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The Role of Parenting Practices in the Home Environment among Underserved Youth

Beth A. Conlon, MS, RD,[1] Aileen P. McGinn, PhD,[1] David W. Lounsbury, PhD,[1] Pamela M. Diamantis, MD,[2] Adriana E. Groisman-Perelstein, MD,[2] Judith Wylie-Rosett, EdD, RD,[1] and Carmen Isasi, MD, PhD[1]

Abstract

Background: The home environment, which includes parenting practices, is an important setting in which children develop their health behaviors. We examined the role of parenting practices in the home environment among underserved youth.

Methods: We examined baseline data of a family-focused pediatric obesity intervention. Parenting practices (monitoring, discipline, limit setting of soda/snacks [SS] and screen media [SM], pressure to eat, and reinforcement) and availability of fruits/vegetables (FV) and sugar-sweetened beverages (SSBs), family meals, television (TV) watching during meals, TVs in the home, owning active video games/sports equipment, and household food security were assessed in 301 parent/caregivers of overweight/obese children (ages 7–12 years; BMI ≥ 85th percentile). Associations were evaluated using Spearman's rank correlation coefficients and logistic regression models adjusted for potential confounders.

Results: Parents/caregivers (ages 22–67 years) were largely Hispanic/Latino (74.1%), female (92.4%), and reported high levels of limit setting SS and low levels of pressure to eat. Parent age, gender, country of birth, and years living in the United States accounted for differences among several parenting practices. Adjusted logistic regression models identified several statistically significant associations, including: Monitoring was positively associated with availability FV (odds ratio [OR] = 2.19; 95% confidence interval [CI], 1.25, 3.82); limit setting SS was inversely associated with availability of SSBs (OR = 0.40; 95% CI, 0.21, 0.75); and limit setting SM was inversely associated with TV viewing during family meals (OR = 0.51; 95% CI, 0.31, 0.85). Nearly 40% of our population was food insecure, and food insecurity was positively associated with pressure to eat (OR = 1.77; 95% CI, 1.01, 3.15).

Conclusions: Parenting practices play an important role in the home environment, and longitudinal studies are needed to examine these associations in the context of family-focused pediatric obesity interventions.

Introduction

In the United States, childhood obesity disproportionally affects Hispanic (22.4%) and non-Hispanic black (20.2%) youth,[1] which is related to low socioeconomic status (SES).[2] Using the social ecological framework[3] may facilitate addressing obesity risk in children ≤ 12 years of age who have limited autonomy and whose parents or primary caregivers structure their home environments and daily lifestyles.[4] Given that children develop much of their eating and physical activity (PA) behaviors in and around the home, the home environment is an important target of multilevel interventions. However, the mechanisms by which behavioral interventions can promote changes in the home environment are poorly understood, limiting the ability to design effective programs.

The home environment has been previously conceptualized[5,6] as overlapping, interactive domains composed of built and natural, sociocultural, political and economic, and micro- and macro-level environments. Previous measures of the home environment have largely focused on micro-level contributions, which include parenting practices,[7] availability/accessibility of foods, screen media (SM), and PAs,[8–13] family meal structure,[14–16] and household food security,[17–19] given that these components are most proximal to, and therefore influential of, children's daily lifestyles. Parenting practices are important components of children's home environments because they reflect behavioral strategies used by parents to regulate what, when, or how much children eat and engage in PA that can be targeted through behavioral change interventions.[20] Previous literature has revealed important relationships between parenting practices and children's health behaviors.

[1]Department of Epidemiology and Population Health, Albert Einstein College of Medicine, Bronx, NY.
[2]Department of Pediatrics, Children's Health Services, Jacobi Medical Center, Bronx, NY.

For example, increased parental engagement in limit setting of SM and support for PA have been associated with reduced sedentary behavior among youth.[12,21] Results of the *Aventuras para Niños*[22] intervention, which targeted changes in the home environment among Latino families using promotoras (community-based health educators), found that increases in parent report of monitoring and reinforcement, as measured by the Parenting Strategies for Eating and Activity Scale (PEAS), mediated reductions in children's television (TV) viewing while getting ready for school and increases in fruit and vegetable (FV) intake at 2-year follow-up among families who received the intervention, but not the control group.

However, a recent review by Patrick and colleagues[7] highlighted that few studies have identified the mechanisms through which parenting practices influence children's behaviors. We hypothesize that one mechanism by which parenting practices promote changes in children's behaviors is through the home environment. For example, a parent who engages in high levels of monitoring of their child's dietary intake may serve more FV at meals, resulting in an increase in their child's FV consumption. However, few studies have examined the role of parenting practices in the home environment. Given that parenting practices represent independent constructs within the home environment, measured by instruments that have been carefully developed and validated for the purpose of assessing parenting practices,[23–26] examining relationships between parenting practices and other measures of the home environment (*e.g.*, food availability/accessibility) is a rational approach. Such information will elucidate how different aspects of parenting behaviors can be leveraged to promote healthful changes in the home environment, thereby increasing support at home for children to engage in healthier behaviors.

This study aimed to address these research gaps by: (1) characterizing parenting practices in a population of predominantly Hispanic/Latino and overweight or obese children (BMI ≥ 85th percentile), ages 7–12 years, who were enrolled at baseline in a family-based weight management intervention with their parent or primary caregiver (hereafter referred to as parent) in the largely underserved community of Bronx County, New York, and (2) examining associations between parenting practices, as measured by the PEAS instrument (monitoring, discipline, limit setting of soda/snacks [SS], limit setting of SM, and pressure to eat), and home environment outcome measures, including availability of FV and sugar-sweetened beverages (SSBs), frequency of family sit-down dinners (family meals) and family meals in front of the TV, the number of TVs at home, a TV in the child's bedroom, owning sports equipment or video games, and household food security. Based on results of the *Aventuras para Niños* study,[22,26–29] we hypothesized that the parenting practices monitoring, discipline, limit setting SS, and limit setting SM would be associated with healthier reports of the home environment, whereas pressure to eat would be associated with less-healthful reports of the home environment.

