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Neighborhood Perceptions Affect Dietary Behaviors and Diet Quality

Akilah Dulin Keita, PhD [Postdoctoral Scholar],

Department of Nutrition Sciences and Clinical Nutrition Research Center University of Alabama at Birmingham WEBB 415; 1530 3rd Ave S. Birmingham, AL 35204 Ph. 205-975-6226 Fax: 205-934-7050 Akilah@uab.edu

Krista Casazza, PhD, RD [Postdoctoral Scholar],

Department of Nutrition Sciences and Clinical Nutrition Research Center University of Alabama at Birmingham WEBB 415; 1530 3rd Ave S. Birmingham, AL 35294 Ph. 205-975-6226 Fax: 205-934-7050 Krista@uab.edu

Olivia Thomas, PhD, RD [Assistant Professor], and

Department of Epidemiology University of Alabama at Birmingham RPHB 523C; 1530 3rd Ave S Birmingham, AL 35294 Ph. 205-975-6226 Fax: 205-934-8665

Jose R. Fernandez, PhD [Associate Professor]

Department of Nutrition Sciences WEBB 449A; 1530 3rd Ave S Birmingham, AL 35294 Ph. 205-934-2029 Fax: 205-934-7050

Abstract

Objective—The primary purpose of this study was to determine if perceived neighborhood disorder affected dietary quality within a multiethnic sample of children.

Design—Children were recruited through the use of fliers, wide-distribution mailers, parent magazines, and school presentations from June 2005 to December 2008.

Setting—Birmingham-Hoover, Alabama metropolitan area.

Participants—Sample of 100 children aged 7 to 12.

Main Outcome Measure—Dietary quality was assessed using the average of two 24 hour recalls and analyzed using the Nutrition Data System for Research.

Analysis—Multivariate linear regression analyses were conducted to assess the relationship between neighborhood disorder and dietary quality.

Results—Perceived neighborhood disorder was associated with increased iron intake ($P = .031$) and lower potassium levels ($P = .041$). Perceived neighborhood disorder was marginally associated with increased energy intake ($P = .074$) and increased sodium intake ($P = .078$).

Conclusions and Implications—Perceived neighborhood disorder was significantly related to differences in dietary quality. This indicates that subjective neighborhood characteristics may pose

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Corresponding Author: Akilah Dulin Keita WEBB 415 1530 3rd Ave S Birmingham, AL 35294-3360 PH: 205-975-6226 Fax: 205-934-7050 Akilah@uab.edu.

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barriers to healthful eating behaviors for children. Future research efforts and policy should address sociostructural factors and ways to manipulate and improve food environments and individual's perceptions of their neighborhoods.

Keywords

neighborhood disorder; diet quality; child; socioeconomic status

INTRODUCTION

Geographic residence may play a significant role in understanding diet related behaviors.¹ In low-income urban environments, supermarkets are less accessible and residents are more likely to report inferior quality of food products, limited selection, and mediocre services.^{2,3} In turn, residents in these neighborhoods may increase their consumption of low-cost, energy dense foods to supplement their dietary needs.³⁻⁹ These unhealthy dietary behaviors may increase the risks for overweight/obesity, cardiovascular disease, and type 2 diabetes.^{3,10-12}

While most studies use census data to obtain socioeconomic indicators of objective neighborhood disadvantage and disorder (e.g. poverty, unemployment, single-female headed households and crime), little research has addressed the relationship perceived neighborhood disorder and dietary patterns. Research conducted by Burdette and Hill¹³ showed that individuals who perceive their neighborhoods as disordered are more likely to self-report that their diets are fair or poor. However, this study relied upon self-reports of fair, poor, or excellent diet quality and the extent to which dietary differences exist as assessed by more objective measures remains unknown. Therefore, this study set out to determine 1) if individuals residing in comparable objectively measured disordered neighborhoods perceive their neighborhoods as disordered and 2) to what extent do neighborhood perceptions affect dietary related behaviors for children ages 7 to 12 years, as assessed by 24 hour dietary recalls.

