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## The beneficial effect of family meals on obesity differs by race, gender, and household education: The National Survey of Children's Health, 2003–2004

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### Abstract

Studies have indicated that family meals may be a protective factor for childhood obesity; however, limited evidence is available in children with different racial, socioeconomic, and individual characteristics. The purpose of this study was to examine family meal frequency (FMF) as a protective factor for obesity in a US-based sample of non-Hispanic White, non-Hispanic Black, and Hispanic children aged 6 to 11, and to identify individual, familial, and socioeconomic factors that moderate this association. Data were from the 2003 National Survey of Children's Health (n=16,770). Multinomial logistic regression analyses were used to test the association between FMF and weight status, and the moderating effects of household structure, education, poverty level, and sex, by racial group. Non-Hispanic White children who consumed family meals everyday were less likely to be obese than those eating family meals 0 or few days a week. A moderating effect for gender was observed in non-Hispanic Black children such that FMF was marginally protective in boys but not girls. Higher FMF was a marginal risk factor for obesity in Hispanic boys from low-education households, but not in girls from similar households. In conclusion, family meals appear to be protective of obesity in non-Hispanic White children, and non-Hispanic Black boys; whereas, they may put Hispanic boys living in low education households at risk. Greater emphasis is needed in future research on understanding why this association differs among different race/ethnic groups, and the influence of the quality in addition to the quantity of family meals on child obesity.

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## Keywords

family meals; obesity; race; socioeconomic status; gender

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## INTRODUCTION

In the United States, the rise in childhood obesity (1) has been accompanied by a decline in the occurrence of family meals within the home (2). Children who eat family meals consume more fruits and vegetables (3–5), less saturated fat (6), and have better overall diet quality (5). However, few studies to date have examined the relationship between family meals and weight status in childhood, and to the authors' knowledge, none have assessed this association by child gender, in Hispanic and non-Hispanic Black preadolescent children, or in children living in low socioeconomic households. This is surprising given that obesity rates were disproportionately high among Hispanics and non-Hispanic Blacks aged 6 to 11, particularly Hispanic boys and non-Hispanic black girls, as compared to non-Hispanic Whites in a 2003–2006 national study (7). Moreover, U.S. children are at greater risk for obesity if they live in families with low socioeconomic status (8,9) or education level (10,11), and single-parent headed households (12).

A growing body of literature has emerged on the study of family meals and obesity. Most U.S. studies have been conducted in adolescents (13–15) and only one in children (16). In elementary school children, having fewer family meals was predictive of becoming or staying obese one year later (16). No study to date has examined racial differences in this relation among young children; whereas, two studies have been conducted in adolescents. The protective effects of family meals were reported among white adolescents, but were either null or negative in non-Hispanic Black and Hispanic adolescents (13,14). Given the gender differences in obesity rates among Hispanic and non-Hispanic Blacks (7), the protective effects of family meals may differ by gender as well. In addition, it is unknown whether the association between family meals and obesity differs for children living in different socioeconomic contexts. Low household income (4,11,17,18) and years of education (10,11,19), and living in a single-parent headed household (12,14,19) are risk factors for childhood obesity and infrequent family meals. This observational study fills the gap in existing literature by examining the association between family meal frequency (FMF) and weight status among non-Hispanic White, non-Hispanic Black, and Hispanic children (6- to 11-year olds) using the U.S.-based 2003 National Survey of Children's Health (NSCH), and identifying individual, familial, and socioeconomic factors that moderate this association.

## METHODS

### Participants

Data were drawn from the 2003 NSCH, a nationally representative dataset sponsored by the Centers for Disease Control and Prevention. Details on study design and recruitment are reported elsewhere (21,22). Data were collected and entered by trained interviewers using a computer-assisted telephone interviewing system. The national study was approved by the National Center for Health Statistics Research Ethics Review Board and Abt Associates Institutional Review Board. The final sample was restricted to non-Hispanic White, non-Hispanic Black, and Hispanic children aged 6 to 11 years, and those with mother-reported data complete on all variables of interest ( $n = 16,770$ ).