Methods

Study Participants and Setting

The present study involved analysis of baseline data from a randomized, controlled trial (the Family Weight Management Study [FWMS]; registered at www.clinicaltrials.gov, NCT00851201; also known as the Fun Healthy Families Study) conducted at Jacobi Medical Center (Bronx, NY). Eligibility criteria included children 7–12 years of age with a BMI ≥ 85th percentile and enrolled to receive primary care in the North Bronx Health Network. One child enrolled in the study and turned 13 years old during baseline data collection and was allowed to continue in the study. Exclusion criteria included chronic illness (*e.g.*, diabetes), impairments that would affect ability or safety to follow study protocols, treatment with medications to affect body weight, and enrollment in other weight management programs. Enrollment occurred from January 2009 to December 2012. Only one parent per family was invited to join the study, and 359 children and 320 parents met eligibility criteria.

Procedures. All study procedures were approved by the Albert Einstein College of Medicine Institutional Review Board (Bronx, NY). Consent and assent forms were signed by all parents and children, respectively, who met eligibility criteria and were willing to participate in the study. All materials and forms were available in English and Spanish. When families with multiple children (*e.g.*, siblings) enrolled in the study, parents were asked to respond to survey questions with reference to the referred child (the first child in the family that was referred by their pediatrician to participate in the study). For the purposes of this analysis, we limited our sample to parent-child dyads consisting of the participating parent and referred child and excluded 19 parents who did not answer key survey questions, leaving a final sample size of 301 parent-child dyads.

Measures

Anthropometric. Standing height and weight of parents and children were measured objectively by trained staff at baseline using standardized procedures, as previously described.[30–32] Parents' BMI was calculated using the formula BMI = (Weight, kg)/(Height, m^2) and classified as normal weight (BMI ≤ 25), overweight (BMI 25.0–29.99), obese class I (BMI 30.0–34.99), or obese class II/II (BMI ≥ 35), in accord with the National Heart, Lung, and Blood Institute guidelines.[33] Children's BMI percentiles were calculated and classified as overweight (85th–94.9th percentile), obese (≥ 95th to < 97th percentile), or severely obese (≥ 97th percentile), in accord with the 2000 CDC growth charts.[34]

Sociodemographics. Parents self-completed a sociodemographic questionnaire at baseline. Owing to a large proportion of Hispanics (74.1%) in our population, race and ethnicity were collapsed into a single variable (Hispanic/Latino, Non-Hispanic Black, and other). Parent measures included age, gender, race/ethnicity, education, household income, country of birth, and years living in the United States. Child measures included age, gender, and BMI percentiles based on the 2000 CDC Growth Charts for age and sex.[34]

Parenting practices. Parenting practices were measured by parents' self-reported responses to the 26-item PEAS, which was developed and validated by Larios and colleagues[26] among Latina/Mexican-American mothers in California.[28] We conducted principal component analysis (PCA) to assess the factor structure of the PEAS instrument in our population, revealing six distinct factors, as described in Supplementary Table 1 (see online supplementary material at http://www.liebertpub.com): monitoring (six items); discipline (four items); limit setting of SM (four items); limit setting of SS (four items); pressure to eat (six items); and reinforcement (two items). Mean construct scores were calculated (range, 1–5) for factors and demonstrated fair-to-good internal consistency (Cronbach's alpha, range = 0.67–0.87).

Home environment measures. Home environment measures, our outcomes of interest, were assessed by parents' self-reported responses to survey questions, as described in Supplementary Table 2 (see online supplementary material at http://www.liebertpub.com). Availability/frequency of FV and SSBs served at meals were assessed using three items, respectively, from the Project EAT survey.[35,36] Items were summed and the average score was used in analysis. Because the item ''juice served at meals'' did not specify 100% fruit juice, we categorized this item as an indicator of SSB availability. Frequency of family meals and family meals in front of the TV,[14–16] the number of TVs in the home and the presence of a TV in the child's bedroom,[12,37] and owning sports equipment or active video games[37] were assessed using questionnaire items previously reported in the literature. Household food security was assessed by parents' self-response to six items from the Short Form of the Household Food Security Scale,[38,39] a validated and reliable instrument. Of the 301 parent-child dyads, 299 completed the home environment survey.

Statistical Analysis

All statistical analyses were performed in STATA software (13.0; Stata Corp, College Station, TX). Factor structure of the PEAS instrument was determined using exploratory PCA with varimax rotation. To determine the number of factors, we used the criterion of an eigenvalue > 1.0, factor loadings above 0.45, Cronbach's alpha above 0.6, and face validity. Given that the PEAS constructs were found to be non-normally distributed by histograms, descriptive statistics were presented as median (interquartile range; IQR) and nonparametric statistical tests (either Mann-Whitney's U tests or Kruskal-Wallis') were used to evaluate differences in median parenting practices by characteristics of the sample population. Associations between parenting practices (independent variable) and home environment measures (dependent variable) were examined using Spearman's rank correlation coefficients and separate adjusted multivariable logistic regression models. Potential confounders were selected based upon sociodemographic characteristics by which parenting practices significantly differed, and it was decided *a priori* to adjust for parent age, gender, race/ethnicity, and child age and gender. Parent country of birth and parent years living in the United States were collinear; thus, we only included parent years living in the United States in our models. Lowess' smoothing detected violations in linearity among independent variables; thus, the continuous variables, parent age, parent years living in the United States, and child age, were dichotomized at their medians based on sample size, and parenting practices were categorized as high (mean score, >3 to 5) versus low (mean score, 1 to ≤ 3). Parent education was collapsed into those who attained a high school diploma/General Educational Development (GED) or less versus those who attained some postsecondary education or more. Parent race/ethnicity was collapsed into Hispanic/Latino versus non-Hispanic/Latino. Statistical significance was defined as $p < 0.05$.

