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Associations Between Food Insecurity and Parental Feeding Behaviors of Toddlers

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Abstract

Objectives: We examined associations between household food insecurity status and parental feeding behavior, weight perception, and child weight status in a diverse sample of young children.

Methods: Cross-sectional analysis of 2-year old children in Greenlight, a cluster randomized trial to prevent childhood obesity. The exposure was food insecurity, defined as a positive response to a validated screen. Outcomes were parent feeding behaviors/beliefs measured by the Child Feeding Questionnaire and child weight status. T-tests and linear regression were used to assess

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associations between food insecurity and each outcome. We adjusted for child sex, race/ethnicity, parent education, employment, site, number of children in the home, and WIC status.

Results: 503 households (37%) were food insecure. After adjusting for covariates, parents from insecure households reported more pressuring feeding behaviors (mean factor score 3.2 compared to food secure parents mean factor score 2.9, $p=0.01$) and were more worried about their child becoming overweight (mean factor score 2.3 vs 2.0; $p=0.02$). No differences were observed in monitoring or restrictive feeding behaviors. After adjusting for covariates, there was no difference in weight status or prevalence of overweight/obesity of children or parents based on household food insecurity status.

Conclusions: Parents from food insecure households reported more pressuring feeding behaviors. This finding underscores the need to address food insecurity and potentially prevent harmful effects on child feeding. Parents in food insecure households might benefit from linkage with resources and education to develop healthier feeding behaviors.

Keywords

Food Insecurity; parental feeding practices; obesity; minority health

Introduction

Good nutrition is essential for proper physical growth and cognitive behavioral development in children¹, yet in 2018 approximately 1 out of every 7 U.S. households with children identified as food insecure², affecting 5 million American households with children.³ The US Department of Agriculture defines food insecure households as those in which “consistent access to adequate food is limited by a lack of money or other resources”.^{4,5} Households with children are at increased risk of food insecurity, making food insecurity important to pediatric health care providers.⁴ Additional risk factors for food insecurity include being an ethnic minority and living below the federal poverty level.⁴

Previous studies suggest that food insecurity can influence parental feeding behaviors.⁶⁻⁸ The mechanism linking food insecurity and parental feeding behaviors is complex and mediated by factors such as maternal depression⁹, household stress, and conflict.¹⁰ Parental feeding behaviors are important because pressuring behaviors have been shown to adversely affect children’s eating behavior,^{11,12} while restrictive behaviors are associated with increased BMI and obesity in young children.^{11,13-15} As suggested by conceptual models, parental feeding behaviors may contribute to child weight¹⁶ and therefore to childhood obesity risk. Food insecurity could potentially influence parental behaviors because parents might adopt either more pressuring or restrictive behaviors when access to an adequate quantity of nutritious foods is inadequate. A relationship between food insecurity and parental feeding style has been described previously in young infants^{6,7} and in elementary school children.¹⁷ However it remains unclear whether this relationship also exists in toddlers, an important age to understand because longer-term eating patterns may be influenced by behaviors at this age.¹⁸ Important changes occur between infancy, where the parent exclusively determines the child’s nutrition, and toddlerhood, when children develop their own food and feeding preferences and autonomy related to food.¹⁸ Elucidating the

association between food insecurity and non-responsive feeding behaviors in this age group is important given literature which demonstrates that non-responsive feeding behaviors, including restrictive feeding and pressuring feeding behaviors, are associated with overweight and obesity in infants, toddlers¹⁹ and school aged children.²⁰ Further, understanding associations between food insecurity and feeding behaviors may be especially important for ethnic minority children, who are at increased risk for obesity.²¹

Our study aimed to determine whether household food insecurity status was associated with differences in parental feeding behaviors and attitudes in an ethnically diverse sample of young children. We hypothesized that parents in food insecure households would report both more restricting and pressuring behaviors relative to food secure households due to a desire to ensure adequate caloric intake and limit food waste. We also hypothesized that parents in food insecure households would express less concern about future childhood overweight, since parents might be primarily concerned with food scarcity. A secondary aim of our study was to determine whether differences exist in child weight status and parent overweight/obesity between food insecure (FI) and food secure (FS) households. We hypothesized that children and parents from food insecure households would have a higher weight status compared to children from food secure households.

