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Food security, maternal feeding practices and child weight-for-length

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ABSTRACT

Background: Over consumption of energy-dense nutrient-poor foods may contribute to childhood obesity. We hypothesized that greater than recommended servings of sugar sweetened beverages and foods, indicators of food security, and a high maternal recumbent weight-for-length are positively associated with high percentages of child overweight/obesity.
Methods: This secondary data analysis consisted of a sample of 240 mother-child dyads. The original studies were designed to examine the effect of a public health nursing intervention on optimal childhood growth for low-income, minority children. Eligibility to participate included: 1) mothers self-identified as Hispanic; 2) children were 12–24 months old; and 3) children were enrolled in the Special Supplemental Nutrition Program for Women, Infants and Children (WIC); and 4) children were free of any major disease. Multivariate logistic regression examined the association between child weight, weight-for-length, maternal recumbent weight-for-length, child's eating schedule, maternal attitudes on feeding, food security, and consumption of sugar-sweetened beverages, desserts and fatty meats.
Results: Receiving SNAP was positively associated with child weight-for-length (WL). Children whose mothers reported ever having received SNAP were 2.01 times more likely to be overweight compared to children whose mothers did not report ever having received SNAP (95% CI = 1.04–3.90). Children who consumed desserts were 2.87 times more likely to be overweight compared to children who did not consume desserts (95% CI = 1.19–6.88). Also, child's caloric intake was significantly associated with child WL. Children who consumed more calories were 1.00 times more likely to be overweight compared to children who consumed fewer calories (95% CI = 1.00–1.00).
Discussion: Research on food security and children's weight has reported mixed findings. Methodological issues have been identified as contributory to the inconsistent findings. Of paramount importance to these studies is the measurement of low food security.
Conclusion: Children in this sample who were food insecure, as indicated by SNAP recipients, were more likely to have a higher WL measurement. Future studies should focus on the correlation between food security and hunger/satiety cues.

1. Introduction

For infants and toddlers, growth and development reflect nutrition status and are primarily monitored by weight-for-length (WL) measurement. Even though very young children in the U.S. meet or exceed energy and protein requirements with negligible vitamin and mineral deficiencies, most consume low levels of dietary fiber and excessive amounts of dietary fat (e.g., saturated fat) and sodium (Butte, Fox,

Abbreviations: WL, weight-for-length; BMI, body mass index; CI, confidence intervals; HFSS, Household Food Security Survey; NHANES, National Health and Nutrition Examination Survey; OR, Odds ratios; WIC, Special Supplemental Nutrition Program for Women, Infants and Children; SNAP, Supplemental Nutrition Assistance Program; USDA, United States Department of Agriculture.

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Briefel, et al., 2010; Cole & Fox, 2008). The over consumption of energy-dense nutrient-poor foods is believed to contribute to the high estimates of childhood obesity (Nicklas, Yang, Baranowski, Zakeri, & Berenson, 2003; Ogden, Carroll, Kit, & Flegal, 2012). According to the 2009–2010 National Health and Nutrition Examination Survey (NHANES), 9.7% of U.S. infants and toddlers had a high weight-for-length (Nicklas et al., 2003). Estimates for high weight-for-length among U.S. Hispanics and Mexican Americans (a Hispanic sub-group) were more severe, 14.8% and 15.7%, respectively (Nicklas et al., 2003).

Because overweight and obesity are ubiquitous health concerns for Mexican American preschool children and contribute to future health outcomes, there is an unequivocal need to understand and address the ecological factors that may influence the onset of overweight and obesity in this group. The purpose of this study was to determine the association between measures of food insecurity, maternal feeding practices, maternal weight, and child WL in a sample of low income Mexican Americans. The women and children in the study were clients in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) and received nutrition education every six months. This study illustrates behavioral factors that persist even with nutrition education as well as the influence of family and home environment.

To reduce the incidence and prevalence of childhood overweight and obesity in minority populations, it is necessary to create deep understandings of factors that contribute to the problem. Descriptive research allows for discovery of hypotheses that can be further tested through experimental research. Without such understanding, it becomes much more difficult to create parsimonious research trials that can yield useful and meaningful data for clinical practice. The authors hypothesized that these social, interpersonal, and behavioral factors, in particular, food and beverage intake, various measures of food insecurity, including receiving Supplemental Nutrition Assistance Program (SNAP) benefits (known colloquially as Food Stamps), and a high maternal body mass index (BMI) are positively associated with high percentages of child overweight and obesity (WL values ≥85th percentile using CDC standards for WL) (Barlow & The Expert Committee, 2007).

It is now commonly accepted that by age five, children's dietary patterns and food preferences are well established (Birch & Fisher, 1998; Farrow & Blissett, 2012). Dietary patterns and ultimately food preferences of children are influenced by their parents' feeding practices (Benton, 2004; Faith, Scanlon, Birch, Francis, & Sherry, 2004; Hodges, 2003). Parental feeding practices create the social learning environment wherein the child adopts the eating behaviors role-modeled by the parent. Harmful feeding practices such as restrictive feeding, insistence/pressure to eat, and emotional eating as well as the amount and type of foods given are associated with unhealthy eating behaviors and increased caloric intake in children (Faith et al., 2004; Hodges, 2003; Johnson, 2000; Satter, 1996; Stang & Loth, 2011; Thompson & Bentley, 2013). However, more formative research on the role of feeding practices in mothers of Mexican origin, an at-risk population for childhood obesity, is needed.