METHODS

Study Design

The sample data were obtained from a cross-sectional study which evaluated risk factors for obesity and insulin resistance. All study data were collected from June 2005 to December 2008. The target population consisted of healthy European, African, and Hispanic American children aged 7 to 12 residing in the Birmingham-Hoover, Alabama metropolitan area. Children were recruited from neighborhoods of diverse community level socioeconomic status. Due to the clinical nature of the study and the requirement of two visits, including an overnight hospital stay, participation was voluntary and relied on the involvement of parents and children. Children were unable to participate if they had a diagnosis of diabetes, if they were using medications that could affect metabolism (e.g. Attention Hyperactivity and Asthma medications), or if girls had started their menstrual cycle. If the aforementioned conditions were met, and the parents and children agreed to spend one night in the hospital, parents were sent a consent form. Participants were recruited through the distribution of fliers, in-school and parent presentations, radio advertisements, and the distribution of information in Val-Pak® mailers, parent magazines, and newspapers. Recruitment efforts were also translated into Spanish, in order to target the Hispanic population. Before participating in the study, children and parents provided consent to the protocol, which was approved by the University of Alabama at Birmingham Institutional Review Board for human subjects. Parents and children received gift cards for their participation in the study.

Sample

Survey data were collected via face to face interviews. The total sample included 207 respondents; however census tract information was unavailable for 8 respondents. The missing respondents were more likely to be European American and live in rural areas where the roads had not been linked to census tracts. To examine the study aims, the 50th percentile for objective neighborhood disadvantage was calculated which left an analytic sample of 101 respondents (n = 43 African Americans, n = 23 Hispanic Americans and n = 35 European Americans). According to information made available by the United States Census (2000), the ethnic specific population proportions for the age group 7 to 12 are 36%, 1.8% and 60% respectively. This indicates that Hispanics and African Americans were overrepresented and European Americans were underrepresented.

Outcome Variable

Diet—Dietary information was gathered from two 24-hour recalls using the multiple pass method. 14 Trained interviewers and one registered dietitian presented parents and children with cup and bowl sizes to approximate food portions over the course of a typical day. Parents and children were instructed to provide information for all foods and beverages consumed during the day. Parents and children were then prompted to recall the methods used to prepare the foods, whether any fats, salts, or other products were added, portion sizes and number of servings consumed. All dietary recall information was entered into the Nutrition Data System for Research Software (version 2006 developed by the Nutrition Coordinating Center (NCC), University of Minnesota, Minneapolis, MN) by a registered dietitian. The NDSR Software assessed nutrient composition of the individual diets and estimates of macronutrient and micronutrient composition were provided. The average of the two 24-hour recalls was used to identify nutritional outcomes of interest that included total energy (kilocalories), the distribution of total kilocalories expressed as percent of calories from protein, fats, and carbohydrates and the non-macronutrients: fiber (g), sodium (mg), calcium (mg), iron (mg), potassium (mg), total sugars (g), percent saturated fatty acids, monounsaturated fats, and polyunsaturated fats.

Independent Variables

Objective Neighborhood Disadvantage and Disorder—Study participant addresses were geo-coded to area census tracts.¹⁵⁻¹⁹ The percentages of unemployment, poverty, female headed households, and vacant housing^{25,26} within an area were gathered from each census tract and then summed to create an index (U.S. Census Bureau 2000) using the methods by Ross et al.^{17,20,21} This scale had a reliability of $\alpha = .938$. In order to standardize objective neighborhood conditions, scores in the 50th percentile or above, were evaluated; this left an analytic sample of N=101 participants. The use of percentiles has been established as reliable and valid for neighborhood research,²² as well, evaluations of the higher percentiles such as the 75th would have further reduced the sample size.