Results

Participant Characteristics

Parent characteristics of the sample population are summarized in Table 1. The majority of parents self-reported female gender ($n = 278$; 92.4%) and relationship to child as mother ($n = 271$; 90.5%). Mean parent age was 37.1 ± 7.7 years (range, 22–67), and 62.6% ($n = 187$) were obese (BMI ≥ 30). Nearly three fourths ($n = 223$) of parents were Hispanic/Latino, 37.2% ($n = 112$) were born in Mexico, and 41.2% ($n = 124$) lived in the United States for ≤ 14 years. There were 162 (53.8%) female children. Mean child age was 9.95 ± 1.8 years, and most children ($n = 230$; 76.4%) were obese or severely obese.

Parenting Practices

Supplementary Table 1 (see online supplementary material at http://www.liebertpub.com) provides a summary of mean parenting practices in the sample population. Parents reported the highest levels of limit setting SS (mean, 3.93 ± 1.02), followed by monitoring (mean, 3.74 ± 0.96), reinforcement (mean, 3.74 ± 1.28), limit setting SM (mean, 3.54 ± 1.23), discipline (mean, 3.34 ± 1.28), and the lowest levels of pressure to eat (mean, 2.61 ± 0.90).

Differences in median parenting practices by characteristics of the sample population are summarized in Table 1. Parenting practices significantly differed by parent age, gender, education, employment, country of birth, and years

Table 1. Differences in Median Parenting Practices by Characteristics of the Sample Population ($n = 301$)[a]

Variable	*n* (%)	Parenting practices, median (IQR)[b]					
		Monitoring	Discipline	Limit setting soda/snacks	Limit setting screen media	Pressure to eat	Reinforcement
Parent characteristics							
Age (years)[a]							
20–29	49 (16.4)	3.8 (3.0, 4.7)	3.8 (2.8, 4.5)	**4.5 (3.5, 5.0)****	4.0 (3.0, 5.0)‡	**2.8 (2.3, 3.5)****	4.0 (3.0, 5.0)
30–39	149 (50.0)	3.8 (3.2, 4.5)	3.5 (2.5, 4.5)	**4.3 (3.3, 5.0)**	4.0 (3.0, 4.8)	**2.7 (2.0, 3.2)**	4.0 (3.0, 5.0)
40–49	81 (27.2)	3.8 (3.0, 4.5)	3.0 (2.5, 4.3)	**4.0 (3.0, 4.5)**	3.3 (2.5, 4.3)	**2.2 (1.7, 2.7)**	4.0 (3.0, 5.0)
≥50	19 (6.4)	3.8 (2.3, 4.3)	3.0 (1.0, 4.0)	**3.5 (2.5, 4.5)**	3.5 (2.0, 4.5)	**2.7 (1.7, 3.5)**	4.0 (2.0, 5.0)
Parent gender							
Female	278 (92.4)	3.8 (3.0, 4.7)	**3.5 (2.5, 4.5)****	**4.3 (3.3, 5.0)***	3.8 (3.0, 4.8)	2.5 (2.0, 3.2)	4.0 (3.0, 5.0)
Male	23 (7.6)	3.7 (2.7, 4.3)	**3.0 (1.0, 3.8)**	**3.8 (2.8, 4.5)**	3.5 (2.5, 4.5)	2.8 (2.0, 3.7)	4.0 (3.0, 4.5)
Parent weight category (BMI; kg/m^2)[c]							
Normal weight (≤25.0)	25.0 (8.4)	4.0 (3.0, 4.5)	3.0 (2.5, 4.0)	4.0 (3.5, 4.8)	4.0 (3.0, 5.0)	2.8 (2.3, 3.8)	4.0 (3.0, 5.0)
Overweight (25.0–29.9)	87 (29.1)	3.8 (3.0, 4.5)	3.3 (2.8, 4.5)	4.3 (3.3, 5.0)	4.0 (3.0, 5.0)	2.5 (2.0, 3.2)	4.0 (3.0, 5.0)
Obese I (30.0–34.9)	101 (33.8)	3.8 (3.0, 4.5)	3.5 (2.0, 4.8)	4.0 (3.0, 5.0)	3.5 (2.8, 4.8)	2.5 (1.7, 3.2)	4.0 (3.0, 5.0)
≥Obese II (≥35.0)	86 (28.8)	3.9 (3.2, 4.7)	3.5 (2.5, 4.5)	4.0 (3.3, 4.8)	3.6 (3.0, 4.3)	2.5 (2.0, 3.2)	4.0 (3.0, 5.0)
Parent race/ethnicity							
Hispanic/Latino	223 (74.1)	3.8 (3.0, 4.5)	3.5 (2.5, 4.5)	4.0 (3.3, 5.0)	3.8 (3.0, 5.0)	2.5 (1.8, 3.3)	4.0 (3.0, 5.0)
Non-Hispanic black	54 (17.9)	4.0 (3.2, 4.7)	3.1 (2.3, 4.0)	4.3 (3.5, 4.8)	3.5 (2.5, 4.3)	2.5 (2.0, 3.0)	4.0 (3.0, 5.0)
Other[d]	24 (8.0)	3.9 (3.0, 4.8)	3.1 (2.4, 4.3)	3.9 (3.0, 4.5)	4.0 (3.5, 4.3)	2.8 (2.1, 3.4)	4.3 (3.3, 5.0)
Parent education							
Less than high school	146 (48.5)	3.8 (3.0, 4.3)	3.5 (2.5, 4.5)	4.0 (3.0, 5.0)	4.0 (3.0, 4.8)	**2.8 (2.0, 3.5)****	4.0 (3.0, 5.0)
High school or GED	76 (25.3)	4.0 (3.2, 4.7)	3.4 (2.8, 5.0)	4.5 (3.5, 4.8)	3.5 (2.9, 4.4)	**2.5 (2.2, 3.2)**	4.0 (3.0, 5.0)
Postsecondary education[e]	79 (26.3)	4.0 (3.0, 4.7)	3.0 (2.3, 4.0)	4.3 (3.3, 5.0)	3.8 (3.0, 4.5)	**2.2 (1.7, 2.8)**	4.0 (3.0, 5.0)

