

**Nutrition knowledge and behaviors of low-income Latino parents of preschoolers:  
Associations with nutrition-related parenting practices.**

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Slusser W, [Erausquin JT](#), Prelip M, Fischer H, Cumberland W, & Neumann C. Nutrition knowledge and behaviors of low-income Latino parents of preschoolers: Associations with nutrition-related parenting practices. *Early Child Development and Care*, 2012, 182(8): 1041-1055.

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**Abstract:**

Parents are in an ideal position to promote long-term healthy dietary behaviours for their children. This study aimed to determine parent and child characteristics and to test their associations in a cross-sectional sample of urban low-income, low-education Latino immigrants with preschool-age children. Also determined were family demographic characteristics, child feeding practices, parent nutrition knowledge, parent fruit and vegetable consumption, and child Body Mass Index (BMI). Our analysis shows several significant associations: (1) lower parent nutrition knowledge and less healthy child feeding practices (increased pressure,  $p = 0.017$  and increased restrictions,  $p = 0.037$ ); (2) higher parent vegetable consumption and healthier child feeding practices (more responsibility for the types and amount of food eaten,  $p = 0.022$ , and less restrictions on child eating,  $p = 0.030$ ); and (3) a significant difference by child gender, such that parents of girls with higher BMIs for their age group being more concerned about their daughter's weight ( $p = 0.004$ ) and practising healthier feeding practices, that is, less pressure ( $p = 0.008$ ). Our findings support promoting healthy eating within the context of the family, and contribute to a growing literature on preschool parent-child feeding practices. Understanding the practices of immigrant Latino parents can help researchers and practitioners develop culturally appropriate interventions to address childhood obesity.

**Keywords:** nutrition | parent nutrition knowledge | child nutrition | preschool children | parenting practices | low-income families | latino families | child feeding behaviors

**Article:**

Introduction and background

Latinos comprise the largest and fastest-growing racial/ethnic minority group in the USA (U.S. Bureau of the Census, 2011a). Currently representing about 16% of the US population, by 2050,

Latinos will make up 25% of the population (U.S. Bureau of the Census, 2011b). Thirty-four per cent of the Latino population is under the age of 18, compared with 21% for non-Hispanic whites (Pew Hispanic Center, 2009). As young as age four years, rates of obesity for Latino children are significantly higher than those of their white and African-American peers (Mei et al., 1998; Ogden, Carroll, Curtin, McDowell Tabak, & Flegal, 2006). The National Health and Nutrition Examination Survey 2007–2008 found that 27.7% of Mexican-American preschool children were either overweight or obese, compared with 17.4% of non-Hispanic white children and 26% of African-American children (Ogden, Carroll, Curtin, Lamb, & Flegal, 2010).

Numerous factors affect the development of child overweight, including genetic, physiological, behavioural, and social and physical environmental factors (Birch & Davison, 2001; Davison & Birch, 2001; Ramirez, Chalela, Gallion, Green, & Ottoson, 2011; Spruijt-Metz, 2011; Ventura & Birch, 2008). Particularly among young children, parents are considered key to both the development and potential prevention of overweight (Institute of Medicine, 2011). Parents determine the home food environment through modelling eating behaviours, their child feeding practices, and purchasing and preparation decisions that determine availability of foods and beverages (Sleddens, Gerards, Thijs, de Vries, & Kremers, 2011; Ventura & Birch, 2008). Modelling, child feeding practices, and purchasing decisions are, in turn, affected by parents' own food preferences and eating habits (Anzman, Rollins, & Birch, 2010). As a result, parenting behaviours have been identified as an important factor in paediatric nutrition – and a potentially important area for intervention (Institute of Medicine, 2005, 2011).

Controlling and restrictive child feeding practices have been shown to interfere with a child's ability to recognise internal cues for hunger and satiety and to shape child food preferences. If parents excessively control 'when, what, and how much' children eat, they teach children to ignore feelings of hunger, which may result in overconsumption (Davison & Birch, 2001). As Haire-Joshu and colleagues note, 'frequent comments (e.g. clean your plate) and punishment prompts (e.g. no dessert), can negatively affect the child's long-term preference for [fruit and vegetables] and ability to regulate intake, leading to obesity', (2008, p. 77). Further, restricting particular foods (e.g. foods high in fat and/or sugar) may increase children's preference for those foods and is associated with increased child weight (Fisher & Birch, 1999a, 1999b). Alternatively, parents setting appropriate limits, providing structure and routines, and associating healthy eating with positive reinforcement is linked to healthy child eating habits (Stark et al., 1986; Ventura & Birch, 2008).