Foods offered to children are dependent on their families' food security. The United States Department of Agriculture (USDA) categories food security into four levels: high food security (no food access problems), marginal food security (anxiety over food sufficiency with no changes in diets or food intake), low food security (reduced quality, variety, or desirability of diet without changes in food intake), and very low food security (disrupted eating patterns and reduced food intake) (United States Department of Agriculture, 2012). The last two levels encompass food insecurity. Food insecurity is a household-level indicator of minimal economic conditions and reflects limited or uncertain access to food (National Academic Press, 2006). Very low food security indicates that hunger is present, which is an individual-level condition (National Academic Press, 2006). Food banks, large distribution sites of donated foods and other products, are sponsored by non-profit agencies, provide food to clients who meet eligibility criteria, and serve as a private response to community hunger via smaller, local food pantries. Obtaining emergency food assistance from food pantries, emergency kitchens, or similar programs is a coping mechanism used by low-income households to augment household food supplies (United States Department of Agriculture, 2012).

The lack of nutrient-dense food has deleterious effects on children's mental and physical development, including developmental delays, iron-deficiency anemia, learning difficulties, and emotional/behavioral problems (Ludwig, Blumenthal, & Willett, 2012). Evidence for the association between obesity and food security is inconsistent; some researchers reported no associations (Jones & Frongillo, 2007; Whitaker & Sarin, 2007) while others reported a lower risk between obesity and low food security (Rose & Bodor, 2006). The most consistent evidence for a positive association between obesity and low food security is among low-income women (Laraia, Epel, & Siega-Riz, 2013; Townsend, Peerson, Love, Achterberg, & Murphy, 2001). Moreover, very low food security is associated with an increased intake of total calories, calories from fat, and added sugar in children of Mexican origin (Sharkey, Nalty, Johnson, & Dean, 2012).

Results from several studies show that maternal weight is a strong predictor of childhood obesity (Gibson et al., 2007; Kaar, Crume, Brinton, et al., 2014; Maffeis, Talamini, & Tato, 1998; Starling, Brinton, Glueck, et al., 2015; Whitaker, Wright, Pepe, Seidel, & Dietz, 1997). Genetic predisposition, prenatal influences, and factors in the home environment contribute to this association. Additionally, among U.S. Hispanic immigrants, maternal weight and child weight are highly correlated regardless of acculturation level (Barroso, Roncancio, Hinojosa, & Reifsnider, 2012; Rosas et al., 2011). It is speculated that immigrant families who experience very low food security, consume more energy-dense nutrient-poor foods, eat larger portion sizes, have higher rates of binge eating, and have adopted sedentary lifestyles.

Social-ecological models provide a framework to comprehend and address the intrapersonal, interpersonal, socio-cultural, built, and policy environments that interactively influence a person's health decisions, behaviors, and, eventually, outcomes (McLeroy, Bibeau, Steckler, & Glanz, 1988; Richard, Gauvin, & Raine, 2011; Stokols, 1996). For a child, a social-ecological model outlines the various levels of influence in his/her environment that contribute to his/her growth and development (Reifsnider, Allan, & Percy, 2000; Reifsnider et al., 2006). In Reifsnider's Ecological Model of Growth (EMG), an experience-based model grounded in human ecology (Brofenbrenner, 1979) and epidemiology (Reifsnider, 1995), the microsystem, mesosystem, exosystem, and macrosystem interact synergistically with the epidemiological concepts of agent and host to support and guide growth and development. The microsystem consists of relationships within the family, most intensely with the parents. The activities and social interactions of a child in various settings (the home, daycare center, school, etc.), and the linkages and processes between the various settings of the child comprise the mesosystem. The mesosystem also includes the linkages and processes of the various settings of the parent (caretaker) that indirectly influence the child. The exosystem reflects the influence of the broader community in which the child and the family reside. The macrosystem can be considered as the broader culture that embraces all of the characteristics of the microsystems, mesosystems, and exosystems of the child and his/her salient others (parent) (Brofenbrenner, 1979). The concept of agent reflects the food available to the child to enhance and sustain growth. The host is the child and includes the child's individual characteristics including weight, length, eating behaviors, caloric intake. In this study, the EMG provided the theoretical framework to examine the influences of the child's microsystem (parental feeding practices, parental body size, food accessibility) and mesosystem (neighborhood characteristics including food banks) to child overweight/obesity. The parent tends to be an active participant in the child's microsystem and mesosystem; hence, the influence of the parent (positive or negative) is imperative (Acharya, Feese, Frankli, & Kabagambe, 2011; Reifsnider, Gallagher, & Forgione, 2005). The influences of the exosystem or macrosystem are beyond the scope of this paper.