Subjective Neighborhood Disorder—Due to time constraints, perceived neighborhood disorder was assessed using the short 10-item version developed by Ross and Mirowsky 23 scale. Parents and children responded to a set of statements that assessed perceptions of physical and social disorder and safety. Examples of the statements include ‘there is a lot of graffiti in my neighborhood’ and ‘there is a lot of crime in my neighborhood. The response options ranged from ‘strongly agree’ = 4 to ‘strongly disagree’ = 1 with possible scores from 10 to 40. The measure had a Cronbach’s alpha $\alpha = .866$ for the parents and $\alpha = .856$ for the children. To determine whether parents assessed their neighborhoods as disordered, the median split was also computed. Participants were grouped by subjective disadvantage score (0 = low disorder, 1 = high disorder).

Neighborhood Grocery Store—Usage of neighborhood food markets was assessed by asking the parent if they shopped at their neighborhood grocery store (defined as less than a ten minute drive from their home). Response options were 0 = no and 1 = yes. Three follow-up questions were asked and included, ‘do you buy fresh fruits and vegetables at your neighborhood grocery store,’ ‘please provide the name and location where you shop the most’ and ‘how long does it take you to drive to the grocery store where you shop the most.’

Economic Indicators—Economic indicators were included as research has shown that differences in dietary quality are primarily due to a lack of financial resources.^{4,8,24,25} Socioeconomic status (SES) was measured using the Hollingshead Four Factor Index.²⁶ This is a 4-factor index of social class that combines educational attainment and occupational prestige for the number of working parents. Scores ranged from 8 to 66, with higher scores indicating higher social status. Reduced/Free School Lunch: Participation in or qualification for the free or reduced National School Lunch program was included because it denotes poverty status among children. In order to qualify, households must be at or below 130% of the federal poverty line.²⁷ This was assessed by asking the parent if the child received or qualified for free or reduced school lunch. Responses were coded 0 = no and 1 = yes.

Body composition—Total percent body fat was assessed via Dual Energy X-ray Absorptiometry (DXA) scan with the General Electric Lunar Prodigy Scanner (Lunar Radiation Corp., Madison, WI). Participants were scanned in light reflective clothing with arms at their sides. In children, DXAs have high reliability and function as good indicators of body fatness with a correlation above .96.²⁸

Statistical Analyses

Cronbach’s alpha was analyzed for objective neighborhood disadvantage and perceived neighborhood disorder and both scales had Cronbach’s alphas greater than 0.85. Simple descriptive statistics including means, standard deviations, and percentages were computed. Simple bivariate correlations were evaluated to test for multicollinearity (set at a criterion of $r \leq 0.60$). The correlation between objective and subjective neighborhood disorder was $r = 0.21$ which suggests that they measure distinct neighborhood conditions. Simple t-tests were used to compare sociodemographic and dietary quality information for the low and high perceived neighborhood disadvantage groups. The probability criterion E was set at $p < .05$. There were no significant differences in percent body fat between the two perceived disadvantage groups and was thusly excluded from further analyses. Multivariate linear regression analyses were used to determine if characteristics of neighborhoods influenced dietary behavior for children. In this model, perceived neighborhood disadvantage was entered as a continuous variable. Additional covariates included age, ethnicity, and gender with males as the reference group. The probability for the model was set at $p < .05$ and variables were log transformed where appropriate. All analyses were conducted using SAS. Version 9.1 (SAS Institute Inc, Cary, NC).

RESULTS

Although there were significant differences in objective neighborhood characteristics between the perceived disorder groups ($p < .001$), this translated into less than one-tenth of a point (Table 1). There were no significant differences in age, gender, socioeconomic status, or the percentage of children who qualified or participated in the National School Lunch Program between the low and high perceived neighborhood disorder groups. However, there were significant differences in how parent respondents perceived their level of neighborhood disadvantage ($p < .001$). Of the total sample, 40.5 % did not perceive their neighborhoods as

disordered while 59.4% perceived that they lived in disordered areas. Parent respondents in the low perceived neighborhood disorder group were significantly more likely to shop at their neighborhood food markets than those in the high disorder group (97% versus 71%). While not statistically significant ($P = .373$), children in the greater perceived disadvantage group had slightly more body fat than children in the low perceived group (23.5% versus 21.7% body fat).