Among Latino parents, culture and acculturation influence child feeding practices and may combine with other social and environmental factors (e.g. low socioeconomic status, fewer opportunities for physical activity) to place Latino children at higher risk for overweight and obesity. However, there are relatively few well-designed studies that specifically examine child feeding among Latino families (Bleich, Ku, & Wang, 2011; Spruijt-Metz, 2011; Ventura & Birch, 2008). The available literature indicates Latinos, particularly immigrant Latinos, have cultural beliefs related to food, child feeding, and weight that may change over time as they

become more acculturated (Arredondo et al., 2006; Sussner, Lindsay, Greaney, & Peterson, 2008). For example, participants in a study of Latina mothers (mostly immigrants from Central America) believed Latino culture valued children finishing their plates and emphasised good mothering meant providing a lot of food to children (Sussner et al., 2008). Another study, focusing on Mexican-American parents, found that controlling child feeding practices was associated with unhealthy child eating (Arredondo et al., 2006). Further, younger, unemployed, and less acculturated parents were more likely to engage in controlling practices. More broadly, compared with their more-acculturated peers, less acculturated Mexican-American mothers have been found to be more likely to offer children alternative foods when they refused to eat; to believe bribes, threats, and punishment are effective in encouraging eating; and to use eating-out as a reward for good behaviour (Kaiser, Melgar-Quinonez, Lamp, Johns, & Harwood, 2001).

The growing literature on parenting practices suggests intervening with parents may be an effective way to prevent overweight and obesity among children (Institute of Medicine, 2011). However, most research focusing on parent feeding practices has been with white middle-class populations (Bleich et al., 2011; Spruijt-Metz, 2011; Ventura & Birch, 2008; Wardle, Carnell, & Cooke, 2005) and has not addressed the cultural context of Latino families, or attempted to understand the determinants of Latinos' child feeding practices. In the current study, we address these limitations by examining data from a unique sample of low-income, Spanish-speaking Latino parents and their preschool-age children in order to: (1) describe in the context of family demographic characteristics, child feeding practices, parent nutrition knowledge, parent fruit and vegetable consumption, and child BMI, and (2) to test the associations among these characteristics, as an initial step in establishing the need for intervening with parents.

## Methods

The study was conducted in Los Angeles at the clinic, public education, and community-based non-governmental organisation sites. Each recruitment site served the low-income group (living in poverty in the USA according to household size and monthly income), predominately Latino families with preschool-age children. The sites were the Venice Family Clinic (VFC) Simms/Mann Health and Wellness Center, Los Angeles Unified School District Title 1 preschools (where at least 40% of students are eligible and enrol in the US Department of Agriculture's reimbursable lunch programme), and community not-for-profit preschools (the Mar Vista Family Center and the Children's Bureau).

## The sample

One hundred and sixty families were recruited during health care clinic visits at VFC, or in the classrooms at the community preschool sites between the years 2006–2009. Recruitment was initiated with flyers given by the primary care provider or teachers to distribute to the parents. Interested parents were screened for the following inclusion criteria:

1. having at least one child between the ages of two and four years old living in the home, and
2. latino was the self-stated ethnicity.

Exclusionary criteria were a previous diagnosis of failure to thrive and medical complications associated with the child's overweight status such as Prader–Willi syndrome. If the child was found to have a Body Mass Index (BMI) percentile less than the 5 percentile, they were excluded from the study and referred to their primary physician for further medical and nutritional assesment. No child was excluded for medical complications associated with overweight status and only one child was excluded because they were found to have a BMI percentile less than the 5 percentile. No records were kept of how many flyers were handed out.