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Table 1. Differences in Median Parenting Practices by Characteristics of the Sample Population ($n = 301$)[a] *continued*

Variable	*n* (%)	Parenting practices, median (IQR)[b]					
		Monitoring	Discipline	Limit setting soda/snacks	Limit setting screen media	Pressure to eat	Reinforcement
Parent employment							
Homemaker	143 (47.5)	3.8 (3.2, 4.7)	3.8 (2.5, 4.5)	4.3 (3.3, 5.0)	4.0 (3.0, 5.0)	**2.8 (2.0, 3.3)***	4.0 (3.0, 5.0)
Employed FT or PT	110 (36.5)	3.8 (3.0, 4.5)	3.3 (2.5, 4.0)	4.0 (3.0, 5.0)	3.5 (3.0, 4.5)	**2.3 (1.8, 3.0)**	4.0 (3.0, 5.0)
Unemployed or retired	48 (16.0)	3.8 (2.8, 4.4)	3.3 (2.1, 3.3)	4.1 (3.1, 4.9)	3.9 (2.9, 4.3)	**2.5 (2.0, 3.1)**	3.8 (2.8, 5.0)
Household income							
$0–$9,999	118 (39.2)	3.8 (3.2, 4.3)	3.5 (2.8, 5.0)	4.3 (3.5, 5.0)‡	3.5 (3.0, 4.5)	2.5 (1.8, 3.5)	4.0 (3.0, 5.0)‡
≥$10,000.00	130 (43.2)	3.8 (3.0, 4.7)	3.3 (2.3, 4.3)	4.0 (3.0, 4.8)	3.8 (3.0, 4.5)	2.5 (2.0, 3.0)	3.5 (3.0, 5.0)
Don't Know	53 (17.6)	4.2 (2.8, 4.7)	3.8 (2.3, 4.5)	4.3 (3.0, 5.0)	4.0 (3.0, 4.8)	2.7 (2.2, 3.2)	4.5 (4.0, 5.0)
Parent country of birth							
United States[f]	63 (20.9)	4.0 (3.0, 4.7)	3.0 (2.0, 4.3)	4.5 (3.3, 5.0)	**3.0 (2.5, 4.0)***	**2.5 (1.7, 2.8)***	4.5 (3.5, 5.0)
Mexico	112 (37.2)	3.8 (3.3, 4.5)	3.8 (3.0, 4.5)	4.1 (3.3, 5.0)	**4.0 (3.0, 5.0)**	**2.8 (2.2, 3.5)**	4.0 (3.0, 5.0)
Puerto Rico	18 (6.0)	3.7 (3.0, 4.0)	3.9 (2.5, 5.0)	4.0 (3.0, 4.0)	**3.8 (2.5, 4.8)**	**2.1 (1.7, 3.5)**	3.8 (3.0, 5.0)
Dominican Republic	35 (11.6)	3.5 (3.0, 4.3)	3.0 (2.3, 4.8)	4.3 (3.3, 5.0)	**3.0 (2.0, 4.5)**	**2.3 (1.7, 3.3)**	3.0 (2.0, 5.0)
Jamaica	22 (7.3)	3.8 (2.8, 4.7)	3.3 (2.3, 4.0)	4.5 (3.5, 5.0)	**4.0 (3.3, 4.5)**	**2.4 (2.2, 2.8)**	4.0 (3.0, 5.0)
Other[g]	51 (16.9)	4.2 (3.2, 4.7)	3.5 (2.8, 4.5)	4.0 (3.0, 4.5)	**4.0 (3.0, 5.0)**	**2.7 (2.0, 3.2)**	4.0 (3.0, 5.0)
Parent years living in the United States							
0–14	124 (41.2)	3.9 (3.2, 4.7)	**3.8 (2.8, 4.9)***	4.3 (3.4, 5.0)‡	**4.0 (3.0, 5.0)***	**2.8 (2.2, 3.4)****	4.0 (3.0, 5.0)‡
≥15	114 (37.9)	3.8 (3.0, 4.3)	**3.3 (2.5, 4.0)**	4.0 (3.0, 4.5)	**3.8 (2.5, 4.8)**	**2.3 (1.8, 3.2)**	3.5 (2.5, 5.0)
US born	63 (20.9)	4.0 (3.0, 4.7)	**3.0 (2.0, 4.3)**	4.5 (3.3, 5.0)	**3.0 (2.5, 4.0)**	**2.5 (1.7, 2.8)**	4.5 (3.5, 5.0)

