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Fat Avoidance and Replacement Behaviors Predict Low-Fat Intake Among Urban, African American Adolescents

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Abstract

Using measures of behaviors shown to predict low-fat intake in previous research, this study examined whether the behaviors would predict low-fat intake among urban, African American adolescents. Recruited through youth services agencies in Philadelphia, Pennsylvania, participants were 399 African American adolescents (67% female) with a mean age of 13.09 years (range, 10–15 years). Fat-related dietary behaviors were measured using items that were adapted from the Food Habits Questionnaire. Fat intake was measured using the Block Fat Screener. Spearman correlations examined the relationships between fat-related dietary behaviors and fat intake. Seven behaviors were significantly associated with low-fat intake: had chicken that was baked or broiled instead of fried; ordered pasta or pizza served without meat sauce or meat toppings; had a vegetarian dinner; used low-calorie instead of regular salad dressing; ate at least two vegetables (not green salad) at dinner; ate bread, rolls, or muffins without butter or margarine; and avoided foods that were fried in oil, shortening, or lard. Using multiple regression, fat intake was regressed on the linear combination of demographic variables and these fat-related dietary behaviors. The regression equation accounted for 17% of the variance in fat intake, adjusted $R^2 = 0.13$. Fat avoidance (ate bread, rolls, or muffins without butter or margarine) and replacement (ordered pasta or pizza served without meat sauce or meat toppings) behaviors were significant predictors of low-fat intake. Dietary interventions to lower fat intake among urban, African American adolescents should promote the adoption of these behaviors.

Keywords

Dietary fats; Adolescents; African Americans; Eating behavior; Humans

1. Introduction

The recommended fat intake for US adolescents is between 25% and 35% of energy [1]. Yet, national nutrition surveillance data reveal that the proportions of African American adolescents who are meeting this recommendation are small: 15.5% of African American males and 13.4% of African American females have intakes that fall within recommended guidelines [2]. African

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American adolescents have higher mean intakes of total fat than do non-Hispanic White and Mexican American adolescents [3]. Among youths aged 12 to 15 years, fat accounts for 36% of energy among non-Hispanic African Americans, 33% of energy among non-Hispanic Whites, and 34% of energy among Mexican Americans [3]. Research with urban adolescents reveals their higher fat intake [4]. Urban, African American youths consume on average, 40% of energy from fat compared with 35% of energy among urban, White youths [4].

The total amount and types of fat in the diet affect risk for cardiovascular diseases, non-insulin-dependent diabetes, and obesity [5], conditions that disproportionately affect African Americans [6–8]. Overweight and obesity in childhood track into adulthood [9–12]. There is also evidence of early consolidation and tracking of dietary intake patterns and food choice behaviors [13–14]. Thus, early intervention to promote the adoption of a low-fat diet among African American adolescents can influence youths' long-term dietary behaviors and reduce their risk of developing a variety of adverse health conditions. The increasing incidence among adolescents of diet-related diseases once common in middle age suggests that youths can also derive immediate health benefits from the adoption of a low-fat diet [15].

A key aim of many nutrition education efforts is to translate national nutrient objectives into guidelines for dietary behavior [5]. Dietary practices that reduce fat intake include the use of specially manufactured products (e.g., skim milk, low-fat mayonnaise), the alteration of commonly available foods to be lower in fat (e.g., removing skin from chicken), the consumption of foods lower in fat (e.g., yogurt based soups, fresh fruit), and the exclusion of certain classes of foods or preparation techniques (e.g., not eating meat, not frying potatoes, or not seasoning cooked vegetables with butter) [16]. These practices are amenable to change through intervention [17–21]. Increasing them is a successful strategy for reducing fat intake.

Previous research has found that African and Hispanic American adolescents and adults use fewer fat reduction behaviors than do White adolescents and adults [5,22]. Smaller proportions of African American adults use low-fat products and modify meats to make them lower in fat than do White and Hispanic adults [23]. Behaviors commonly practiced by African American adults include using margarine instead of butter and eating fish or chicken instead of red meat [24]. African American women avoid fat as a seasoning and replace high-fat foods with fruits and vegetables more often than do White women [25].

Notwithstanding data on ethnic-racial variations in dietary practices that reduce fat intake, studies examining these behaviors among urban, African American adolescents are lacking. Knowledge of these behaviors can advance understanding of human nutrition and aid nutrition researchers and practitioners in designing intervention programs to target and address behaviors unique to this population. Together, the need for intervention to lower fat intake among urban, African American adolescents, the promise of programs that target behaviors shown to reduce fat intake, and the lack of data on these behaviors among urban, African American adolescents provided the impetus for this study.