### Procedures

After recruitment, the parent/guardian gave written consent for themselves and their preschool child to participate in the study. Following the consent process, an assessment of the parent/guardian and child's weight was conducted. All of the adult study participants were the mother of the child participant, therefore, we will refer to the adult participant from now on as mothers. The mothers who participated in data collection received a \$20 gift certificate to a local non-grocery chain store. Collected measures assessed each of the study's intended outcomes. Four bilingual trained field workers conducted the interviews that took between 30–45 minutes. The same field workers collected weight and height measurements from the mother and child. These interviews and measurements occurred at the clinic or pre-school sites.

This study was approved by the Institutional Review Board of the University of California, Los Angeles, and the research ethics committees of the VFC, the Los Angeles Unified School District (LAUSD) the Mar Vista Family Center, the Santa Monica School District, and the Children's Bureau's Evaluation.

### Measures

Measurements were collected at the time of initial assessment. Measures included the following:

1. BMI measurements: Weight of the child and mother were measured on a Seco beam leaver balance to the nearest 100 g. Heavy clothes and shoes were removed before weighing and measuring the child and mother. Height was measured to the nearest 0.1 cm using a stadiometer board. Ages were calculated from the birthdates of the child and the date on which the measurements were made. BMI was calculated as:  $BMI = \text{kg}/\text{m}^2$ , where kg is weight in kilograms and height is metres. BMI percentiles and BMI z-scores were determined using the recommended Center for Disease Control/National Center for Health Statistics tables and formulas for BMI (Centers for Disease Control and Prevention, z-score data files). The mother was present for the interview and, therefore, reported the father's weight and height.

2. Family demographics. Fourteen questions obtaining information about the parent's birth date, gender, self-identified ethnic group, marital status, employment status, occupation, years of education, number of people in the household (Zive et al., 1998), weight history, child's gender and birth date, relationship of participating adult to child.

3. Diet: In order to capture the eating habits of the caregiver, questions based on the California Health Interview Survey (CHIS, 2001) were utilised. The questions capture how frequently the respondent consumed foods in eight categories in a day, week or month. The reported frequencies were then standardised to daily frequencies to standardise the results. Validation results of the CHIS Fruit and Vegetable Screener (2000) have found that estimates of median intake of servings of fruits and vegetables were: Men: 24-food recalls – 5.8; CHIS screener – 5.5; Women: 24-food recalls – 4.2; CHIS screener – 4.5.

Validation results for the Multifactor Screener which includes a similar fruit and vegetable component has reported strong correlation with estimated true fruit and vegetable intake of 0.6–0.7 among men and 0.5–0.8 among women (Thompson et al., 2004).

4. Parental feeding practices were measured using the Child Feeding Questionnaire (CFQ) (Birch et al., 2001). Possible responses ranged from disagree to agree on a 5-point scale. The CFQ variables measured the following five dimensions of parenting practices: parents perceived responsibility for ensuring their child eats the right types and amounts of food (Responsibility); concern for their child's future or current weight status (Weight Concern); monitoring of their child's portions, sweet and high fat food intake (Monitoring); pressure they perceive they must put on their child to make sure he/she eats enough or finishes all the food on his/her plate (Pressure); and belief that restrictions or rewards are necessary in their child's diet (Restriction). Each of these variables is the sum of several questions measured on the Likert scale ranging from disagree (1) to agree (5) and for comparison purposes standardised so the composite scores all ranged from 1 through 5. Internal consistencies for the CFQ factors have been shown to be above 0.70 (Birch et al., 2001) among Latino and Caucasian families. A study of the psychometric properties of the CFQ among Black and Hispanics (Anderson, Hughes, Fisher, & Nicklas, 2005) supported the factor structure of the CFQ using LISREL 8.51 for the factor analysis, but found some problems with perceived child weight factors. Since they did not include parent perceived weight questions in their analysis, we did not include these weight factors in the CFQ utilised for our study.