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Table 1. Differences in Median Parenting Practices by Characteristics of the Sample Population ($n = 301$)[a] *continued*

Variable	*n* (%)	Parenting practices, median (IQR)[b]					
		Monitoring	Discipline	Limit setting soda/snacks	Limit setting screen media	Pressure to eat	Reinforcement
Child characteristics							
Age (years)							
7–9	155 (51.5)	4.0 (3.2, 4.7)‡	3.8 (2.5, 4.8)	4.3 (3.3, 5.0)	**4.0 (3.0, 5.0)***	**2.7 (2.2, 3.5)****	4.0 (3.0, 5.0)
10–12	146 (48.5)	3.8 (3.0, 4.3)	3.0 (2.3, 4.0)	4.0 (3.3, 4.8)	**3.5 (2.5, 4.5)**	**2.3 (1.7, 3.0)**	4.0 (3.0, 5.0)
Gender							
Female	162 (53.8)	3.8 (3.2, 4.7)	3.5 (2.5, 4.5)	4.3 (3.3, 5.0)	3.5 (3.0, 4.5)‡	**2.5 (1.8, 3.0)***	**4.0 (3.0, 5.0)***
Male	139 (46.2)	3.8 (3.0, 4.3)	3.3 (2.5, 4.5)	4.0 (3.3, 4.8)	4.0 (3.0, 5.0)	**2.7 (2.0, 3.5)**	**4.0 (2.5, 5.0)**
Weight category (BMI; %)[h]							
Overweight (85–94.9)	71 (23.6)	4.0 (3.0, 4.7)	3.3 (2.5, 4.5)	4.3 (3.3, 5.0)	4.0 (2.5, 5.0)	2.7 (2.0, 3.2)	4.0 (2.5, 5.0)
Obese (95.0–97.0)	164 (54.5)	3.8 (3.0, 4.5)	3.3 (2.3, 4.5)	4.0 (3.3, 5.0)	4.0 (3.0, 4.8)	2.5 (2.0, 3.3)	4.0 (3.0, 5.0)
Severely obese (≥97.0)	66 (21.9)	3.9 (3.0, 4.3)	3.5 (2.8, 4.5)	4.3 (3.3, 4.5)	3.5 (2.8, 4.5)	2.3 (1.7, 3.0)	4.5 (3.0, 5.0)

Significant differences ($p < 0.05$) are in bold: **significant at $p < 0.01$; *significant at $p < 0.05$. Differences that approach significance ($p < 0.10$) are indicated with ‡.

[a]Total sample, $n = 301$ parents/caregivers; for parent age, $n = 298$ parents/caregivers (3 parents/caregivers did not report birth dates).

[b]Possible scores ranged from 1 (low engagement in parenting practice) to 5 (high engagement in parenting practice).

[c]Categorized in accord with the National Heart, Lung, and Blood Institute's clinical guidelines.[29]

[d]Other race includes participant's self-reports of non-Hispanic white ($n = 5$), Asian/South Asian ($n = 12$), Mid-Eastern ($n = 2$), European ($n = 1$) Native Hawaiian or other Pacific Islander ($n = 1$), Caribbean ($n = 2$), and not specified ($n = 1$).

[e]Postsecondary education includes some college but not receiving a diploma ($n = 29$), receiving a technical school certificate ($n = 12$), associate's degree ($n = 13$), bachelor's degree ($n = 23$), and graduate or professional school ($n = 2$).

[f]Does not include Puerto Rico.

[g]Includes other Caribbean, Africa, Central America, South America, Europe, and South Asia.

[h]Categorized in accord with the 2000 CDC Growth Charts.[29]

GED, General Educational Development; FT, full time; PT, part time; IQR, interquartile range; limit setting SS, limit setting of soda and snacks; limit setting SB, limit setting of sedentary behavior; US, United States.

living in the United States, as well as by child age and gender. For example, parents who were younger, attained less than a high school education, lived in the United States for 0–14 years, were born in Mexico, and had a younger (ages 7–9) and male child reported significantly higher levels of pressure to eat. Monitoring was the only parenting practice that did not statistically significantly differ by any of the measured sociodemographic characteristics.

Home Environment Survey

Supplementary Table 2 (see online supplementary material at http://www.liebertpub.com) summarizes parent report of the home environment. The majority of parents (62.9%) reported high availability of FV and low availability (77.6%) of SSBs in the home. Most (76.9%) reported high frequency ($\geq$1–3 times/week) of family meals and eating family meals in front of the TV (53.2%). The majority (56.5%) of parents reported having one to two televisions in the home, a TV in their child's bedroom (73.6%), and owning active video games (56.6%) and sports equipment (61.9%). Nearly 40% of families were household food insecure.

Associations between parent monitoring and home environment measures. Spearman's correlation coefficients (*rho*) ranged between -0.25 and 0.16 (Table 2). Monitoring was positively associated with FV availability ($rho = 0.16$; $p < 0.01$) and owning sports equipment ($rho = 0.14$; $p < 0.05$) and inversely associated with SSB availability ($rho = -0.15$; $p < 0.05$) and frequency of family meals in front of the TV ($rho = -0.25$; $p < 0.001$). These associations remained statistically significant in adjusted logistic regression models (Table 3). Parents who reported high versus low levels of monitoring had significantly increased odds of reporting high FV availability (odds ratio [OR] = 2.19; 95% confidence interval [CI], 1.25, 3.82) and owning sports equipment (OR = 2.15; 95% CI, 1.22, 3.77) and significantly decreased odds of high SSB availability (OR = 0.48; 95% CI, 0.26, 0.87) and more frequent family meals in front of the TV (OR = 0.37; 95% CI, 0.21, 0.63).