Methods

Study Population

This study is a cross-sectional analysis of participants in the Greenlight study, which is a cluster randomized controlled trial conducted at four academic centers, designed to prevent childhood overweight. The Greenlight Study methods have been previously described.²² Study sites include New York University, University of Miami, University of North Carolina at Chapel Hill, and Vanderbilt University. Sites were randomized to the obesity prevention intervention arm or the injury prevention active control arm. Study enrollment began in April 2010.²² Eligibility criteria included presenting to one of the four clinics for a 2-month well child visit, parent speaking English or Spanish, child gestational age of >34 weeks or birth weight >1500 grams and > 3rd percentile of weight at study enrollment, and no medical condition affecting weight. Parent exclusion criteria included: age less than 18 years, mental health or neurologic impairment affecting ability to consent, or poor visual acuity. Data was collected in person at well child visits. The current analysis is from data collected at the 24 month Greenlight well-child visit time point and demographic information collected as baseline.²² IRB approval for this study was obtained at all four research sites, and parents provided written informed consent.

Outcome Measures

Parental feeding behaviors and attitudes were measured using the Child Feeding Questionnaire (CFQ). The CFQ has been studied for use in children as young as 2 years of age²³ and in diverse populations.²⁴⁻²⁷ The CFQ contains 31 questions that load onto seven factors. The factors of the CFQ include monitoring feeding behaviors, restricting feeding behaviors, pressuring feeding behaviors, parental perception of own weight, parental responsibility for child feeding, parental perception of child's weight, and parental concern

about child becoming overweight.²³ An example of a pressuring question would be “If I did not guide or regulate my child’s eating, s/he would eat much less than she should.” An example of a restricting question is “I have to be sure my child does not eat too many sweets.” An example of a weight concern question is “How concerned are you about your child becoming overweight.” Each individual question is rated on a 5-point Likert scale. A score of 1 corresponds to a response of “unconcerned/markedly underweight/disagree/never,” depending on the question, and a 5 response corresponds to “agree/always/concerned/markedly overweight.” A response of 3 indicates a neutral response. The average factor score is obtained by summing the questions loading onto a factor and dividing by the total number of questions loading onto an individual factor. Mean factor scores are reported on a 5-point scale.²³

Child weight status was treated as a continuous and dichotomous variable. Weight and length data was obtained by trained clinic staff.²² Child weight status was determined by the World Health Organization Body Mass Index (WHO BMI) z-score. The WHO z-BMI was used to capture BMI information on children who presented for their 2-year well child visits prior to formally turning 2 years of age. Mean WHO BMI z-score for children from food secure and food insecure households were examined. WHO BMI z-score was dichotomized into >2 and ≤ 2 .²⁸

Parent BMI data was calculated from self-reported height and weight. Parent overweight was defined as BMI ≥ 25 .²⁹

Exposure Variable

Household food insecurity status was determined using a validated 2-item questionnaire.^{4,30} As is recommended, a household was defined as food insecure if the parent gave an affirmative response to either of the questions: “Within the past 12 months, we worried whether our food would run out before we got money to buy more”, or, “within the past 12 months, the food we bought just didn’t last and we didn’t have money to get more.”^{4,30} Households were classified as food secure if parents answered “no” to both questions. Using this approach, 37% of households identified as food insecure. The cohort for analysis was limited to those for whom food security information was available at 24 months. Of the 865 parent-child dyads enrolled at baseline, information on household food insecurity status was available for 503 dyads (Figure).

Control Variables

Control variables chosen *a priori* to be included in the model were child sex, child race/ethnicity, parent education level, parental employment, site, number of children in the home and WIC status. These variables were included because they are thought to influence parental feeding behavior and be associated with household food insecurity status.³ Household income was not included in multivariate models because recent household income was not collected at 24 months. Household employment status was included in the model and was defined as any parent working. An interaction term between site and food insecurity status (generated by site x food insecurity status) was examined and found to be non-significant; therefore we removed it from the model.