5. Parental nutrition knowledge came from the Diet and Health Knowledge Survey (Food Survey Research Group, 1999), and the National Institutes of Health Diet Health Questionnaire (National Institutes of Health, 2002) and were adapted to address our research needs into a questionnaire utilised by the research team in other nutrition evaluations (Prelip, Thai, Erausquin, & Slusser, 2011; Prelip, Slusser, Thai, Kinsler, & Erausquin, 2011). The questionnaire began with a series of seven questions testing knowledge of the healthiness of certain foods and appropriate fruit, vegetable, sugar, and fat intake. The questions offered a

choice of food pairs (A or B), for the mother to choose the food that is better for her health: regular milk or skimmed milk; pepperoni/sausage pizza or cheese pizza; baked chicken with the skin off or fried chicken; steamed/boiled rice or fried rice; ice cream or fresh fruit popsicle; eating food without adding salt or shaking salt on food before eating it. There was one multiple choice question: if you want to eat more fruit, which of the following should you choose? Choices were: orange soda; grape jelly; banana; or strawberry ice cream. The Nutritional value was calculated as the percent of questions answered correctly. The individual items intentionally covered diverse aspects of food and nutrition.

## Analysis

Because the child feeding questionnaire variables, nutrition knowledge, and parent fruit and vegetable consumption were highly skewed, Spearman correlations were used to test for statistical association. BMI z-scores were calculated to closely approximate a normal distribution, but because an association was also being tested with highly skewed variables, Spearman correlations were used in this case as well. For the presence of 'robustness', associations were also tested using standard correlation analysis. Because pairwise correlations indicated that child BMI z-scores may be affected by mother age and education, partial correlations controlling for mother age and education were calculated.

Calculation of the associations between the child feeding questionnaire variables with nutrition knowledge, and parent fruit and vegetable consumption were conducted using the entire study population. Correlation calculations of BMI z-scores with the child feeding questionnaire variables were stratified by gender since the literature indicates differences in attitudes by this metric (Birch, Fisher, & Davison, 2003; Robinson, Kiernana, Matheson, & Haydel, 2001).

## Results

Table 1 summarises means and standard deviations of relevant demographic characteristics of the study population as well as a breakdown of child BMI percentiles, child feeding questionnaire variables, nutrition knowledge scores, and fruit and vegetable consumption. All of the respondents in the sample were the mothers of the child in the study. Of note, 70% of the mothers in the sample were obese or overweight. The fathers' weight was not measured but was reported by the mother during data collection. The mothers reported 32% of the fathers were overweight or obese. Mother's vegetable and fruit consumption was on average three servings per day. The 2005 CHIS findings report 62% of Latino women in the Los Angeles Metro Area consumed less than five servings of fruits and vegetables per day (CHIS). The majority of children had government sponsored health insurance (88%); 90% of the children were not in childcare; 94% participated in the Women, Infant and Child (WIC) Supplemental Feeding programme; 89% of the children were born at a normal weight but 36% were overweight or obese at the time of study enrolment with the average age of 3.4 years old; 96% of the children were born in the USA and 81% of mother's and 77% of fathers were born in Mexico; 93% of

fathers and 28% of mother's were employed. All of the families in the study generated incomes that classified them as living in poverty in the USA according to household size and monthly income based on our inclusion criteria for study sites.

Table 1. Demographic characteristics of sample (n = 160).

Variable	Mean (SD)
Maternal age (years)	31.25 (5.68)
Maternal education (years)	9.36 (3.68)
Paternal age (years)	34.03 (6.53)
Paternal education (years)	8.75 (3.46)
Child age (years)	3.39 (0.86)
Household size	4.90 (1.50)
CFQ variables <sup>a</sup>	
Responsibility	4.77 (0.43)
Weight concern	2.66 (1.28)
Monitoring	4.49 (0.79)
Pressure	3.67 (1.07)
Restriction	3.81 (0.79)
Nutrition knowledge <sup>b</sup>	6.09 (1.21)
Parent vegetable servings consumed	1.42 (1.20)
Parent fruit servings consumed	1.55 (1.08)
	Per cent
Gender	
Male	47
Female	53
Maternal current BMI categories <sup>c</sup>	
Underweight	1

Normal weight	29
Overweight	34
Obese	36
Maternal childhood BMI categoriesd	
Underweight	20
Normal weight	69
Overweight	10
Obese	1
Paternal current BMI categories	
Underweight	6
Normal weight	64
Overweight	25
Obese	6
Paternal childhood BMI categories	
Underweight	22
Normal weight	71
Overweight	6
Obese	2
Child BMIe	
Normal weight	64
Overweight	16
Obese	19
Health insurance	
Medical/healthy families	88
No insurance	12



