studies were limited by their cross-sectional study design or small sample size.[20] **However, longitudinal studies with the data to allow for this comparison are rare**

Particular dietary habits are of interest because of the evidence linking them to obesity or chronic disease. The rising obesity rate and its related co-morbidities may be in part fueled by increasing consumption of sugar sweetened beverages,[21–23] fast food, [24–26] and calories.[5,27] Consumption of saturated fat has been linked to heart disease.[28] Conversely, there is increasing data on the health benefits of fruits and vegetables including decreasing hypertension[29] and cancer risk;[30] however only 24% of the US population currently consumes 5 servings of fruits and vegetables per day.[31,32] The current study uses data from a large prospective cohort study to examine the dietary habits of adults before and up to seven years after the entrance of the first child into their home. By describing the types of dietary changes that occur when children enter the home, this report provides insight to both advance research concerning children's role in influencing family diet behavior and identify interventions to improve dietary changes among parents and their children.

Methods

This study was approved by the University of Iowa IRB. The Coronary Artery Risk Development in Young Adults (CARDIA) study was approved by all IRBs at the participating field centers and study participants gave written informed consent to participate in the CARDIA study.

Sample Population

The CARDIA Study is a primarily urban multi-center longitudinal prospective cohort study to identify the development of coronary risk factors in young adults. When the study was initiated in 1985, the CARDIA cohort consisted of 5115 black and white men and women aged 18–30 years at baseline. Clinical centers are located in Birmingham, AL, Chicago, IL, Minneapolis, MN, and Oakland, CA.[33,34] The retention rate at year 7 was 81%.[34] Further detail on sampling procedure and recruitment of the CARDIA study are detailed elsewhere.[33]

These analyses included only CARDIA men and women without children at the baseline interview (n=3476). Participant data was excluded from 1) women who were pregnant at baseline or year 7 (n=55); 2) those with extreme values for energy intake on the food frequency questionnaire at baseline or year 7 (men > 8000 or < 800 kcal/day and women > 6000 or <600 kcal/day; n=99); and 3) those with missing values for physical activity, BMI, education, or smoking status at baseline (n=27) and diet (n=726) or child data (n=6) at baseline or year 7. There were 2563 study participants included in this analysis (1295 women and 1268 men).

Comparisons of those included into final analyses to those adults without children and were not pregnant at baseline excluded from the analyses (n=908) showed the following: participants were not statistically different in terms of baseline BMI, gender, or baseline activity level. However, those excluded were more likely to be African American (55% vs 37%) and on average 1 year younger. Those excluded were less likely at baseline to be working full time (51% vs 60%) or to live with a partner (17% vs 23%) and were more likely to smoke (31% vs 23%). They had an average of 0.8 fewer years of education at baseline (all p<0.001).

Data Collection

Data were collected by trained interviewers[35] and included socio-demographic characteristics, clinical and behavioral risk factors, and the ages of all children in participants' homes. Dietary intake was assessed by an interviewer-administered CARDIA Diet History questionnaire at baseline (1985–86) and Year 7 (1992–3), including questions on usual dietary practices (including frequency of fast food intake)[36] and a validated quantitative food frequency questionnaire with a core list of 100 foods consumed over the prior month.[36,37] Nutrient intake was calculated using the University of Minnesota Nutrition Coordinating Center's Nutrient Database versions 10 (baseline) and 20 (year 7) and food groups created by NDSR 2005.[37,38] Standard servings for each food group were based on USDA standard serving sizes. Height and weight, were measured by trained staff and BMI was calculated as weight (kg)/height (m).[2,33]

Statistical Methods

Statistical analyses were conducted using Statistical Analysis Software (version 9.2, 2010 SAS Institute Inc, Cary, NC).