Associations between parent discipline and home environment measures. Spearman's correlations ranged between -0.14 and 0.05 (Table 2). Discipline was significantly inversely associated with TV viewing during

Table 2. Spearman's Rank Correlation Coefficients Between Parenting Practices and Home Environment Measures ($n = 299$ Parent/Caregiver-Child Dyads)[a]

Home environment measure	Parenting practices					
	Monitoring	Discipline	Limit setting soda/snacks	Limit setting screen media	Pressure to eat	Reinforcement
Family meals[b]	0.05	0.00	**0.14***	**0.12***	0.10	0.05
TV viewing during family meals[b]	**−0.25*****	**−0.14***	**−0.17****	**−0.23*****	**−0.15***	**−0.18****
FV availability[c]	**0.16****	0.00	0.00	0.09	0.00	0.03
SSB availability[c]	**−0.15***	−0.09	**−0.19*****	**−0.19*****	−0.03	−0.07
Number of TVs at home[d]	−0.08	−0.05	−0.03	**−0.12***	−0.10	−0.05
TV in child's bedroom[e]	−0.06	0.01	0.03	0.00	0.03	−0.01
Own active video games[e]	−0.03	−0.05	−0.05	**−0.17****	−0.10	−0.03
Own sports equipment[e]	**0.14***	0.05	**0.17****	0.05	0.05	0.00
Household food security[f]	−0.09	0.01	0.00	−0.03	**0.13***	0.02

***Significant at $p < 0.001$; **significant at $p < 0.01$; *significant at $p < 0.05$.

[a]$n = 297$ parent/caregivers; 2 missing from own active video games and own sports equipment owing to nonresponses.

[b]Frequency of (scale: never, once per month, 2–3 times per month, 1–3 times per week, $\geq$4 times per week), categorized as 0 = never/once per month/2–3 times per month, 1 = 1–3 times/week/$\geq$4 times per week.

[c]How often available in the home/served at meals (scale: always, usually, sometimes, never); categorized as 0 = never/sometimes, 1 = usually/always.

[d]Scale: 0 = 1–2 TVs; 1 = 3–6 TVs.

[e]Scale: 0 = no; 1 = yes.

[f] Scale: 0 = food secure; 1 = food insecure

FV, fruits and vegetables; SSB, sugar-sweetened beverages; TV, television; PA, physical activity.

Table 3. Logistic Regression Analysis of Associations Between Parenting Practices (Independent Variable) and Home Environment Measures (Dependent Variables; $n = 296$ Parent/Caregiver-Child Dyads)[a]

Home environment measure	Parenting practices[g]																	
	Monitoring			Discipline			Limit setting soda/snacks			Limit setting screen media			Pressure to eat			Reinforcement		
Dependent Variable	OR	95% CI	*p* value	OR	95% CI	*p* value	OR	95% CI	*p* value	OR	95% CI	*p* value	OR	95% CI	*p* value	OR	95% CI	*p* value
Family meals[c]	1.48	0.81, 2.71	0.21	0.92	0.54, 1.62	0.78	1.48	0.79, 2.77	0.22	1.66	0.93, 2.98	0.09	1.38	0.71, 2.68	0.35	1.45	0.81, 2.58	0.21
TV viewing during family[c] meals	**0.37**	**0.21, 0.63**	**0.001**	0.66	0.41, 1.05	0.08	**0.51**	**0.29, 0.90**	**0.02**	**0.51**	**0.31, 0.85**	**0.01**	0.64	0.3, 1.11	0.11	**0.52**	**0.31, 0.86**	**0.01**
FV availability[d]	**2.19**	**1.25, 3.82**	**0.006**	1.42	0.86, 2.34	0.18	1.04	0.57, 1.88	0.90	1.41	0.83, 2.38	0.20	1.21	0.69, 2.14	0.50	1.44	0.85, 2.42	0.17
SSB availability[d]	**0.48**	**0.26, 0.87**	**0.02**	0.62	0.35, 1.09	0.10	**0.40**	**0.21, 0.75**	**0.004**	**0.37**	**0.20, 0.67**	**0.001**	0.80	0.42, 1.54	0.51	0.61	0.34, 1.09	0.09
Number of TVs at home[e]	1.25	0.71, 2.19	0.45	0.86	0.52, 1.42	0.56	1.18	0.65, 2.14	0.58	0.76	0.45, 1.30	0.32	1.05	0.58, 1.88	0.88	0.83	0.49, 1.41	0.49
TV in child's bedroom[e,f]	0.96	0.52, 1.77	0.91	0.94	0.55, 1.62	0.84	1.30	0.70, 2.44	0.41	1.03	0.58, 1.83	0.93	1.33	0.70, 2.50	0.38	1.03	0.58, 1.83	0.91
Own active video games[b,f]	1.26	0.71, 2.21	0.43	1.09	0.66, 1.80	0.75	0.81	0.45, 1.49	050	0.64	0.37, 1.09	0.10	0.86	0.48, 1.53	0.60	0.79	0.47, 1.35	0.39
Own sports equipment[b,f]	**2.15**	**1.22, 3.77**	**0.008**	1.27	0.77, 2.10	0.34	**2.07**	**1.15, 3.73**	**0.02**	1.25	0.74, 2.13	0.40	1.53	0.86, 2.76	0.16	0.96	0.57, 1.63	0.88
Household food security[g]	0.96	0.54, 1.69	0.89	1.16	0.69, 1.93	0.58	1.16	0.63, 2.12	0.63	0.97	0.56, 1.67	0.56	**1.77**	**1.01, 3.15**	**0.045**	1.16	0.68, 1.98	0.59

Multivariate logistic regression models were run to assess associations between respective parenting practices (dichotomized as 0 = low engagement; 1 = high engagement) and home environment measures when adjusting for parent age, parent gender, parent race/ethnicity, parent educational attainment, parent years living in the United States, child age, and child gender. Significant associations ($p < 0.05$) are in bold.