## Measures

Similar to a previous study using national survey data (14), mothers were asked “During the past week, on how many days did all the family members who live in the household eat a meal together?” to assess family meal frequency. Responses were recoded into none or few days (0–2 days;  $n = 1933$ ), some days (3–4 days;  $n = 3389$ ), almost everyday (5–6 days;  $n = 3882$ ), and everyday (7 days;  $n = 7566$ ). Race/ethnicity categories were non-Hispanic White, non-Hispanic Black, and Hispanic; those who reported mixed race or other were excluded due to small sample size. Highest household education level (<12 years, 12 years, >12 years) was reported. Because few households reported <12 years (4.6%), education was recoded into 0= 12 years and 1=>12 years. Family structure (0=two-parent, 1=single-parent), poverty level (0=not poor, 1=185% poverty; 1=near poor, 2=133% and <185% poverty; 2=poor, <133% poverty level), and child’s age and sex were assessed.

Based on parent reports of height and weight, child body mass index (BMI;  $\text{kg}/\text{m}^2$ ) categories were provided in the CDC dataset (20): normal weight (5<sup>th</sup> and <85<sup>th</sup> percentile), overweight (85<sup>th</sup> and <95<sup>th</sup> percentile), and obese (95<sup>th</sup> percentile). In the CDC dataset, 10.7% of Hispanic children had missing BMI data compared to 4.8% of non-Hispanic Black and 3.5% of non-Hispanic White children. Children with missing BMI data were more likely to be poor, have family meals every day, and reside in households with 12 years of education ( $P < .05$ ) than children without missing BMI data.

## Statistical Analyses

Data analyses were conducted using STATA 9.1 (21) to account for sample weights and complex survey design (22). All models were performed separately by racial group. Multinomial logistic regression was used to investigate the association between FMF categories and weight status. Normal weight children and FMF of “none or few days” (0–2 days) was the reference group. Adjusting for covariates, odds ratios [ORs] and their respective 95% confidence intervals [CI] were calculated.

Multinomial logistic regression analyses were used to identify moderators (i.e., interaction terms) of the association between FMF and weight status. Preliminary analyses identified children who ate family meals every day (i.e., FMF=7) as demographically distinctive from children in the other FMF categories. When children with FMF=7 were excluded from the logistic regression analyses, clear linear trends were observed between FMF and weight status; however, when these same children were included in the model, the unstandardized betas were inconsistent with the direction of these trends. In other words, the inclusion of children with FMF=7 not only changed the trend of the results but actually masked the results of the remaining sample (i.e. children with FMF=0 to 6). In addition, t-tests ( $P < .05$ ) revealed that children who reported FMF=7 had different demographic characteristics compared with children who reportedly ate family meals less often. Children with FMF=7 were more likely to be poor, younger, and reside in single-parent households and households with 12 years of education. Given these findings, the everyday group was excluded from the moderation analyses. This reduced the sample size for the moderation analyses: non-Hispanic White ( $n = 7,445$ ), non-Hispanic Black ( $n = 996$ ), and Hispanic ( $n = 763$ ). In each model, poverty level, family structure, education, or gender were tested as moderators of the relationship between FMF and weight status (i.e., a 2-way interaction), and whether the effect of each moderator differed by gender (i.e., a 3-way interaction; e.g., FMF\*gender\*poverty). FMF as a continuous variable (range: 1–6) was centered and multiplied by each covariate to create 2-way interaction terms, and then by each covariate and gender to create 3-way interaction terms (23). In each model, the 3-way interaction term was tested first; if the interaction term had a p-value exceeding .10, the model was reduced and the 2-way interaction term was tested. Initially, overweight and obese were examined

separately; but they produced similar results and were combined in all moderation models. For significant interactions ( $p < .10$ ), simple slopes were computed (24,25). The current study was granted exempt status by the Pennsylvania State University Institutional Review Board.

## RESULTS AND DISCUSSION

Sample descriptives stratified by race are shown in Table 1. The majority of the children were non-Hispanic White (71.7%). FMF was high in all children; on average, Hispanics reportedly had family meals 5.6 days/week, non-Hispanic Whites 5.2 days/week, and non-Hispanic Blacks 5.0 days/week. Slightly less than half of non-Hispanic white children were overweight or obese (43.0%) compared with almost two-thirds of the Hispanic (60.3%) and non-Hispanic Black children (63.3%).