The primary independent variable was theentrance of any child or step child of the participant into the household between baseline and year 7. The dependent variables included change from baseline to year 7, in percent calories from saturated fat (PSF), intake of energy, fruit and vegetables (FV), fast food, and sugar-sweetened beverages (SSB). Using the change score as the dependent variable reduces the repeated-outcome data to one outcome per person (year 7 value – year 0 value), thus allowing a univariate analysis to be performed. FV consumption was defined as the total number of servings of FV consumed per day. Two versions of this variable were examined: (1) FV excluding fried potatoes, fruit juice and potato chips, and (2) FV including these foods. Because no significant differences were seen in the analysis, only the version excluding these foods is presented. Fast food consumption was defined as the number of times per month participants reported eating at fast food restaurants.[24] SSB consumption was defined as the total number of 8-ounce servings of sugar-sweetened soft drinks and fruit drinks consumed per day.

To increase power and control for possible confounders, the following covariates were added to the regression models: age of adult, gender, race (black or white), field center, years of education, partner status (married or living in a marriage-like relationship vs. other),[39] current smoking status, exercise level (moderate or vigorous activity score based on level of exercise multiplied by frequency), employment status (full time employment or no), baseline BMI, baseline energy intake, and the baseline value of the dietary variable of interest. Variables were chosen a priori based on literature review. Statistically insignificant variables were not dropped from the model because this would result in less accurate *p*-values for tests for the variables of interest.[40]

In bivariate analyses, demographic characteristics, dietary intake, and other covariates were compared between adults with and without children at year 7. Comparisons were made using two-sample t-tests, Wilcoxon (rank-sum) tests or chi-square tests. Linear regression analysis evaluated dietary change scores (year 7 value – baseline value) between those with and without children at year 7, adjusting for covariates as listed above.

Interactions of child entrance into the home with race, gender, adult age at baseline (18–24 or 25–30 years) and overweight status (BMI >25) were tested separately in all regression models. Interactions were not significant for any dietary variable and thus were not retained in the models. Adjusted means of each dietary variable for parents and non-parents were computed using the SAS LSMEANS statement; these adjusted means are derived from the linear regression models by averaging predicted values over levels of categorical covariates with continuous covariates set to their mean values.

Primary tests consisted of testing for an association between the primary independent variable (entry of a child between baseline and 7 years) and change in each of the five outcomes, adjusted for covariates. Conservative adjustment for multiple comparisons using the Bonferroni methods sets the cut off for significance at p-value < 0.01 (p=0.05/5 comparisons = 0.01).

Primary tests had 80% power to detect a 0.15 standard deviation difference in the change scores (year 7 minus baseline) between the child and without-child groups. This difference can be interpreted in the following way: the probability is 0.54 that a randomly selected person's change from one group will exceed that for a randomly selected person from the other group. We note that by chance there is a 0.50 probability; thus we have power to detect a relatively small difference. This power computation is based on a two-sample *t* test with alpha = 0.01. Power computations were performed using nQuery Advisor 6.01 sample size software (Statistical Solutions Ltd., Cork, Ireland).

Additional Analysis

All models were run with and without baseline dependent variables as covariates and showed no substantial differences in results (not shown). Further analyses controlled for change in partner status in the models (not married or living in a marriage-like relationship at baseline but in a relationship at year 7). Additional models examined duration of time a child was in the home. Using data from Year 2 and 5, adults were grouped by length of time they had children in their home (never, <2 years, 2–5 years, 5–7 years, intermittently). We then estimated the regression model with this variable replacing the parent-status variable and tested for a difference between the three length-of-time levels for those with children. For all dietary variables parent groups did not differ significantly from each other and thus results are not shown. For secondary tests no adjustment was made for multiple comparisons; tests with $p \leq 0.05$ were considered significant from an exploratory-analysis perspective.

Results

Throughout the paper, "parent" refers to an adult who had their child or step-child living in their home by year 7. "Non-parent" refers to an adult without any children or without any children living in the home at year 7.

Baseline Comparisons

Baseline characteristics are reported in Table 1. Parents were more likely to be older, female, employed full-time and married or living as married. Comparisons between parents and non-parents were statistically insignificant with respect to race, education, physical activity score, BMI, calories per day, smoking status, and all baseline dietary variables.

Change-score Analyses

Change-score regression results are reported in Table 2 and discussed in this section. Unless stated otherwise, the results discussed are for the regression model that includes the covariates listed in Table 2. Interactions between child and gender were non-significant in all models with p-values ranging from 0.22 –0.96 therefore men and women were analyzed together in order to maximize power.