Statistical Analysis

Descriptive statistics were used to describe demographic characteristics of the study sample using percentages for categorical variables and means for continuous variables. Measures of associations for the exposure variable, food insecurity status, and study demographic information were assessed using Chi-squared test or the Wilcoxon rank sum test as appropriate for categorical variables, and t-test and Wilcoxon for continuous variables. To assess for association of food insecurity status with parental feeding behaviors and attitudes while adjusting for potential covariates we performed multivariate linear modeling. Adjusted predicted means for each CFQ factor domain were obtained from the model. A multivariable logistic regression model was used to explore covariates associated with risk of loss to follow up at 24 months.

Statistical analyses were performed using Stata Version 14. Two-sided p-values less than or equal to 0.05 were considered statistically significant.

Results

A total of 865 parent-child dyads were enrolled in the trial. Parent-child dyads with food security status at 24 months were included in the current analysis (N=503 dyads). No differences were observed in demographic characteristics of the baseline cohort and the sample at 24 months included in the current analysis. Study sample demographic characteristics are summarized in Table 1. The average child age was 25 months (SD 1.3 months). The population was ethnically and racially diverse with approximately half of the children in the sample identifying as Latino, 29% of children identifying as Black Non-Latino, 15% White Non-Latino, and 4% identified as other. The sample was evenly split between female and male children. The majority of the parents had a high school education or less, and 60% of households had WIC for either the mother or child. Approximately one third of households had 3 or more children under age 18 living in the home. Over a third (37%) of households were identified as food insecure.

In bivariate analysis, food insecurity was associated with child race/ethnicity ($p=0.03$) (Table 2). WIC participation was associated with household food insecurity status with 68% of food insecure households and 56% of food secure households participating in WIC ($p=0.005$). Lack of completion of high school education by parents was also associated with food insecurity. Thirty-seven percent of FI households had 3 children under 18 years of age while 27% of FS households had 3 children. Child female sex was associated with food insecurity, while parent employment status was not.

The relationship between food insecurity status and parental feeding behaviors and attitudes after adjustment for potential confounders is shown in Table 3. There was no difference between food secure and food insecure households in mean factor score for monitoring or restrictive feeding behaviors. However, pressuring feeding behaviors were more likely to be observed in food insecure households compared to food secure households (mean factor score 3.2 vs 2.9, $p=0.011$). Parents in food insecure households were also more likely to be concerned with their children becoming overweight relative to those in food secure households (mean factor score 2.3 vs 2.0 $p=0.021$).

There were no differences in child weight status as assessed by mean BMI z-scores or proportion of children who were overweight or obese, or prevalence of parent overweight/obesity, between food secure and food insecure households (Table 4).

Discussion

In this diverse cohort, parental feeding behaviors differed based on household food insecurity status. Parents of young children in food insecure households described more pressuring behaviors relative to those in food secure households. This finding is consistent with previous studies that have demonstrated an aversion to wasting food among low-income/food insecure families.³¹ Previously it has been described that food insecure parents may try to optimize children's caloric intake and avoid wasting food when it is available.³¹ Parental pressure to eat caloric-dense, nutrient poor foods is one mechanism by which food insecurity could lead to obesity. Educational interventions could be valuable and necessary to support parents in adopting more healthful feeding patterns, which could in turn reduce obesity risk. Previously described interventions hold promise for modifying feeding behaviors^{32,33} and may be especially important for children in food insecure households, given their increased risk of obesity.