This is the first study to investigate racial differences in the association between FMF and weight status among children. Referring to Table 2, FMF was inversely associated with being obese in non-Hispanic White children only. Compared to non-Hispanic Whites who ate none or few family meals (0–2 per week), the odds of being obese were 33% less in non-Hispanic Whites who ate family meals almost everyday. In addition, having family meals everyday or on some days marginally lowered the odds of being obese by ~19%. No significant associations were observed for overweight. These findings corroborate previous research conducted with adolescents (13,14).

To our knowledge, this is the first study to investigate individual, familial, and socioeconomic moderators in the relationship between family meals and weight status. Sex marginally moderated the relation between FMF and weight status in non-Hispanic Blacks ( $P = 0.07$ ). The odds of being overweight or obese marginally decreased as FMF increased in non-Hispanic Black boys (simple slope,  $B = -0.15$ ,  $P = 0.08$ ; OR = 0.89, 95% CI: 0.73 to 1.02); whereas no association was found in non-Hispanic Black girls ( $P = 0.45$ ).

In Hispanics, two 3-way interactions were significant at  $P < 0.10$ : FMF\*family structure\*gender ( $P = .02$ ) and FMF\*education\*gender ( $P = 0.07$ ). Hispanic boys living in single-parent households were more likely to be overweight or obese if they reported greater FMF (simple slope,  $B = .27$ ,  $P = 0.098$ ; OR = 1.31, 95% CI: 0.95 to 1.80). Similarly, Hispanic boys living in low education households were more likely to be overweight or obese if they reported greater FMF (simple slope,  $B = 0.33$ ,  $P = 0.06$ ; OR = 1.38, 95% CI: 0.98 to 1.95). No associations were observed for Hispanic girls living in single-parent or low education households ( $P > 0.05$ ), or boys or girls living in 2-parent or high education households ( $P > 0.05$ ). To assess whether the FMF\*family structure\*gender and FMF\*education\*gender interaction terms had unique effects on BMI in Hispanics, the main effects and interaction terms from both models were entered into one model. Results revealed that only FMF\*education\*gender remained statistically significant ( $P = .02$ ). No significant interactions were observed in non-Hispanic Whites.

Findings from the current study highlight potential ethnic and contextual differences in the relation between family meals and weight status. There was a trend for non-Hispanic Black boys to be heavier when family meals were less frequent and for Hispanic boys living in low education households to be heavier if they consumed frequent family meals; in contrast, no relation was observed among their female counterparts. It is possible that parents within these ethnic populations used different child-feeding practices with their male and female children; previous research has shown this to be the case in other ethnic groups (26–29). In one study, for instance, non-Hispanic White parents placed more foods within reach for boys than girls during family meals (29). Future studies should examine cultural practices

regarding mealtimes that may shed light on the gender differences that emerged in the current study

Further, mechanisms such as meal quality may account for the observed differences among racial groups. One study found that Hispanic parents were more likely to purchase fast food for family dinners than other ethnic groups (30). Moreover, education level may play a role in the nutritional quality of family meals served in Hispanic households. In one study, for example, parents with low-incomes, which is influenced by education level, reported that they had little time to prepare meals or have family meals, and that they often purchased fast foods or prepared quick meals (31). Such purchases may reflect an unhealthy food environment at home where high-calorie snack foods are readily available and fast food is regularly consumed. Thus, family meals may only be protective of obesity when they are healthful.

The current study has several limitations. The data are cross-sectional and thus causality cannot be determined. Children's BMI was based on mother-reported height and weight, and thus may be subject to bias. Ten-percent of Hispanic children had missing BMI data and were not included in the current study. However, the data were nationally representative and thus the findings are generalizable. Some of the interaction terms approached statistical significance but did not reach it. Therefore, the authors further examined the extent to which design effects—a consequence of the study's complex sampling design—inflated the standard errors of the interaction term parameters. Though acceptable, the design effects of these parameters ranged from 2.10 to 2.54, suggesting that the standard errors of the parameters were 2.1 to 2.5 times larger than they would have been if the sample were randomly sampled. Further, the design effects of the interaction parameters reduced the effective sample sizes of non-Hispanic Blacks to 473 and Hispanics to 300 in the moderation models. Though it is uncertain, the design effects may have made it difficult for the interaction terms to reach statistical significance. Lastly, the moderation analyses did not include children who consumed family meals everyday (45% of the sample) for reasons described previously. Although this limits the generalizability of the moderation findings to only those children who consume family meals 0 to 6 days per week, these findings overall highlight the complex nature of the relationship between family meals and weight status within minority populations.

