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Exploring the Association Between Household Food Insecurity, Parental Self-Efficacy, and Fruit and Vegetable Parenting Practices Among Parents of 5- to 8-Year-Old Overweight Children

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Introduction

Food insecurity is defined as "limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire food in socially acceptable ways."[1-3] In the United States, 14.7% or 17.4 million households experienced food insecurity in 2009, with substantially higher rates among populations at increased risk for obesity, such as low-income households and racial/ethnic minority groups.[4] Although parenting and its effects on a child's dietary behavior and nutritional outcomes have been extensively studied, relatively little is known about the impact of food insecurity on parental self-efficacy and specific food-related parenting practices. Food insecurity has been recognized as a source of external stress that can negatively impact parenting quality.[5,6] Therefore, parental exposure to higher stress levels caused by food insecurity may undermine family efforts to engage in beneficial weight-related health behaviors and may place children at risk of developing obesity.

At the household level, food insecurity has been associated with disrupted household dynamics evidenced by parental irritability, anger, parental unavailability, and conversation gap with children.[7,8] At the individual level, food insecurity has been linked to feelings of deprivation or lack of choice and to higher levels of anxiety affecting parental psychological well-being.[6,9] Food insecurity has also been associated with overcompensation during periods when food is available,[7,10-11] a practice that may compromise children's dietary and nutritional status and may be expected to have long-term detrimental effects.

Social cognitive theory (SCT)[12] postulates that a dynamic interplay of personal (e.g., self-efficacy), agent's behavior (e.g., parenting practices), and the physical and social environment (e.g., home food insecurity) interact to determine outcomes (e.g., children's fruit and vegetable consumption). Parents influence their children's home food environment not only by dictating food availability, preparation, and quantity[13] but also through parental modeling.[14] Parental modeling, parental intake, and fruit and vegetable home availability have been consistently associated with children's fruit and vegetable consumption.[15-17] Lower intakes of fruit and vegetables have been observed among children from low-income households where food availability and the amount of time parents spend managing their children's eating behavior were reduced.[18]

Parental self-efficacy (PSE) is an estimation of the degree to which parents perceive themselves as capable of performing the varied tasks

associated with parenting.[19] PSE has been linked to parenting quality[20] and has been related to important aspects of parenting, such as role satisfaction, parental warmth, control, responsiveness, participation, and involvement.[21,22] Higher PSE has been associated with children having more obesity-protective behaviors such as regular physical activity and fruit and vegetable consumption.[23] Low PSE has been related to less competent parenting practices such as the use of coercive discipline,[24] parental defensive and controlling behaviors as well as to a higher risk of stress and parental depression.[25]

Although studies on the causal relationship of food insecurity and childhood obesity remain equivocal,[26] the higher prevalence of obesity among food-insecure children presents an interesting paradox that has led to new theories to explain this phenomenon. Emerging evidence linking food insecurity and childhood obesity suggests the need for integrated efforts that consider the family socioeconomic context and its surrounding environment on children's access to adequate food.[27] Moreover, since parents from food-insecure households are more likely to use "detrimental practices" that further compromise the quality of their children's diet, developing strategies to increase parenting skills to manage limited food resources adequately is warranted. We propose that lower perceived PSE and lower use of effective parenting practices may contribute directly or indirectly to the mechanisms by which food insecurity may affect children's dietary intake and weight status. To begin to explore this hypothesis, we conducted a secondary analysis of baseline data from a pilot obesity treatment program.[28] Due to the small sample size, the main objective of this study was to assess whether there was an association between food insecurity (an external stressor), PSE (an internal personal factor), and parenting practices (agent's behavior) related to children's fruit and vegetable consumption among mothers of children 5 to 8 years old, an age group with the greatest increase in obesity prevalence.[29]

Methods

Study Design and Participants

We conducted a secondary analysis of baseline data collected for the pilot feasibility study of an obesity treatment program called Helping HAND.[28] The study was approved by the Baylor College of Medicine Institutional Review Board, and all participants provided informed consent and assent to participate.