Percent Saturated Fat Intake

Percent saturated fat intake decreased among both groups, but parents showed a smaller decrease compared to non-parents (1.59 vs. 2.10 % fat; p<0.001). Intake decreased more for women than men (p<0.001), more for those with higher education than lower education (p<0.001), and more in nonsmokers than smokers (p<0.01). When adjusting for change in partner status, differences in percent fat between parents and non-parents remained significant.

Caloric Intake (Energy)

Compared to non-parents, the increase in caloric intake of parents was higher by 79 calories/day (116 vs. 37 calories/day increase, p=0.059) but not statistically significant. When change in partner status was added to the Table 2 model difference in caloric intake change was similar (Parent 126 calories, Non-parent 30 calories: difference 89 calories p=0.03). In the Table 2 model, caloric increase was higher in men (p<0.001), blacks (p=0.02), and for those with a higher activity level (p=0.02) or lower education at baseline (p<0.01).

Fruit and Vegetable Intake

On average both groups increased their FV intake over 7 years and the amount of change did not differ between parents and non-parents. Unrelated to parent status, FV intake increased significantly more for white adults (p<0.001) and those who were more active or ate more calories (p<0.001).

Sweetened Beverage Intake

Adults showed no change in SSB intake over the 7 year time period. Women (p<0.001), whites (p<0.001) and those with higher education (p=0.003) decreased their intake more. However, the change in SSB intake was not significantly different between parents and non-parents.

Fast Food Intake

The change in fast food intake did not differ significantly between parents and non-parents. Neither group on average exhibited a significant change over time. However, women (p<0.001), active adults (p<0.01), and older adults (p<0.01) showed a greater decrease and black adults a greater increase (p<0.001) in intake.

Discussion

This study is one of the first large longitudinal studies to examine how the addition of children into the home may affect parents' eating habits. Adults who had their children or step-children enter the home during a 7-year time span (parents) decreased their consumption of saturated fat less than non-parents (no children in their home at year 7). There were no statistically significant differences in change in caloric, fruit and vegetable, sugar sweetened beverage or fast food intakes. These child effects did not differ significantly by race, gender, age cohort, or baseline BMI.

Overall both parents and non-parents decreased their percent saturated fat intake over 7 years, in keeping with national trends.[41] Parents decreased their saturated fat intake by 1.6% compared to 2.1% lower intake by non-parents (p <0.001). Trends of saturated fat intake in two national surveys of the U.S. population showed a similar decrease among adults age 20–39 from 1976–80 to 1988–94 of 1.6% for men and 1.2% for women.[42] Results from a cross-sectional study in the US also showed higher saturated fat intake among parents compared to non-parents.[18,19] In contrast in Finland and Denmark, where all women received extended paid leave for child rearing (44–48 weeks)[43], one study found women with children under the age of 7 had better diets overall, which included lower saturated fat from "spread on bread"[17] and similar results for fat intake were found in a Denmark study but only among women in their forties.[44]

A variety of factors singly and in combination might explain the smaller decrease in saturated fat among US parents. For example, pre-school age children may directly influence parental diet.[11,14] Almost 50% of parents believe that meal, grocery, and restaurant choices are influenced by their children.[10] Finding foods their children like and request was described by parents as one of the major factors influencing purchasing decisions.[45,46] An observational study of parents at the grocery store with children under age 8 showed that 47.8% gave in to their children's requests for certain food items.[11] Given that marketing strategies to US children focus on high fat, high sugar foods, these requests are often for less healthy foods.[11,45,47,48] One hypothesis is that parents may consume more of these foods after purchasing them for their children.

Children may also indirectly influence the family diet by limiting adults' free time and affecting family finances. Time constraints placed on parents by caring for a young child may influence the ability to shop for, prepare, and even consume foods.[12,1349] Low to moderate income working parents described a desire for healthy shared family meals but in some cases mothers "traded off personal and occasionally child nutrition to save time and energy" while others were able to make work schedule and other changes to make family meals easier.[49] Convenience foods, which require little or no preparation and are easy to eat while doing other tasks, may become an increasing part of parents diets.[12,13] Unfortunately these foods are often higher in saturated fats.[50,51] For example, previous work showed increased pizza, salty snacks and bacon/sausage/processed meats consumption among adults with children in the home compared with adults without children.[18] Cost may be a consideration as raising children may put an increased strain on family finances. High fat food tends to be less costly than others.[52] These constraints may be lessened, at least initially, in places where women get longer paid leave for child-rearing and allow families to focus on healthy eating. It is encouraging that parents decreased their saturated fat at all despite these contraints.