[a]Three parent/caregiver responses were missing from age and 2 were missing from the home environment questionnaire owing to nonresponses.

[b]$n = 294$ for own active video games and own sports equipment; 2 missing owing to nonresponses.

[c]Frequency of (scale: never, once per month, 2–3 times per month, 1–3 times per week, ≥4 times per week), categorized as 0 = never/once per month/2–3 times per month, 1 = 1–3 times/week/≥4 times per week.

[d]How often available in the home/served at meals (scale: always, usually, sometimes, never); categorized as 0 = never/sometimes, 1 = usually/always.

[e]Scale: 0 = 1–2 TVs; 1 = 3–6 TVs.

[f]Scale: 0 = no; 1 = yes.

[g]Scale: 0 = food secure; 1 = food insecure.

OR, odds ratio; CI, confidence interval; FV, fruits and vegetables; SSB, sugar-sweetened beverages; TV, television; PA, physical activity.

family meals ($rho = -0.14$; $p < 0.05$). This association approached statistical significance (OR = 0.66; 95% CI, 0.41, 1.05) in an adjusted logistic regression model (Table 3).

Associations between parent limit setting of soda/snacks and home environment measures. Spearman's correlations ranged between −0.19 and 0.17 (Table 2). Limit setting SS was positively associated with the frequency of family meals ($rho = 0.14$; $p < 0.05$) and access to sports equipment in the home ($rho = 0.17$; $p < 0.01$) and inversely associated with SSB availability ($rho = -0.19$; $p < 0.001$) and frequency of TV viewing during family meals ($rho = -0.17$; $p < 0.01$). All associations but family meal frequency remained statistically significant in adjusted logistic regression models (Table 3). Parents who reported high versus low levels of limit setting SS had significantly reduced odds of reporting high SSB availability (OR = 0.40; 95% CI, 0.21, 0.75) and more frequent family meals in front of the TV (OR = 0.51; 95% CI, 0.29, 0.90) and had significantly increased odds of owning sports equipment (OR = 2.07; 95% CI, 1.15, 3.73).

Associations between parent limit setting of screen media and home environment measures. Spearman's correlations ranged between −0.23 and 0.12 (Table 2). Limit setting of SM was positively associated with frequency of family meals ($rho = 0.12$; $p < 0.05$) and inversely associated with SSB availability ($rho = -0.19$; $p < 0.001$), frequency of family meals in front of the TV ($rho = -0.23$; $p < 0.001$), number of TVs at home ($rho = -0.12$; $p < 0.05$), and owning active video games ($rho = -0.17$; $p < 0.01$).

Associations between limit setting SM and number of TVs at home did not remain statistically significant in adjusted logistic regression models (Table 3). The association between limit setting SM and frequency of family meals approached significance (OR = 1.66; 95% CI, 0.93, 2.98). Parents who reported high versus low levels of limit setting SM had significantly decreased odds of reporting high SSB availability (OR = 0.37; 95% CI, 0.20, 0.67) and more frequent family meals in front of the TV (OR = 0.51; 95% CI, 0.31, 0.85).

Associations between parent pressure to eat and home environment measures. Spearman's correlations ranged between −0.15 and 0.13 (Table 2). Pressure to eat was inversely associated with TV viewing during family meals ($rho = -0.15$; $p < 0.05$) and positively associated with household food security ($rho = 0.13$; $p < 0.05$), the former of which did not remain statistically significant in an adjusted logistic regression model (Table 3). Parents who reported high versus low levels of pressure to eat had significantly increased odds being household food insecure (OR = 1.77; 95% CI, 1.01, 3.15).

Associations between parent reinforcement and home environment measures. Spearman's correlations ranged between −0.18 and 0.05 (Table 2). Reinforcement was inversely associated with family meals in front of the TV ($rho = -0.18$; $p < 0.01$). This association remained statistically significant in an adjusted logistic regression model (Table 3). Parents who reported high versus low levels of reinforcement had significantly decreased odds of reporting frequently watching family meals in front of the TV (OR = 0.52; 95% CI, 0.31, 0.86).

Discussion

Previous literature[20] has demonstrated that parenting practices influence children's health behaviors and long-term energy balance. Results of this analysis indicated that parenting practices may also play an important role in shaping the home environment. Parent age, gender, education, employment, country of birth, and years living in the United States, child age, and child gender accounted for significant differences across multiple parenting practices, which is consistent with previous observations that parenting practices differ by sociodemographic characteristics.[27,29,40–42] Deepening our understanding of these sociodemographic disparities will improve our abilities to develop culturally appropriate interventions. In this sample of overweight and obese children enrolled in a family-focused weight management program with their parent/caregiver at baseline, parents/caregivers reported moderate-high levels of monitoring, limit setting SS, limit setting SM, and reinforcement as well as moderate-to-low levels of pressure to eat. With the exception of pressure to eat, these parenting practices appeared to be health promoting, which is consistent with our hypothesis and results previously reported by Arredondo and colleagues[29] and Ayala and colleagues[28] in their evaluations of the *Aventuras para Ninos* intervention. In our study, monitoring, limit setting SS, limit setting SM, and reinforcement were inversely associated with TV viewing during meals. In other words, parents/caregivers who reported higher use of these parenting practices had significantly reduced odds of reporting frequently (≥ 1–3 times/week) watching TV during family meals, compared to infrequently (≤ 2–3 times/month). Frequently watching TV during family meals is a negative component of the home environment, given that it has been associated with children's increased intake of soda and chips,[16] decreased intake of FV and higher dietary fat intake,[14] and higher BMI *z*-scores longitudinally.[43] In addition, we observed that higher levels of monitoring, limit setting SS, and limit setting SM were inversely associated with frequency of SSB availability; thus, parents who reported engagement in higher levels of these practices had significantly reduced odds of reporting usually/always serving SSBs at meals, compared to never/sometimes. SSBs are a major source of added sugar and excess calories among low-income children,[44–46] and reduction of SSB availability in the home may improve children's dietary quality and body weight.[47] De Coen and colleagues[48] observed that mean soft drink consumption of children from high SES was 58% times less than children of low SES,