Helping HAND was a 6-month pilot obesity treatment program delivered at four pediatric clinics in Houston, Texas, between January 2007 and July

2010. Helping HAND was designed to promote healthy eating and physical activity among overweight or obese 5 to 8-year-old children (body mass index [BMI] ≥ 85th percentile but <99th percentile) and their families and to encourage effective parenting practices across 7 different behaviors: eat more fruit, eat more vegetables, be more active, drink fewer sweetened drinks, drink more water, watch less TV, and eat healthy snacks. More details of the intervention have been described elsewhere.[28]

Thirty mothers with complete data were selected from an original sample of 40 parents who participated in Helping HAND. Eligible parents were required to read and write in Spanish or English and to be legal guardians or primary caretakers of a 5- to 8-year-old child who was overweight or obese, did not present with any co-morbidities, attended 1 of the 4 participating pediatric clinics, and was a member of the Texas Children's Health Plan (TCHP), a regional Medicaid and Children's Health Insurance Program (CHIP) provider.

Data for this secondary analysis included parent height and weight, self-reported information on PSE and food-related parenting practices, household food security status, and demographics. Exclusion criteria were incomplete data defined by completion of less than 75% of the items in each subscale of PSE and parenting practices questionnaires as well as missing values for food security assessments and demographic data.

Measurements

Anthropometrics

Parent height and weight were measured by trained study staff. Height without shoes was measured twice to the nearest 0.1 centimeter using a portable stadiometer (Seca-214, Hanover, MD). If there was a difference of more than 0.5 cm between the first 2 measurements, a third measurement was obtained. Body weight with light clothing and without shoes was measured twice to the nearest 0.1 kg using an electronic scale (Health-o-meter® 752KL, Bridgeview, IL). If there was a difference of more than 0.2 kg between the 2 recorded weights, a third measurement was obtained. The mean of the 2 last measures was used to calculate the parent's BMI [(kg)/ (m)^2].

Demographic Data and Household Food Security Status

All participant parents completed a socioeconomic demographic survey that assessed child, parent, and household characteristics. This questionnaire was available to parents in English or Spanish. The 18-item United States Department of Agriculture (USDA) Core Food Security

Module was used to assess and measure food security status.[30] This instrument has been used in national surveys, and its reliability and validity have been established with low-income, Spanish-speaking mothers.[31-33] Following the USDA guidelines, households were categorized into 4 levels of food security: (1) high food security, (2) marginal food security, (3) low food security, and (4) very low food security.[29]

Parental Self-efficacy (PSE) and Parenting Practices (PP) Measures

Parental self-efficacy and parenting practices to promote children's fruit and vegetable intake were measured using two validated questionnaires: self-efficacy fruit and vegetable parenting practices (SEFVPP)[34] and fruit and vegetable parenting practices (FVPP).[35]

Self-efficacy Fruit and Vegetable Parenting Practices Questionnaire (SEFVPP).

PSE to provide and encourage children's fruit and vegetable consumption was assessed with a 20-item questionnaire composed of 3 subscales: PSE for modeling fruit and vegetable consumption, planning/encouraging fruit and vegetable consumption, and making fruit and vegetables available. The reliability and validity of this questionnaire have been previously reported.[34] The SEFVPP has a 3-point response category from "not sure" to "very sure" with higher mean scores in each subscale representing higher PSE.

Fruit and Vegetable Parenting Practices Questionnaire (FVPP).

The FVPP is a 39-item questionnaire consisting of two subscales: effective (non-directive control, responsiveness, and structure) and ineffective (external control) fruit and vegetable parenting practices. Acceptable internal consistency reliability of this instrument has been reported in a group of health professionals.[35] Parental behaviors such as non-directive control (4 items), responsiveness (5 items), and structure (16 items) have been positively associated with children's home fruit and vegetable consumption.[36] Non-directive control refers to parents involving their children in the selection and preparation of fruit and vegetables, a practice that has been considered effective in increasing children's fruit and vegetable consumption.[35] Some of the items that assessed non-directive control were: "asking your child to choose the fruits or vegetables for meals and snacks" or "asking your child to help with fruit or vegetable preparation." Responsiveness involves the use of parenting practices that

encourage fruit and vegetable consumption. Examples of the items that assessed responsiveness included: "praising your child when you see them eat fruit or vegetables" or "encouraging your child to try a couple of bites of the fruit or vegetable." Structure is related to the creation of a home environment where positive children's dietary habits are modeled and where there is an increased availability and accessibility of fruit and vegetables. Structure was measured by items such as "show your child that you enjoy eating fruit and vegetables" or "include some form of fruit or vegetable in most meals." In contrast, the use of external control has been considered ineffective in increasing children's fruit and vegetable intake and may even reduce fruit and vegetable consumption.[35] External control was measured by 14 items; examples include: "reward your child with sweets if they eat their fruit or vegetable" and "insist your child sit at the table until they eat their fruit or vegetable." The FVPP questionnaire has a 4-point response category from "never" to "always." Higher mean scores among non-directive control, responsiveness, and structure subscales represent greater "effective" fruit and vegetable parenting practices whereas higher mean scores in the external control subscale represent greater "ineffective" fruit and vegetable parenting practices.