This study found that adults increased their average caloric intake, consistent with the overall population of that age[41,53] On average parents caloric intake increase more (116 calories/day versus 37 calories/day increase: p=0.059) but the difference did not reach statistical significance. One small Australian study also found a longitudinal increase in caloric intake in women who became parents compared to no increase in non-parents.[20] However, the cross-sectional study of parents which found an increase in saturated fat also reported caloric differences that did not quite reach significance [18] We had sufficient statistical power to detect a difference. However, self-reported dietary intake assessed by a food frequency questionnaire is known to underestimate energy intake when compared to doubly labeled water by 31–38%. [54] Items most underreported in dietary questionnaires are snack foods and side dishes not central to the meal.[55] There is no reason to suspect a difference between parents and non-parents in underreporting unless they are underreporting food eaten off a child's plate or snacks shared with children (which would decrease the difference between them). Greater measurement error in estimation of calories may contribute to lack of precision and attenuation of any effect seen, despite sufficient statistical power based on sample size if there was no measurement error.

Parents and non-parents showed an increase in fruit and vegetable consumption over time consistent with national studies[41,53] but no difference was observed between the groups. Results from national surveys of the US population suggest a small increase of around 0.6 servings from 1989–1991 to 1994–1996, which was higher in those with education beyond high school and higher income.[41] The current study revealed a somewhat larger increase in the number of fruit and vegetable servings/day in both groups. One cross-sectional study found those who were married with children had higher fruit and vegetable intake (except for vegetable intake among blacks) and sometimes higher intake in single people with children.[56] One life-course analysis study in the US found that parents reported serving and eating more fruits and vegetables for "the sake of their children".[16] In Finland women but not men with children showed a diet closer to guideline which included daily fruits and vegetables [17] In our study, it is encouraging that parents increased fruit and vegetable intake as much as non-parents, but the current study did not show a greater increase for parents as reported in other studies. [16,56] Perhaps the motivation provided by children to eat more fruits and vegetables balances out time factors to keep parents in line with non-parents in increasing FV intake. Children may have the potential to motivate change in FV intake of parents but perhaps in the US parents need more financial support and education, such as provided in other countries, to increase their intake further then they have.

Sugar-sweetened beverage intake increased over the past three decades.[21,22,57] In this study, both parents and non-parents showed little change in mean number of 8oz servings consumed and average consumption was low with a large number of non-drinkers. Most studies showing the increase compare cross-sectional studies over time.[22] Thus each successive cohort may drink more soda but individuals within a cohort may not increase consumption (as measured in this study). The entire CARDIA cohort showed overall decrease in consumption over 20 years linked to higher prices for soda in certain markets.[58] This could also represent underreporting secondary to desirability bias if these drinks are perceived as "unhealthy". The current study found no significant difference in the change in intake over seven years between parents and non-parents. This is consistent with the finding of no difference in fast food consumption. Whether, older children might affect consumption because of child requests is still unanswered.

We hypothesized that parents would eat more fast food because of requests from children and time pressures,[13,59] but these study results suggest this is not the case. Specifically, parents did not increase their fast food intake any more than non-parents. During the first seven years, the analysis showed very little change in fast food intake among the either group. Blacks, men, and younger participants ate more fast food.[24] Neilson et al found, among 19–36 year olds, an increase in restaurant and fast food as a percentage of meals from 25.7% in 1989–91 to 30.7 % in 1994–96. This could represent a cohort effect rather than increase of individuals over time. The current study's measure asked about eating "out" at a fast food restaurant so prepared food brought into the home may not have been included. Additionally, fast food intake could be more of an issue with parents of older children.[15,59] Since the time of this data collection, fast food establishments have further proliferated and the frequency of eating out has continued to climb,[27] and this may be more of a factor among more recent parents.