## Childcare

No childcare	90
Participation in childcare	10

## WIC

WIC participation	94
No WIC participation	6

## Birthplace

### Child birthplace

Mexico or Central America	4
USA	96

### Mother birthplace

Mexico	81
Other Central American	16
USA	3

### Father birthplace

Mexico	77
Other Central American	18
USA	5

## Marital status

### Parents' marital status

Married	72
Live with partner	15
Divorced or single	13

## Child birthweight

Low birthweight (<5 lb, 8 oz)	5
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Normal birth weight	89
High birthweight (>8 lb, 13 oz)	7
Employment	
Father employment	93
Mother employment	28

a CFQ variables are measured on a Likert scale ranging from 1 (never) to 5 (always).

b Seven question test measuring parent nutrition knowledge.

c Mothers with BMI < 18.5 were underweight. Mothers with BMI in the range of 18.5–24.9 were normal weight. Mothers with BMI in the range of 25–29.9 were overweight weight. Mothers with BMI  $\geq$ 30 were obese.

d Fathers' current BMI categories and parental childhood BMI categories were reported.

e Children with BMI in the 95th percentile or greater were obese. Children with BMIs in the 85th to 94th percentile were overweight. Children with BMI between 5th to the 84th percentile were categorised as normal weight.

Demographic characteristics outlined in Table 1 were not significantly different between recruitment sites, with the exception of mother employment and child age. Mothers from community sites were less likely to be employed than those recruited from clinic sites, with 37% of clinic mothers being employed versus 20% of community mothers. Children in community sites tended to be on average one year older than those in clinic sites.

#### BMI and child feeding practices results

For the girls in the study population, there was a significant association between Pressure and child BMI z-score (p-value = 0.008). Specifically, parents of girls who have higher BMIs for their age groups tend to exert less pressure on their daughter to eat and expressed less concern that their child eats enough. This association was not observed for boys. Similarly, for girls, there was a significant correlation between Weight Concern and child BMI z-score (p-value = 0.004), with parents of girls who have higher BMIs for their age group being more concerned about their child's weight. There was no significant association seen for boys. These results were also obtained using standard correlation and controlling for mother age and education. See Table 2. Results were consistent between clinic and community sites.

Table 2. Significant associations with CFQ variables and maternal nutrition knowledge, maternal fruit and vegetable consumption and z-scores and gender differences.

	Spearman's $\rho$	p-value
Significant associations – female (n = 85)		
Pressure and BMI score	-0.287	0.008
Weight concern and BMI z-score <sup>a</sup>	0.311	0.004
Significant associations – total population (n = 160)		
Pressure and nutrition knowledge <sup>a</sup>	-0.189	0.017
Restriction and nutrition knowledge	0.166	0.037
Responsibility and vegetable consumption <sup>a</sup>	0.181	0.002
Restriction and vegetable consumption <sup>a</sup>	-0.172	0.030

<sup>a</sup> Significant controlling for mother age and education.

#### Nutrition knowledge and child feeding practices results

There was a significantly negative association between maternal nutrition knowledge and Pressure, with mothers who exerted more pressure on their child tending to have lower nutrition knowledge scores (p-value = 0.017). Additionally, nutrition knowledge and restriction were significantly correlated, with parents who placed more restrictions on their child's diet tending to have lower nutrition knowledge (p-value = 0.037). Although these results were significant using tests for standard correlation only the significance for Pressure and low maternal nutrition knowledge remained when controlling for mother's age and total years of education. See Table 2. Results were consistent between clinic and community sites.

#### Parent fruit and vegetable consumption and child feeding practices results

There was also a significant association between parent vegetable consumption and both Responsibility and Restriction, with parents who consumed more vegetables tending to feel more responsible for their child's diet (p = 0.022), but less likely to enforce diet restrictions (p = 0.030). These results were significant using standard correlation and controlling for mother age and education. Table 2 summarises these results, as well as indicating which were significant after controlling for mother age and education. Results were consistent between clinic and community sites.