There were also significant dietary differences between the two groups for unadjusted dietary intakes (Table 2). Overall, children in both perceived disadvantage groups took in more total calories than the daily recommended intakes and consumed a slightly greater percentage of calories from fat than recommended (e.g. 36% and 35% in comparison to the recommended 25-35% recommended ranges).²⁹ This finding mirrors national trends as data from the National Health and Nutrition Examination Survey (2003-2004), have shown that on average, children in the age group 6-11 consume 2,089 kilocalories, which exceeds recommendations.³⁰ Children in both disadvantage groups consumed 11 grams lower than the recommended fiber intakes.²⁹ In addition, children from both groups were likely to consume more than twice the amount of recommended sodium, (3217 mg for the low perceived group and 3495 mg for the high perceived group compared to the 1500 mg daily recommended intake).³¹ On average, both disadvantage groups exceeded the daily recommended intakes of iron but failed to meet recommended intakes of potassium.^{31,32} Individuals in the low perceived disorder group had significantly higher intakes of calories from fat ($p = .017$) and greater calcium intake ($p = .045$) in comparison to children from the high disadvantage group. Conversely, children in the high perceived disorder group had higher intake of iron ($p = .001$), zinc ($p < .001$), and consumed significantly more sugars ($p = .016$) than children in the low perceived disadvantage group.

The regression models tested for significant relationships between perceived neighborhood disorder (as a continuous variable) and dietary outcomes while adjusting for covariates (Table 3). Perceived neighborhood disorder was associated with increased iron intake ($P = .031$) and lower potassium levels ($P = .041$). While not significant, perceived neighborhood disorder was marginally associated with increased energy intake ($P = .074$) and increased sodium intake ($P = .078$). In regression analyses, perceived neighborhood disorder was not a significant predictor of the quality and quantity of fat intake or sugar consumption.

Individual level socioeconomic status was associated with lower sodium consumption ($P = .001$) (Table 3). Additionally, socioeconomic status was significantly associated with the types of dietary fat, exhibiting a positive association with percentage of calories from saturated fatty acids ($P = .022$). Children who participated in (or qualified for) free or reduced school lunch also reported lower intakes of fiber ($P = .046$), and higher saturated fat consumption ($P = .003$). While not significant, children who participated in the National School Lunch Program tended to have lower sodium intakes ($P = .063$).

DISCUSSION

This study had two primary aims 1) to determine if individuals residing in comparable objective neighborhood conditions perceived their neighborhoods in similar ways and 2) if neighborhood perceptions affected dietary patterns for children. Although objective neighborhood conditions were similar, almost half of the parent respondents did not perceive their neighborhoods as disadvantaged suggesting that individuals who live in similar neighborhood conditions may not perceive their neighborhoods in similar ways. These findings were also observed among children as well, such that children's perceptions mirrored parental perceptions of neighborhood disorder (data not shown).

Assessments of dietary patterns by neighborhood socioeconomic status have shown that the combination of living in a low-income area with reduced grocery store access is associated with higher intakes of meat, lower fruit, vegetable, and fish intakes, and lower serum carotenoids, and poorer diets.^{12,22,33,34} For this research, neighborhood factors were significantly associated with dietary related behaviors. Parents who perceived their neighborhoods as disordered were significantly less likely to shop in their neighborhood food markets. Although the types of stores located in neighborhoods was not assessed (e.g. supermarket, corner store, convenience store), similar results were found when follow-up questions were asked indicating that parents were significantly less likely to buy fruits and vegetables from their neighborhood food markets and were more likely to drive outside of their neighborhoods to their preferred grocery stores (data not shown). Taken together, this suggests that access to food markets within neighborhoods may not be indicative of usage. Instead, and possibly more important, the way that people perceive their neighborhoods may be more significant when examining diet related behaviors and choices.