These data suggest no significant differences between men and women in terms of dietary changes brought on by children. Interactions between presence of children and gender remained far from significant (all $p > 0.22$). The majority of studies on parental lifestyles have focused on the mother. One previous report showing increased saturated fat intake among those with children in the home also found no significant difference between men and women.[18] At least when eating at home, many mothers and fathers share the same meals and food available, and, therefore, it might be expected that dietary changes which affect one might also affect the other.[39] In addition, fathers increased participation in caregiving in some families[60,61] may increase the possible influences of children on their diet.

The following should be considered when interpreting these data. This data was collected from 1985 – 1993 and thus changes since that time could alter findings in current families. This analysis does not account for the varying ages of children present in the home by year 7, but most children were under age 7 and an analysis exploring length of time a child was in the home did not show differences between groups. As with most self-reported dietary data, this data is subject to desirability and recall biases. Data is only available at years 0 and 7 and thus the study cannot examine changes in food choices during smaller time frames.

Conclusions

Parenthood does not have unfavorable effects on parents' diets but neither does it lead to significant improvements compared to non-parents as health practitioners would hope. In fact, parents lag behind their childless counterparts in decreasing their intake of saturated fat and overall their diets still remain poor. Poor nutrition not only puts the parents' health at risk but provides poor role modeling for their children. Hopefully the nutrition environment will start to improve; this study makes use of some of the best data available but further study in a new cohort is warranted to monitor parent eating behaviors. The transition to parenthood, may be a teachable moment for dieticians and health practitioners to educate adults not only on child nutrition or nutrition for pregnancy but on changing diet patterns for the whole family. Nutrition education programs and health practitioners should develop strategies to support and motivate healthy eating habits in parents.

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Table 1

Baseline sample characteristics by parent status at year 7

	Parent (n = 808)[a]	Non-Parent (n = 1755)
Female [*]	54.0%	49.0%
Age at Baseline (mean) [**,c]	24.9 yrs	24.3 yrs
Race/Ethnicity		
White	61.1%	64.1%
Black	38.9%	35.9%
Average yrs of education completed[c]	14.4	14.4
Living with Partner [**,b]	38.1%	15.5%
BMI (mean)[d]	24.2	24.0
Physical activity score (mean)[d]	449	444
Working Full Time [**]	66.0%	57.2%
Smoking	22.8%	23.7%
Calories per day (mean)[d]	2660	2736
Percent Saturated Fat (mean)[c]	14.1%	14.0%
Fruit and Vegetable servings/day (median)[d]	3.00	3.12
Fast Food intake per month (median)[d]	4.33	4.33
Sweetened Beverage serving/day (median)[d]	0.64	0.64

[*] $p \leq 0.01$ for comparison of those with and without children

[**] $p \leq 0.001$ for comparison of those with and without children

[a] Participant's children or step-children are living in the home at year 7

[b] Living with partner = married or living as married at baseline

[c] T-test

[d] Wilcoxen

Table 2

Adjusted Mean[a] (SE) change in dietary intake from baseline to year 7, n=2563

Dietary intake	Parent[b]	Non-Parent	Difference	p value
Energy, kcal per day	116 (37)	37 (27)	79	0.06
% kcal from saturated fat per day	−1.59 (0.001)	−2.10 (0.001)	0.51	<0.001
Fruits and Vegetables (servings/day)	1.69 (0.15)	1.86 (0.13)	0.17	0.30
Fast food (times per month)	−0.2 (0.4)	0.3 (0.3)	0.5	0.27
Sugar-sweetened beverages (8 oz servings/day)	0.09 (0.06)	0.01 (0.04)	0.08	0.24

[a]Adjusted means are computed from the linear regression models of X on Y, controlling for age of adult, gender, race, field center, education, partner status, current smoking status, exercise level, employment status, baseline BMI, baseline energy intake (except for percent kcal from saturated fat), and the baseline value of the dietary variable of interest. For this computation, each covariate is set to its mean value.

[b]Within parenthesis are the standard errors (SE)