#### Discussion

The results of this present study of a low-income, Latino, urban population suggest parental vegetable consumption and greater nutrition knowledge has a statistically significant effect on healthy child feeding behaviours and one that demands an explanation. Furthermore, we also found parents of girls who have higher BMIs for their age group tended to exert less pressure on their child to eat, have less concern that their child eats enough and are more concerned about their child's weight. The demographics reflect higher rates of child (35.5%) overweight and obesity (Ogden et al., 2010) and similar rates of maternal (70%) overweight and obesity (Flegal, Carroll, Ogden, & Curtin, 2010) when compared to US national averages. These high maternal and child overweight and obesity rates in this Latino, low-income and low-education population place this sample of children at high risk for future obesity (American Academy of Pediatrics, 2007).

Studies have found parents' child feeding behaviours can have a positive or negative impact on a child's ability to self-regulate energy intake and weight (Birch et al., 2003; Institute of Medicine, 2011; Robinson et al., 2001). While previous studies have focused predominately on the Caucasian population, our study contributes to the smaller but growing literature about Latino child feeding practices. One previous study that focused on overweight Mexican-American preschool children found among the child feeding strategies, only 'child takes food from the refrigerator or pantry between meals' was associated with childhood overweight, suggesting genetic or socioeconomic factors that played a larger role (Melgar-Quinonez & Kaiser, 2004). Other studies suggest self-regulation can be disrupted by highly controlling parent feeding practices (Institute of Medicine, 2011). One study found parent feeding practices explained more variance in total fat mass than did dietary fat intake (Spruijt-Metz, Lindquist, Birch, Fisher, & Goran, 2002).

In our study, like in others, parents of girls appear to have different feeding styles than parents of boys (Birch et al., 2003; Robinson et al., 2001). We observed parents of girls who have higher BMIs for their age group tended to exert less pressure on their child to eat, had less concern that their child ate enough and were concerned about their child's weight. These results suggest healthier parent feeding practices for the girls. Furthermore, parents did not tend to employ restrictive feeding behaviours with their girls. Restrictive feeding practices have been found to increase girls' eating in the absence of hunger (Birch et al., 2003; Institute of Medicine, 2011). These feeding practices for the Latino girls in our study might be protective against future obesity when compared to their Latino male counterparts who have higher obesity rates nationally: 41.7% of 2–19-year-old Mexican-American boys compared to 36.1% of 2–19-year-old Mexican-American girls. This is in contrast to the obesity rates by gender in 2–19-year-old Caucasian boys (29.5%) versus Caucasian (29.2%) and 33% of 2–19-year-old African-American boys (33%) and African-American girls (39%) (Ogden et al., 2010).

Gender biases can exert a negative influence on a child's weight as well. One recent study reports Hispanic boys with parents with indulgent feeding styles had significantly higher BMI z-scores compared to Hispanic boys with parents with authoritative, authoritarian or uninvolved parent

feeding styles (Hughes et al., 2011), suggesting the complexity of parental influence on a child's BMI z-scores. However, fathers may also play an important role; one study reports, fathers who were more controlling had girls with higher percentage of fat and were more concerned about their daughters' future health (Johannsen, Johannsen, & Specker, 2006).

Parent feeding practices may be mediated by parents' nutrition knowledge and their own eating habits. In our study, lower parental nutrition knowledge was associated with more restrictions on child's diets and more pressure on the child to eat. Melgar-Quinonez and Kaiser (2004) reported that household income, mother's BMI, child's birth weight and juice intake as a proportion of total daily energy, were associated with children's overweight status. This suggests that biologic and socioeconomic factors might be stronger determinants than child feeding practices for overweight in this population. In contrast, in our study, the correlation of Nutrition Knowledge and Pressure to Eat was significant even after controlling for maternal age and education, however the correlation with Restriction was not. Unhealthy feeding practices have been associated in many other studies with increased intake of high calorie foods, decrease self-regulation of high calorie food intake, and diminished preference of healthy foods (Institute of Medicine, 2011). The Institute of Medicine recommends that parents 'provide healthy food to children and allow children to control the amount they eat' (Institute of Medicine, 2011).