Using measures of behaviors shown to predict low-fat intake in previous research [16], this study examined whether the behaviors would predict low-fat intake among urban, African American adolescents. Because ethnic-racial differences in these behaviors have been found [5,22–25], we believed that some of the behaviors would have greater salience for youths than others; however, we did not have an a priori hypothesis regarding which behaviors would predict low-fat intake in this population. Thus, our study objective was to identify behaviors that predicted low-fat intake among urban, African American adolescents.

2. Methods and materials

2.1. Subjects and design

Study participants were 399 African American adolescents (67% female) aged 10 to 15 years (mean (SD) age = 13.09 (1.10) years). Participants were recruited through youth services agencies located in Philadelphia, Pennsylvania. Youth services agencies were private nonprofit organizations that provided such human services as school dropout prevention, substance abuse prevention, recreation, educational tutoring, computer literacy training, and youth club activities. Over three-fourths (78%) of the agencies were located in communities in which 20% or more of families had annual household incomes below the Federal poverty level.

This exploratory study used a cross-sectional design. This design was appropriate for initially testing the relationships between youths' fat intake and fat-related dietary behaviors [26]. Prior to their study involvement, all youths provided informed written assent and informed written consent from a custodial parent or legal guardian. Participants were administered a questionnaire under the direction of trained research staff. Youths reported their gender and age, and completed measures for assessing their fat intake and fat-related dietary behaviors. The use of human subjects and the study protocol were approved by the Institutional Review Board of Intersystems Incorporated.

2.2. Measures

Fat intake was measured via the Block Fat Screener [27]. This 17-item instrument includes the top sources of fat in the diets of Americans as determined by national surveys and research. Spearman correlations between fat intake estimates derived from the screener and estimates derived from the Block 100-item Food Frequency Questionnaire were at or above 0.60; sensitivity, specificity, and positive predictive value were 0.52, 0.93, and 0.57, respectively [27]. Although the screener was validated with adults [27,28], it has been used to measure fat intake in other adolescent samples [29,30].

Youths reported their frequency of consumption of items in the measure using response options ranging from 0 (once a month or less) to 4 (five or more times a week). Item ratings were summed to derive a total score. Scores at or below seven on this scale indicate very low fat intake (i.e., less than 25% of energy). Scores between 8 and 14 indicate average fat intake (i.e., between 30% and 35% of energy). Scores between 15 and 22 indicate high fat intake (i.e., above 35% of energy). Scores above 23 indicate very high fat intake (i.e., 40% to 50% of energy).

Fat-related dietary behaviors were measured using items that were adapted from the Food Habits Questionnaire (FHQ) [16]. This 20-item instrument measures the following five behaviors: (1) avoiding fat as a seasoning; (2) modifying meat to make it lower in fat; (3) substituting high-fat foods with specially manufactured low-fat equivalents; (4) replacing high-fat foods with fruits and vegetables; and (5) replacing high-fat foods with low-fat alternatives other than fruits and vegetables. Correlations between behaviors measured by the FHQ and percentage of energy from fat ranged from 0.34 to 0.57 [16].

Modifications to items in the measure included simplifying the wording of questions, defining potentially unfamiliar terms (i.e., red meat; vegetarian dinner), and emphasizing adolescent versus adult behaviors (i.e., asking for specially prepared items at home or when eating out versus preparing them for oneself). Participants responded to items in the measure using 4-point Likert scales with response options ranging from 1 (usually or always) to 4 (rarely or never). A "Does not apply" response option was also available to identify practices that were related to foods the respondent was not in the habit of eating. Items so marked were excluded

from analyses. For this study, item responses were reverse scored; higher scores indicated frequent use of the behavior.