There were significant between group differences in dietary quality. Individuals in the low perceived disorder group were more likely to have higher calcium intakes, reduced sugar consumption and a slightly greater percentage of calories from fat. Overall, children in both disorder groups had higher daily caloric intakes than recommended, with overconsumption by approximately 300 kilocalories per day for the low perceived disorder group and 400 kilocalories per day (could lead to approximately a 1 pound monthly weight gain) for the high perceived disorder group. Research by Wang and colleagues demonstrated that on average, an excess consumption of 131 calories translated into a 0.43-kg annual excess,³⁵ if the average trend in overconsumption continues, it is possible that children in the current study will have increased risks for overweight and obesity.^{36,37} The overconsumption of daily energy intake is also reflected in national trends as data from the National Health and Nutrition Examination Survey 2003-2004 showed that youth aged 6 to 11 consumed on average 2089 kilocalories.³⁰ In addition, children in both neighborhood disadvantage groups had higher sodium and lower fiber and potassium intakes than recommended.^{38,39} These findings are also consistent with research demonstrating increased unhealthy dietary behaviors among youth such that children are more likely to have higher intakes of fat, sodium, and sugar sweetened beverages and lower intakes of potassium and fiber.^{40,41} High sodium intake is frequently indicative of a greater consumption of processed foods.^{38,39} Both disorder groups consumed more than twice the recommended upper limit for sodium consumption based on age and sex which closely mirror national trends among youth.^{31, 40} The negative health risks of increased sodium consumption may increase risks for hypertension.³⁸ On average, children in both groups had lower fiber intakes than recommended. Increasing fiber intake could protect against cardiovascular disease, diabetes, obesity and other negative health outcomes.³⁹

The continuous measure of perceived neighborhood disorder also showed significant relationships to dietary quality. Individuals who perceived their neighborhoods as disordered were more likely to have slightly higher than recommended energy intakes, lower potassium, and higher sodium levels. This suggests that neighborhood perceptions may also be important indicators of dietary behaviors.¹³ The findings of significant dietary differences are consistent with the literature that shows the influence of social and community context on dietary behaviors.^{10,22,42-44}

In addition, individual level socioeconomic status operated as a significant predictor of diet quality. Children of higher SES consumed a lower percentage of calories from protein, higher percentage of calories from carbohydrates, had higher calcium intake, and a lower sodium intake. However, socioeconomic status related variables were not predictive of total caloric intake. These findings are consistent with other research demonstrating that

individuals of higher socioeconomic status may have greater access to and usage of health protecting behaviors.^{1,24,25} The lack of significance in total caloric intake and other diet related variables may be due to the proportion of children in this study participating in or qualifying for the National School Lunch Program.

The strengths of this study are the use of both objective and subjective measures of neighborhood disorder to effectively gauge differences in dietary quality among youth. This sample included a multiethnic cohort to better understand factors associated with early life diet related behaviors. There was also a wide distribution in the average socioeconomic status that helped inform the relationship between socioeconomic status related variables and dietary outcomes. The availability of dietary recall information gathered by trained researchers also helped provide good indicators of daily food intake among the children.

While there are numerous strengths to this study, it has several limitations. The sample was self-selected and included only parents and children who were eligible and willing to participate. The sample size was small and limited to a specific geographic region, and results may not be generalizable to other young children. However, the inclusion of objective neighborhood measures may make these results translatable to areas with similar neighborhood conditions. In addition, the types of food markets located in neighborhoods were not assessed. It is possible that if this measure was included, neighborhood differences in availability of grocery store type (e.g. supermarket, convenience store, corner store) may have been observed. There are also limitations to dietary recalls including the possibility of introducing recall bias¹⁴ and the inability to account for added salts to prepared foods which may underestimate actual sodium intakes.

Implications for Research and Practice

This study demonstrates the importance of including neighborhood characteristics when evaluating dietary quality among children. It appears that neighborhood factors impact dietary quality in children. Additional insights into differential diet quality among children should also address the home environment, parental feeding practices, and cultural perceptions of food that may affect eating patterns. Future research efforts and policy should address sociostructural factors and ways to manipulate and improve food environments and individual's perceptions of their neighborhoods.