Statistical Analysis

In this secondary analysis, the dependent variables were fruit and vegetable parenting practices (FVPP) and parental self-efficacy (PSE); the independent variable was household food security status. Subjects were grouped as food-secure and insecure according to the protocol developed by the USDA.[30] Because of the small sample, high food security and marginal food security categories were combined to form the food-secure group whereas low food security and very low food security categories comprised the food-insecure group.

Descriptive statistics and chi-square tests were used to describe and test demographic differences between food-secure and food-insecure groups. Data between subjects included and excluded from the analysis were compared to investigate for systematic differences between groups. Mean scores were calculated for each SEFVPP and FVPP subscale. Independent *t*-tests were used to investigate differences in SEFVPP and FVPP mean scores by food security status.

Since the nature of this study was exploratory and the analysis was conducted using pilot data, results $< .05$ were considered significant, and results at the $.05<P<.1$ level were considered marginally significant. All statistical analyses were performed using PASW 19.0 (SPSS Inc, Chicago, IL, 2009).

Results

Table 1 shows the demographic characteristics of the 31 mothers who constituted the final sample. The mean age of the mothers was 34 years (±7.9), and the majority was Hispanic (80.6%). Twenty-one (67.7%) reported a high school education or less, and 14 (45.2%) reported an annual income lower than $20,000, the official poverty threshold for 2007 when data were collected.[37] Nine mothers—or 22.5 % of the original sample (N=40)—were excluded for analysis due to missing data. No significant differences were found between the excluded and included parents.

More than half of the study sample was food-insecure (64.5%). Differences between food-secure and -insecure groups were not significant except for BMI. Mothers in the food-insecure group presented with a higher BMI compared to those in the food-secure group (mean difference of -4.47; 95% CI -8.54 to -.40; p=.03) (Table 1).

Results from independent *t*- tests showed no significant differences between fruit and vegetable parenting practices and parent self-efficacy by food security status. There was a trend toward a decrease in parent self-efficacy to make fruit and vegetables available at home in the food-insecure group, but the difference was only marginally significant (p=.06) (Table 2).

Discussion

The purpose of this study was to explore the relationship between food insecurity, PSE, and parenting practices related to children's fruit and vegetable consumption. In this sample of predominantly Hispanic mothers, a trend towards a decrease in PSE to make fruit and vegetables available for children was observed in the food-insecure group. This finding is supported by a recent study examining characteristics of the physical and social environment on the home availability and accessibility of fruit and vegetables among low-income Hispanic families.[37] Dave and colleagues reported a positive association between food insecurity and home availability and accessibility of fruit and vegetables.[38] However, when home and parental factors that promote fruit and vegetable intake were added to their final model, this association was no longer significant, suggesting that parental factors may play a role mediating the effect of food insecurity on home availability and accessibility of fruit and vegetables.

A higher BMI among food-insecure mothers was observed in our sample. Several hypotheses have been proposed to explain the

association between food insecurity and obesity in adults. First, it has been suggested that childhood food insecurity may have long-term nutritional effects leading to obesity in adulthood.[39,40] Second, food-insecure adults may be more likely to over consume low-cost, energy-dense foods[41-45] and decrease their fruit and vegetable intake significantly, increasing their risk for obesity.[46] Finally, food insecurity has been associated with psychological and behavioral changes, such as preoccupation with food, anxiety, stress, depression, and physical limitations in adults, all of which can also lead to obesity.[40, 44, 47-48] Future research is needed to better understand this phenomenon.