2.3. Statistical analysis

Descriptive statistics were used to generate a profile of respondent demographic characteristics and fat intake. One-way analysis of variance (ANOVA) and *t* tests for independent samples were used to determine whether fat-related practices differed based on youths' gender and age [31]. Multiple regression analysis was used to identify predictors of low-fat intake. Because multiple regression analysis is ideal when the independent variables (i.e., fat-related dietary behaviors) are correlated with the dependent variable (i.e., fat intake) and uncorrelated with one another [32], our goal was to select potential predictors that satisfied these two conditions. Correlation analysis examined the degree of association between fat-related dietary behaviors and fat intake. Because fat-related behaviors were measured on an ordinal scale, Spearman correlations were calculated [31]. The magnitude of the correlations among variables that were significantly associated with fat intake was also examined. Significant coefficients were found among the potential predictors ranging from 0.11 to 0.35, which suggests some intercorrelation among the variables but not a high degree of multicollinearity. Using multiple regression, fat intake was regressed on the linear combination of demographic variables and fat-related dietary behaviors that were significantly correlated with low-fat intake. Variance inflation factor and tolerance statistics confirmed the absence of multicollinearity between potential predictors included in the model. Analyses were conducted using Statistical Package for the Social Sciences (version 12.0.1, 2003, SPSS Inc, Chicago, Ill). All levels of significance were set at $P < .05$.

3. Results and discussion

Participants' mean (SD) fat score was 31.05 (11.83), a value corresponding to a fat intake between 40% and 50% of energy. A modest 8% of youths were meeting current dietary recommendations for fat intake. Most youths (76%) had diets very high in fat.

Shown in Table 1, Spearman correlations revealed that seven fat-related dietary behaviors were significantly and inversely related to fat intake: had chicken that was baked or broiled instead of fried ($r = -0.15$); ordered pasta or pizza served without meat sauce or meat toppings ($r = -0.11$); had a vegetarian dinner ($r = -0.13$); used low-calorie instead of regular salad dressing ($r = -0.13$); ate at least two vegetables (not green salad) at dinner ($r = -0.11$); ate bread, rolls, or muffins without butter or margarine ($r = -0.20$); and avoided foods that were fried in oil, shortening, or lard ($r = -0.12$). Fat-related dietary behaviors did not differ based on youths' gender or age. The regression equation containing demographic variables and these seven behaviors accounted for 17% of the variance in fat intake, $F_{9,212} = 4.79$, $P < .001$, adjusted $R^2 = 0.13$. As shown in Table 2, two of the seven behaviors – ordered pasta or pizza without meat sauce or meat toppings and had bread, rolls, or muffins without butter or margarine — were significant predictors of low-fat intake.

Consistent with the literature, youths consumed a higher percentage of energy from fat than is recommended. Youths' mean fat intake was higher than the mean intake of 36% of energy found among a nationally representative sample of similarly-aged African American adolescents [3], but comparable to the mean percentage of energy from fat found among urban, African Americans in other research [4,33,34]. Findings underscore the need for intervention to lower fat intake among urban, African American adolescents.

Notwithstanding the overall high fat intake in our sample, youths engaged in a variety of behaviors shown to reduce fat intake in previous research: avoiding fat as a seasoning (ate bread, rolls, or muffins without butter or margarine and avoided foods that were fried in oil,

shortening, or lard), modifying meat to make it lower in fat (had chicken that was baked or broiled instead of fried), substituting high-fat foods with specially manufactured low-fat equivalents (used low-calorie instead of regular salad dressing), replacing high-fat foods with fruits and vegetables (ate at least two vegetables (not green salad) at dinner); and replacing high-fat foods with low-fat alternatives other than fruits and vegetables (ordered pasta or pizza served without meat sauce or meat toppings and had a vegetarian dinner) [16]. Thus, increasing these behaviors may have beneficial effects on youths' fat intake. The low correlations among the behaviors suggest that they are independently related to low-fat intake. A combination of intervention strategies (versus a standard set of program messages) may therefore be required to modify the different behaviors.

A difference between our findings and findings from previous research is that only two of the behaviors – avoiding fat as a seasoning (ate bread, rolls, or muffins without butter or margarine) and replacing high-fat foods with low-fat alternatives other than fruits and vegetables (ordered pasta or pizza served without meat sauce or meat toppings) – were significant predictors of low-fat intake [16]. One explanation is that the remaining behaviors were not practiced in high enough frequency to predict low-fat intake. Alternatively, fewer behaviors may have salience for predicting low-fat intake among urban, African American adolescents.