and that this relationship was mediated by availability/accessibility of soft drinks at home. Whereas SES is not a modifiable intervention target, availability/accessibility of SSBs in the home is, and encouraging parents to use more monitoring and limit setting of SSBs in the home may be one strategy by which interventions can modify SSB availability/accessibility in the home.

Monitoring was also positively associated with higher FV availability in the home, and both monitoring and limit setting SS, respectively, were positively associated with owning sports equipment. In other words, parents who reported higher use of monitoring had significantly increased odds of reporting usually/always serving FV at meals, compared to never/sometimes, and parents who reported higher engagement in monitoring and limit setting SS, respectively, had significantly increased odds of reporting owning sports equipment, compared to not owning sports equipment. Higher monitoring and limit setting, as measured by the PEAS instrument,[26] have been previously associated with higher PA and lower BMI *z*-scores among children, respectively. These findings suggest that, in addition to reduced frequency of watching TV during meals and SSB availability, parents who engage in the practices monitoring and limit setting may also have increased availability of fruits, vegetables, and sports equipment in their home. Because our study sample was limited to overweight/obese children, it is important to note that these results do not necessarily indicate that these are best/healthiest parenting practices. Rather, our intent is to conduct further studies to examine whether families enrolled in the FWMS who reported healthier home environments at baseline had better intervention outcomes (*e.g.*, improved weight loss) at follow-up.

Although appropriate use of discipline (neither severe nor permissive), pressure to eat, and reinforcement have been previously associated with children's healthier eating,[26,29] we did not observe an association between these parenting practices and measures of the physical home environment (availability/accessibility of foods, SM, and PA), indicating that focusing on monitoring and limit setting to facilitate changes in the physical home environment may be most efficient for interventions, but more studies are needed to confirm this observation.

Moreover, in contrast to our hypothesis, pressure to eat was not associated with unhealthy, albeit nor healthy, measures of the home environment. Rather, we observed that nearly 38.5% of our population was household food insecure, and the odds of food insecurity increased by nearly 1.4-fold with higher levels of pressure to eat, which is a controlling parenting practice (Table 3).[49] Arredondo and colleagues[29] reported that Mexican American mothers were significantly more likely to use controlling practices if they were younger, unemployed, and less acculturated. In addition, parents who used fewer controlling strategies had children with higher BMIs, and these findings are consistent with our observations. Gross and colleagues[19] reported that food insecurity was related to higher control (restriction and pressuring) among predominantly Hispanic/Latino mothers and infants in the Bronx, which may be mediated by concern for child's weight, proving further evidence that controlling practices may be an important indicator of food insecurity in our predominantly Hispanic/Latino community. Food insecurity is a barrier to health, and future interventions should consider addressing these potential disparities in controlling practices.

Several study limitations should be noted. Some of the effect sizes that we observed in correlation and regression analysis were small, and reports of health-promoting components of the home environment were high. For example, 77.6% of families reported never/sometimes, compared to usually/always, serving SSBs at meals, which appears high for this overweight/obese population of children. This observed effect may be owing to social desirability bias, for example, responding with healthier choices because they are viewed as favorable, leaving the potential that some of our findings may be artifacts of this bias, and therefore they should be carefully interpreted in conjunction with trends in previous data.

Further, this analysis was cross-sectional, and temporal relationships between parenting practices and the home environment cannot be discerned. Both parenting practices and the home environment were assessed by self-report, introducing information and social desirability biases. In addition, this sample was limited to underserved, overweight/obese children in an urban environment, so the sample may also have limited variability, resulting in small effect sizes, as well as limiting the generalizability of our findings. Despite these limitations, this study highlights parenting practices as important behavioral targets that can be potentially leveraged by interventions to promote changes within the home environment. Future studies should examine these relationships longitudinally and consider including a normal weight control group.

Conclusions

Targeting the home environment is an effective strategy in the treatment of childhood obesity. In our study, monitoring, limit setting, discipline, and reinforcement appear to be associated with health-promoting measures within family dynamics, whereas pressure to eat may be an indicator of food-insecure households. Examining the complex inter-relationships among the home environment (*e.g.*, between parents, family interactions, and physical and economic environments) may improve our understanding of the behavioral mechanisms by which family-focused interventions work, and thereby improve our ability to design and implement effective interventions, and achieve clinically meaningful, sustainable outcomes. Moreover, generating this type of new information may yield important advances in our application of the social-ecological framework to the treatment and prevention of childhood obesity.

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Address correspondence to:
Beth Conlon, MS, RD
Doctoral Candidate
Department of Epidemiology and Population Health
Albert Einstein College of Medicine
1300 Morris Park Avenue
Bronx, NY 10461

E-mail: beth.conlon@phd.einstein.yu.edu