A potentially paradoxical finding from our study was that parents in food insecure households were more concerned about their children becoming overweight in the future compared with parents in food secure households. This finding may be surprising since parents in food insecure households might be expected to be more concerned about their child being underweight due to uncertain access to food. However, food insecurity is a complex phenomenon and can occur at the level of the household, child or parent, and in the absence of hunger. Parents may be fully aware that their choices of foods are necessarily economically and not nutritionally-driven. They may thus be concerned that their children will be overweight as a result of an unfortunate tradeoff. Our study addressed food insecurity at the household level and does not provide insight into food insecurity at the level of the child, and did not assess whether hunger was present. Qualitative work demonstrates that during periods of food insecurity, families make nutritional changes to ensure that the family has an adequate quantity of food while meeting other financial demands.^{34,35} Though our study design precluded exploring this further, it is possible that parents in food insecure households are aware of the potential negative impact of their feeding behaviors and calorically dense foods, and therefore more concerned about future obesity.

Although parents in food insecure households described more pressuring feeding behaviors, this did not translate into differences in weight status for children or parents in food insecure households relative to children and parent from food secure households. The lack of difference could be explained by more time being required for differences in parental feeding behaviors to lead to a statistically significant difference in BMI z-scores between the two groups. Food insecurity has been associated with overweight and obesity in school aged children; however, the association was not observed in younger children.³⁶ Sample size may also explain the lack of difference in BMI z-scores. In order to detect a statistically significant difference between two groups assuming an alpha of 0.05, power of 0.8 and standard deviation of 1.4 and a ratio of 1:3 we would need a sample size of 12,824 with

3,205 children in food insecure households and 9,624 children in food secure households. Larger and longer-term studies would be needed to determine whether pressuring parental feeding behaviors in food insecure households at age 2 are associated with longer-term increased risk for overweight.

Food insecurity for families can be transient^{5,7} and duration of exposure to household food insecurity might impact children's risk for obesity. We were unable to examine duration of food insecurity within this study; examination of the relationship of food insecurity duration to child feeding behaviors and child weight status would be an important area for future work.

An American Academy of Pediatrics policy statement stressed the importance of food security for all children, and identified programs to address food insecurity such as WIC, SNAP and community food pantries⁴ which have been reported to be beneficial to families during periods of food insecurity.³⁵ While we believe our feeding styles work is important, we believe that the most important result of our work could be to reinforce the fact that pediatricians should be on the front lines of advocacy, encouraging better policies for food attainment for our families at risk. WIC is a frequently reported resource for food insecure households; however, families may face obstacles continuing participation in WIC.³⁵ Clinics serving vulnerable families should assist families in enrolling in programs to address food insecurity such as WIC and SNAP and consider forming relationships with Medical-Legal Partnerships to assist families whose benefits are denied. A notable finding from our study was that within this low-income cohort, food insecurity was associated with participation in WIC. This finding is likely due to greater WIC receipt by families with the lowest incomes, who are also at increased risk for food insecurity. This result serves as a reminder that food insecurity can persist in families despite WIC receipt.

Limitations

There are several limitations to this study. While differences in the CFQ were noted between food secure and food insecure households, the clinical implications of these differences are not known. Also, given the cross-sectional nature of the study we are not able to access the causality of the relationships or chronicity of the exposure. Longitudinal studies would be needed to determine whether the feeding behaviors observed in this study persist or evolve over time as a family's food insecurity status changes. The data for this study were collected in the context of a randomized control trial to reduce childhood obesity and exposure to the intervention might affect parental feeding behavior and response to the CFQ. To test whether the intervention influenced the observed associations between food insecurity status and CFQ, linear models with an interaction term between site and food security were created. The interaction terms for the models were non-significant, suggesting that it is unlikely that the study site or intervention influenced the associations seen in the study. However, the results of the study need to be interpreted within the context of the larger study and study design. Shared method variance is another limitation of the study due to the fact that the food security screener and CFQ were completed by the same respondent. Our analysis was also limited by a large number of missing values for weight status of the parents.

Conclusions

Differences in parental feeding behaviors for 2-year old children exist between food secure and food insecure households. These findings add to the existing evidence on the harmful consequences of food insecurity for children and underscore the need for broad solutions to address food insecurity. Additionally, parents who have experienced food insecurity might benefit from support and education to modify their feeding behaviors and reduce obesity risk. Future interventions could explore how addressing food insecurity, along with its associated comorbidities, coupled with educational interventions, might help support parents in adopting healthy and nutritious eating behaviors.