Given the concordance of parental and adolescent fat-related dietary behaviors [22], it is reasonable to expect similarities between the fat-related dietary behaviors of African American adults and those of African American adolescents. Youths' avoidance and replacement behaviors were similar to the fat-related dietary behaviors practiced by African American adults [5,24]. Patterson et al. found that African American women had lower scores (indicating more frequent use) than did White women on composite measures of avoiding fat as a seasoning and replacing high-fat foods with fruits and vegetables [5]. Gans et al. found that African American adults commonly practiced modification (used margarine instead of butter) and replacement (ate fish or chicken instead of red meat) behaviors [24]. Observed similarities between the fat-related behaviors of African American adolescents and adults suggest the influence of parental avoidance and replacement behaviors on adolescent dietary practices. Because parental fat-related dietary behaviors were not measured in this study, the potential influence of these behaviors on adolescent fat-related dietary practices must await further research. If high concordance is found, the implication is to design intervention programs to target and address both parental and adolescent avoidance and replacement behaviors. Programs of this type may be more effective than interventions focused exclusively on increasing these behaviors among urban, African American adolescents.

This study has notable limits. The use of a self-selected sample limits the generalizability of study findings. Youths who enrolled for the study may have been more motivated to do so than other African American adolescents in similar youth services agency settings. A majority of participants had diets very high in fat. Although the mean percentage of energy from fat observed in our sample was similar to the mean fat intake found among urban, African American adolescents in other research [4], additional research with samples of urban, African American adolescents who consume a low-fat diet is needed to confirm our findings. A previously validated screener was used to provide fat intake estimates. The use of other intake assessment methods (i.e., food records or 24-hour recalls) may have provided a clearer picture of youths' fat intake. The use of a cross-sectional design limits the ability to establish the temporal order of the variables studied. Although fat avoidance and replacement behaviors were shown to predict low-fat intake, the total variance explained by the model that included these behaviors was small, suggesting that other factors not measured in this study are important for understanding variation in youths' fat intake.

Despite these limitations, this is the first study to examine fat-related dietary behaviors among urban, African American adolescents. Fat avoidance and replacement behaviors were significant predictors of low-fat intake in this population. Programs to promote the adoption of these behaviors hold promise for lowering fat intake among urban, African American adolescents. The associations between low-fat intake and choosing baked or broiled versus fried chicken, vegetarian dishes, and low-calorie instead of regular salad dressing; consuming at least two vegetables at meals; and avoiding fried foods suggest that increasing these behaviors may also lead to reductions in youths' fat intake.

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Abbreviations List

FHQ, Food Habits Questionnaire.

Table 1

Correlations among study variables

Variable	Correlation							
	1	2	3	4	5	6	7	8
Fat score	–							
Baked or broiled versus fried chicken ^a	–0.15**							
Pasta or pizza without meat sauce or meat toppings ^b	–0.11*	–0.13*	–					
Vegetarian dinner ^b	–0.13*	0.06	0.07					
Low calorie instead of regular salad dressing ^c	–0.13*	0.14*	0.03	–0.22**				
Two vegetables (not green salad) at dinner ^d	–0.11	0.12*	0.01	0.16**	–0.17**			
Bread, rolls, or muffins without butter or margarine ^e	–0.20**	0.18**	0.13*	0.22**	0.35**	–0.17**	–	
Avoided foods fried in oil, shortening, or lard ^e	–0.12**	0.13*	0.12*	0.15**	0.28**	0.22**	0.16**	–

Sample sizes varied due to the exclusion of items marked “Does not apply” (range, n = 270 – n = 396).

^a Modify meat

^b Replace with low-fat alternatives other than fruits and vegetables

^c Substitute

^d Replace with fruits and vegetables

^e Avoid fat as a seasoning

* $P < .05$, Spearman correlation.

** $P < .01$, Spearman correlation.

Table 2

Regression analysis of fat intake on demographic variables and fat-related behaviors

Variable	β	SE	P
Gender ^a	0.21	1.60	.001
Age	−0.01	0.68	.916
Baked or broiled versus fried chicken ^b	−0.07	0.89	.322
Pasta or pizza without meat sauce or meat toppings ^b	−0.14	0.66	.029
Vegetarian dinner ^b	−0.09	0.74	.191
Low calorie instead of regular salad dressing ^b	0.04	0.75	.529
Two vegetables (not green salad) at dinner ^b	−0.09	0.85	.177
Bread, rolls, or muffins without butter or margarine ^b	−0.19	0.77	.007
Avoided foods fried in oil, shortening, or lard ^b	−0.07	0.76	.287

Sample size, n = 221.

^aDichotomously coded: 0 (male), 1 (female).^bHigher scores indicate frequent use of the behavior.