Research on the home food environment has emphasized the important role parents play in increasing the dietary quality of children. Demographic characteristics of the family and household income may also play an important role.[49] A number of studies have shown that Hispanic families consume a lower variety of fruit and vegetables in comparison to other ethnic groups.[50, 51] In addition, children from low-income households have reported lower fruit and vegetable intake and fruit and vegetable home availability.[18,52-53] In this secondary analysis, associations between socioeconomic variables and children's fruit and vegetable intake were not investigated. However, research examining the factors that influence home availability of fruit and vegetables in Hispanic households is lacking, and future studies with larger, more representative samples of this population are warranted.

This study has several limitations. Results are based on self-reported data; this can potentially lead to information and misclassification bias. The cross-sectional design of this study precluded the determination of the direction of effects. Our sample was predominantly Hispanic; therefore, the results may not be generalized to a broader population. The lack of significant associations between food insecurity and parenting practices and other PSE subscales may be a result of the small sample size. Coping strategies such as participation in nutrition assistance programs as well as other factors known to affect fruit and vegetable consumption such as access to food stores, transportation, and food preferences were not examined since the data were not available in this sample.

Current literature supports the hypothesis that food insecurity may lead to childhood obesity through parenting mechanisms such as parents' increased overreliance on inexpensive, energy-dense foods or the use of detrimental parenting practices (e.g., overcompensation when food is available). The impact of food insecurity on parenting has also been shown to affect central aspects of children's development earlier in life. A

longitudinal study using a nationally representative sample found that food-insecure mothers of children aged 9 to 24 months were more likely to have lower breast-feeding rates and begin weaning foods at an earlier age compared to food-secure mothers.[5] This is important since the anti-obesity effects of breast-feeding[53-56] and the association between early introduction of solid foods and increased odds of obesity have been documented.[57]

Despite its limitations, the results of this exploratory study yielded important insights about the potential effects of food insecurity on PSE to make fruit and vegetables available at home. Parental competence in providing a healthy home food environment may be a critical determinant in the development of healthy eating patterns in children. Future studies are warranted to understand the underlying factors that contribute to children's poor nutritional outcomes in this population in light of the high prevalence of childhood obesity in low-income and minority groups. Furthermore, longitudinal studies examining the impact of food insecurity on PSE and food-related parenting practices are needed to elucidate the pathways by which food insecurity may affect parenting and ultimately children's weight status. One of the authors is currently participating in an ongoing longitudinal trial that we hope will shed new light on the association between food insecurity, parenting, and childhood obesity.

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TABLES

Table 1. Comparisons of participant characteristics by household food security status*

Variables	Total	Food Secure (n=11)	Food Insecure (n= 20)	*P*
Parent age (y) mean ±SD[a]	33.7 (±7.9)	31.36 (±9.9)	35.0 (±6.5)	.29
Parent race/ethnicity n, %				.28
Hispanic	25 (80.6)	10 (90.9)	15 (75)	
Non-Hispanic	9 (19.4)	1 (9.1)	5 (25)	
Parent education level n, %				.24
High school/GED or less	21 (67.7)	6 (54.5)	15 (75.0)	
Annual household's income n, %				.98
< $20,000	14 (45.2)	5 (45.5)	9 (45.0)	
Spanish Speaking n, %	19 (61.3)	6 (54.4)	13 (65.0)	.57
Parent BMI, mean, ±SD[a]	31.8 (6.7)	28.94 (±3.6)	33.41 (±7.5)	**.03**

* n=31
[a] differences calculated by t -tests
SD=Standard deviation

Table 2. Differences across PSE and FVPP subscales by household food security status*

	Food Secure (n=11) mean (±SD)	Food Insecure (n=20) mean (±SD)	*t*-test	*P*
FV Parental Self-Efficacy				
Planning/encouraging	2.64 (±.28)	2.47 (±.57)	.91	.37
Modeling/socialization	2.86 (±.24)	2.68 (±.54)	1.08	.29
Availability/accessibility	2.67 (±.33)	2.32 (±.65)	1.93	**.06***
FV Parenting Practices				
Structure	2.69 (±.71)	2.76 (±.55)	-.28	.78
Responsiveness	3.11 (±.71)	2.85 (±.57)	1.09	.28
Non-directive control	2.27 (±.91)	2.20 (±.86)	.22	.83
External control (ineffective)	1.61 (±.44)	1.46 (±.57)	.75	.46

* n=31

Abbreviations: FV= fruit and vegetables; SD=standard deviation; PSE=Parental Self-Efficacy

*.05> *P* <.10 is considered marginally significant