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Table 1

Descriptive characteristics of children's sociodemographic information by perceived neighborhood disadvantage group. (Means $\pm$ standard deviations).

Sociodemographic	Low perceived disadvantage (n = 41)	High perceived disadvantage (n=60)	α^a
Ethnicity %			
African American	24	55	
Hispanic American	22	23	N/A
European American	54	21	
Age	9.6 $\pm$ 1.6	9.4 $\pm$ 1.44	.474
Gender			
Female %	50	50	N/A
Socioeconomic Status	42.5 $\pm$ 13.2	35 $\pm$ 13.7	.832
Neighborhood Grocery ^b			<.001
Yes %	97	71	
Neighborhood Disadvantage ^c			
Perceived disadvantage ^d	12.78 $\pm$ 2.23	21.21 $\pm$ 3.85	<.001
Perceived disadvantage ^e	15.13 $\pm$ 2.58	24.05 $\pm$ 3.62	.055
School Lunch ^f			
Yes %	48	55	.933
Total % body fat	21.7 $\pm$ 9.1	23.5 $\pm$ 10.1	.373

^a α significance level for t-test of significant differences between groups; significance criteria $\alpha < .05$

^b Neighborhood grocery - Percent of respondents who reported that they shopped at their neighborhood grocery stores (< 10 minute drive from home)

^c Neighborhood disadvantage: Index includes census tract level percent unemployment, poverty, single female headed households with dependent children, and vacant housing

^d Perceived disadvantage — Parent self-reports of perceived neighborhood disadvantage

^e Perceived disadvantage — Child self-reports of perceived neighborhood disadvantage

^f School lunch- Percent of children receiving/qualifying for free or reduced school lunch

Table 2

Descriptive characteristics of children's dietary quality by perceived neighborhood disadvantage group.
(Means $\pm$ standard deviations).

Diet	Recommended Intake (IOM)^a	Low perceived disadvantage (n = 41)	High perceived disadvantage (n=60)	α ^b
Total energy (kcal) ^c	1200-1800	1847 $\pm$ 416	1932 $\pm$ 440	.716
Protein g ^d	10-30	15 $\pm$ 3	15 $\pm$ 3	.687
Fat g ^d	25-35	36 $\pm$ 4	35 $\pm$ 6	.017
Carbohydrate g ^d	45-65	49 $\pm$ 6	50 $\pm$ 8	.186
Fiber (g) ^e	25-31	14 $\pm$ 5	14 $\pm$ 6	.228
Sodium (mg) ^f	1200-1500	3217 $\pm$ 974	3495 $\pm$ 1160	.244
Calcium (mg) ^f	800-1300	929 $\pm$ 384	849 $\pm$ 289	.045
Iron (mg) ^f	800-1000	12 $\pm$ 3	14 $\pm$ 5	.001
Potassium (mg) ^f	3800-4500	2207 $\pm$ 515	2057 $\pm$ 605	.285
Total sugars (g) ^e	N/A	102 $\pm$ 301	110 $\pm$ 43	.016
Saturated fatty acid	N/A	12 $\pm$ 2	12 $\pm$ 2	.705
Monounsaturated fat	N/A	13 $\pm$ 2	13 $\pm$ 2	.094
Polyunsaturated fat	N/A	6 $\pm$ 1	6 $\pm$ 1	.502

^a Institute of Medicine Dietary Reference Intakes

^b Significance level for t-test of significant differences between groups significance criteria $\alpha < .05$

^c kcal = kilocalories

^d g = grams expressed as percentage of calories referring to Acceptable Macronutrient Distribution Range

^e g = grams

^f mg = milligrams

Table 3
Regression estimates for perceived neighborhood disorder and dietary quality among children