Parent nutrition education might be one possible intervention to support healthy parent feeding behaviours. Nutrition education alone, however, has been found to accomplish limited positive changes in parent nutrition behaviours. A systematic review of nutrition education interventions found limited impact on improving dietary intake and parental attitudes and nutrition knowledge among parents with children under two years of age, and none of the interventions improved child weight status (Ciampa et al., 2010). An earlier review of interventions focused on children under five years of age who also identified only a handful of well-designed interventions. Interventions described included common education components in both group and individual settings, parent support activities with peers, home visitation, and repeated health communication messages. Also noted was that essentially all of the described interventions were high-intensity with extensive contact with parent and child participants (Campbell & Hesketh, 2007). These two extensive systemic reviews highlight the need for additional studies that are not limited by study design and implementation challenges. While Latino parents express an interest and desire to learn about nutrition they also want to know the 'how' to change unhealthy nutrition behaviours (McKee, Maher, Deen, & Blank, 2010; Slusser et al., 2011).

The home food environment also plays a key role in mediating healthy eating behaviours as in this study. Parents who ate more vegetables felt more responsibility for the types/amount of food their children ate and were less likely to feel they need to place restrictions on their children's diets. These results were robust using standard correlation and controlling for mother age and education. These healthy eating behaviours have been associated with improved child feeding outcomes (Institute of Medicine, 2011). In addition, the parents eating more vegetables might also be a proxy for increased availability of fruits and vegetables for the child. Availability and

accessibility of fruits and vegetables is a major determinant of fruit and vegetable consumption (Blanchette & Brug, 2005).

### Strengths and limitations

We acknowledge the strengths and limitations of the present study. First, the parent fruit and vegetable consumption, parent nutrition knowledge, the child feeding behaviours and the fathers' height and weight were based all on self-report. While self-report of heights and weights in the Mexican population has been shown to relate to actual practice, it is unclear if reporting your husband's weight and height has similar validity (Avila-Funes, Gutiérrez-Robledo, & Ponce De Leon Rosales, 2004). Furthermore, the study results are confined to a small homogeneous population of low-income, predominately first generation, Mexican-American urban and so cannot be readily generalised. Also, all of our respondents were mothers and so we were unable to assess the influence of the father. The study nevertheless contributes to the literature by studying a unique population comprising Latino, urban low-income families with children between the ages of 2–4 years old who are at high risk for future obesity.

### Conclusion and recommendations

This study contributes to a small but important body of literature describing demographics and feeding practices among low-income Latinos with young children. The findings illustrate the complexity of the interactions between nutrition knowledge, parent fruit and vegetable consumption, child feeding practices and BMI. Our study findings strongly suggest shifting traditional nutrition counselling paradigm of focusing on weight or changes of the child's nutritional intake to focus on healthy eating for the family and parent. Certain aspects of Latino culture could enhance interventions aimed at improving diet and physical activity, given the importance of the family (including nuclear and extended family). Parents play a critical role in shaping the young child's ability to self-regulate their food intake, which is critical for healthy eating throughout life. Our findings support promoting healthy eating within the context of the family, and contribute to a growing literature on preschool parent child feeding practices. Understanding the practices of immigrant Latino parents can help researchers and practitioners develop culturally appropriate interventions to address childhood obesity.

### Notes on contributors

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Fred Frankel, PhD, ABPP is Director of the UCLA Parenting and Children's Friendship Program. He has been principle investigator on two funded research projects concerned with Autism Spectrum Disorders and Attention-Deficit/Hyperactivity Disorder. He has also been co-investigator on three funded projects concerned with childhood obesity, Autism Spectrum Disorders and Fetal Alcohol Spectrum Disorders. He has authored three treatment manuals and one parent self-help book on children's friendships.

Charlotte Neumann, MD, MPH is Professor of Medicine and Public Health at UCLA Schools of Medicine and Fielding Public Health. Her research interest includes intervention nutrition research projects in Kenya as well as pilot intervention projects among low income families in Los Angeles.

### **Acknowledgements**

This pilot study was funded by the generous gifts of: Joseph Drown Foundation, Simms/Mann Family Foundation, and Venice Family Clinic. We thank the staff and administration at Venice Family Clinic, LAUSD, Santa Monica Head Start Program, Children's Bureau, Mar Vista Family Center, and the PHFE WIC program for supporting this work.

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