## Conclusion

This study showed that the relationship between family meals and weight status is complex. Frequent family meals are associated with lower weight status in non-Hispanic White children and non-Hispanic Black boys, but not in Hispanic girls or non-Hispanic Black girls. Family meals may represent a risk factor for obesity in Hispanic boys who live in low education households. These findings highlight the need for future research to place a greater emphasis on examining the quality of food served at family meals in addition to quantity of shared meals to direct guidance given to parents regarding family mealtimes.

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**Table 1**

Sample Weighted Characteristics of Non-Hispanic White, Non-Hispanic Black, and Hispanic Children (n=16,770): National Survey of Children's Health, 2003–2004

Characteristics	Non-Hispanic White (n = 13,271)	Non-Hispanic Black (n = 1,847)	Hispanic (n = 1,652)
<b>Child</b>			
Age, mean (SE), y	8.6 (.02)	8.7 (.1)	8.7 (.1)
Family Meal Frequency, <sup>a</sup> mean (SE), days	5.2 (.03)	5.0 (.1)	5.6 (.1)
Sex, %			
Boys	52.6	49.6	50.1
Girls	47.4	50.4	49.9
BMI Classification, <sup>b</sup> %			
Normal	57.0	36.6	39.7
Overweight	18.7	16.9	17.9
Obese	24.3	46.4	42.4
<b>Household</b>			
Family Structure, %			
2-Parent	81.7	41.8	69.8
Single-Parent	18.3	58.2	30.2
Education, %			
12 y	24.7	41.8	51.5
>12 y	75.3	58.2	48.5
Poverty Level, <sup>c</sup> %			
Not poor	76.1	44.3	44.5
Near poor	10.5	15.3	11.5
Poor	13.5	40.5	44.1

Abbreviation: SE, standard error; y, year.

<sup>a</sup>The range of possible values is 0–7 days.

<sup>b</sup>Children were classified into the following weight categories based on body mass index (BMI; kg/m<sup>2</sup>) percentile: normal (>5<sup>th</sup> percentile and < 85<sup>th</sup> percentile), overweight ( 85<sup>th</sup> percentile and <95<sup>th</sup> percentile), and obese ( 95<sup>th</sup> percentile).

<sup>c</sup>Poverty level was classified into 3 categories based on reported poverty level: poor (<133% poverty), near poor ( 133% poverty and <185% poverty), and not poor ( 185% poverty).



**Table 2**

Association Between Family Meal Frequency (FMF) and Weight Status Among Non-Hispanic White (n=13,271), Non-Hispanic Black (n=1,847), and Hispanic (n=1,652) Children: National Survey of Children's Health, 2003–2004<sup>a</sup>

	Non-Hispanic White	Non-Hispanic Black	Hispanic
	MOR <sup>b,c</sup> (95% CI)	MOR <sup>b,c</sup> (95% CI)	MOR <sup>b,c</sup> (95% CI)
<b>Overweight</b>			
None or few days	1.00	1.00	1.00
Some days	1.14 (0.87, 1.50)	0.90 (0.46, 1.74)	0.78 (0.34, 1.80)
Almost every day	1.00 (0.78, 1.28)	1.08 (0.53, 2.27)	0.98 (0.44, 2.18)
Every day	1.03 (0.82, 1.31)	0.86 (0.47, 1.55)	1.19 (0.62, 2.29)
<b>Obese</b>			
None or few days	1.00	1.00	1.00
Some days	0.82 (0.63, 1.06)	0.99 (0.59, 1.67)	0.68 (0.35, 1.33)
Almost every day	0.67 (0.52, 0.87)**	0.79 (0.46, 1.36)	0.68 (0.31, 1.49)
Every day	0.81 (0.63, 1.02) <sup>†</sup>	0.88 (0.56, 1.40)	0.98 (0.55, 1.73)

Note: Overweight was defined as a body mass index percentile ≥85 and <95, and obese as ≥95.

<sup>a</sup>Weighted to be nationally representative.

<sup>b</sup>Multinomial odds ratios (MOR) and 95% confidence intervals (95% CI) were obtained using multinomial logistic regression. The comparison group was “normal weight” and “none or few days”.

<sup>c</sup>Adjusted for child age and gender, and household poverty level, education, and structure.

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 $p < .01$

<sup>†</sup>  
 $p < .10$