Variable	Total energy (kcal) ^a			Protein (g) ^b			Fat (g) ^b			Carbohydrate (g) ^b			Fiber (g) ^c		
	B ^d	SE ^e	α ^f	B ^d	SE ^e	α ^f	B ^d	SE ^e	α ^f	B ^d	SE ^e	α ^f	B ^d	SE ^e	α ^f
Neighborhood ^g	12.8	8.7	.074	-0.03	0.06	.275	-0.13	0.11	.127	0.17	0.16	.143	0.13	0.10	.104
SES ^h	3.1	5.6	.288	-0.06	0.04	.058	-0.02	0.07	.385	-0.10	0.10	.143	-0.00	0.06	.483
School Lunch ⁱ	-137.1	107.2	.102	-0.20	0.79	.397	0.33	1.4	.332	-0.38	1.9	.421	-2.23	1.3	.046
R ^{2j}	6.2			32.1			0			8.26			4.24		
F statistic ^k	1.92			7.57			0.77			2.25			21.1		

Variable	Calcium (mg) ^a		Iron (mg) ^a		Sodium(g) ^b		Potassium (g) ^b		PUFA						
	B ^c	SE ^d	α ^e	B ^c	SE ^d	α ^e	B ^c	SE ^d	α ^e	B ^c	SE ^d	α ^e			
Neighborhood ^f	0.85	6.1	.444	0.18	0.09	.031	27.2	19.1	.078	-16.9	9.7	.041	-0.09	0.07	.095
SES ^g	5.0	3.8	.097	0.02	0.06	.319	-47.2	12.0	.001	-3.0	6.1	.308	-0.02	0.04	.308
School Lunch ^h	99.8	73.7	.089	0.39	1.1	.367	-453.9	232.3	.063	17.9	117.0	.439	-1.2	0.88	.083
R ²ⁱ	22.6			24.1			35.9			38.5			11.9		
F statistic ^j	4.56			4.87			7.81			8.5			47.5		

Variable	SFA ^a			MUFA ^b		
	B ^c	SE ^d	α ^e	B ^c	SE ^d	α ^e
Neighborhood ^f	-0.07	0.10	.245	-0.19	0.11	.040
SES ^g	0.13	0.06	.022	-0.08	0.07	.110
School Lunch ^h	3.46	1.27	.003	-0.18	1.3	.445
R ²ⁱ	66.4			69.4		
F statistic ^j	24.9			28.6		

All models adjusted for age, gender, and ethnicity

^a kcal = kilocalories

^b g = percentage of total calories expressed in grams

- c Fiber = grams adjusted for total energy intake
- d_B = unstandardized coefficient
- e SE = standard error
- f α values are based on the t statistic for linear regression significance criteria $\alpha < .05$
- g Neighborhood = neighborhood disorder
- h SES = individual level socioeconomic status
- i School lunch = Percent of children receiving/qualifying for free or reduced school lunch
- j R^2 = adjusted R^2 , total variance explained by the model, expressed as a percentage
- k F-statistic test of significance for multiple linear regression
- a mg = milligrams adjusted for total energy intake
- b g = grams adjusted for total energy intake
- c PUFA = polyunsaturated fats
- d_B = unstandardized coefficient
- e SE = standard error
- f α values are based on the t statistic for linear regression significance criteria $\alpha < .05$
- g Neighborhood = neighborhood disorder
- h SES = individual level socioeconomic status
- i School lunch = Percent of children receiving/qualifying for free or reduced school lunch
- j R^2 = adjusted R^2 , total variance explained by the model, expressed as a percentage
- k F-statistic test of significance for multiple linear regression
- a SFA = percentage calories from saturated fatty acids
- b MUFA = percentage of calories from monounsaturated fatty acids
- c B = unstandardized coefficient
- d SE = standard error
- e α values are based on the t statistic for linear regression significance criteria $\alpha < .05$

f_N Neighborhood = neighborhood disorder

g_{SES} SES = individual level socioeconomic status

h_j School lunch = Percent of children receiving/qualifying for free or reduced school lunch

$i_j R^2$ = adjusted R^2 , total variance explained by the model, expressed as a percentage

j F-statistic test of significance for multiple linear regression