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What's New

Parents of toddlers in food insecure households described more pressuring behaviors compared with parents from food secure households and were more concerned about children becoming overweight. Despite these differences, weight status at age 2 was similar for children from food secure and insecure households.

Figure.
Flow Diagram

Table 1.

Characteristics of Parents and Children (N=503)

Characteristic	% (N)/Mean (SD)
Children residing in food insecure households	37% (187)
Child age in months (SD)	25 (1.3)
Child Sex	
Male	49% (246)
Female	51% (257)
Child Race/Ethnicity	
Latino	52% (260)
White Non-Latino	15% (74)
Black Non-Latino	29% (147)
Other	4% (22)
Parent Education^a	
High School	57% (290)
>High School	42% (212)
WIC Status of Family-Enrolled	60% (304)
Number of Children in the Home	
Two or less	69% (347)
3 or more	31% (156)
Households with an Employed member^b	91% (454)

^aOne missing data point for variable^bThree missing data points for variable

Table 2.

Parent/Child Characteristics In Households With and Without Food Insecurity

Characteristics N=503	Food Insecure N=187 %/(N)	Food Secure N=316 %/(N)	P-value ^a
Child Sex			0.03
Male	42% (80)	52% (166)	
Female	57% (107)	47% (150)	
Child Race/Ethnicity			0.03
Latino	55% (103)	50% (157)	
White Non-Latino	10% (18)	18% (56)	
Black Non-Latino	33% (61)	27% (86)	
Other	3% (5)	5% (17)	
Parent Education^b			<0.001
High School	72% (134)	49% (156)	
>High School	28% (52)	51% (160)	
WIC Status of Family^c			0.005
Child or parent not Enrolled	32% (59)	44% (140)	
Child or parent enrolled	68% (128)	56% (176)	
Number of Children in the Home			0.02
Two or less	63% (117)	72% (230)	
Three or more	37% (70)	27% (86)	
Household Employment Status^d			0.06
Employed member	87% (164)	93% (290)	
No employed member	12% (23)	7% (23)	

^aChi-square tests of association^bOne missing data point for variables^cWIC status of child and/or parent^dThree missing data points for variable

Table 3.

Adjusted Mean Child Feeding Questionnaire (CFQ) Factor Scores^a Reported by Parents in Food Insecure and Food Secure Households

CFQ Factor ^b	Food Insecure	Food Secure	P-Value
Pressuring Behaviors	3.2	2.9	0.01
Concern about Child Becoming Overweight	2.3	2.0	0.02
Parental Feeding Responsibility	4.7	4.7	0.87
Parent Perception of Own Weight	3.4	3.5	0.083
Parent Perception of Child's Weight	2.9	2.9	0.43
Restrictive Behaviors	3.7	3.7	0.45
Monitoring Behaviors	4.1	4.2	0.13

^aLinear models were used to calculate adjusted mean scores adjusted for household child sex, child race/ethnicity, parent education, parental employment, site, number of children in the home and WIC status.

^bN=492 for this analysis which was limited to subjects who completed CFQ

Table 4.

Adjusted Mean z-BMI and Prevalence of WHO BMI z-Score >2 of Children and Parents in Food Secure and Food Insecure Households

	Food Insecure (N=174)	Food Secure (N=303)	P-value
Child z-WHO BMI Z Score ^{a,b}	1.04 (SE 0.11)	0.96 (SE 0.08)	0.59
Child z-WHO BMI Z score >2 ^{a,c}	15% (26)	15% (45)	0.94
Parent Overweight/Obese at 2 year visit ^d	63% (135)	72% (243)	0.12

^aN=477 for child z-BMI analyses, which included only children for whom measured weight and length data was available

^bLinear models were used to calculate means adjusting for child sex, child race/ethnicity, parent education level, parental employment, site, number of children in the home and WIC status

^cPredicted prevalence of z-BMI >2 adjusted for child sex, child race/ethnicity, parent education level, parental employment, site, number of children in the home and WIC status

^dN=378 for parents for whom weight and height status was available