



Research report

Healthy eating behaviors and the cognitive environment are positively associated in low-income households with young children[☆]

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ABSTRACT

The purpose of this research was to examine relationships between eating behaviors and the cognitive environment in primarily Hispanic low-income households with young children receiving WIC benefits in Los Angeles County. Survey data were collected from 3645 low-income families with children age 12–65 mo in Los Angeles County. Eating behaviors were measured through questions about fruit, vegetable, milk, soft drink, and fast food intake. The cognitive environment was evaluated through questions on the home literacy environment (HLE), reading frequency, and preschool enrollment. All healthy eating behaviors measured were significantly and positively associated with reading frequency and HLE scores after adjustment for confounders. HLE and reading frequency scores were 18% and 14% higher, respectively, in children eating two or more servings of fruit per day and 12% and 9% higher, respectively, in children eating three or more servings of vegetables per day. Preschool enrollment was not significantly associated with any eating behavior. Outcomes varied by language-ethnic groups and child sex. Results suggest that healthy eating behaviors are positively associated with stronger cognitive environments in low-income Hispanic families with young children. Interventions to prevent childhood obesity in this group may therefore benefit from including a home literacy component.

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Introduction

The Special Supplemental Nutrition Program for Women, Infants and Children (WIC) provides nutritional assistance and support for women and children under 5 years old living in households with an income at or below 185% of the poverty level (“WIC Income Eligibility Guidelines 2009–2010,” 2009). This population is an important target for obesity prevention, since according to the latest estimates from the Centers for Disease Control and Prevention, nearly 15% of low-income preschool-aged children (ages 2–4 y) are obese. For Hispanic populations within this group, the number rises to 18.5% (Obesity Prevalence Among Low-Income, Preschool-Aged Children—United States, 1998–2008, 2009). Over 69% of infants born in Los Angeles County, the most populous county in the United States, participate in WIC, and a large majority of these children (82%) are Hispanic (“Public Health Foundation WIC Program: Data Mining Project,” 2010). Thus, WIC sites are an important point of access to low-income families and,

with appropriately targeted intervention, may be able to significantly impact rates of early childhood obesity.

Current research suggests that successful prevention strategies should be multifaceted, including families and communities in the effort (Ells et al., 2005), and should start early, when feeding practices are just beginning (Lindsay, Sussner, Kim, & Gortmaker, 2006; Taveras, Gillman, Kleinman, Rich-Edwards, & Rifas-Shiman, 2010). Prevention of obesity at an early stage of childhood is thought to be critical for long-term prevention of obesity throughout adolescence and adulthood (Dietz, 1998; Guo, Wu, Chumlea, & Roche, 2002; Harrington et al., 2010; Magarey, Daniels, Boulton, & Cockington, 2003; Monteiro & Victora, 2005). Parents are the most important influences on their child’s eating behaviors at this young age. There are a variety of parenting behaviors and practices that affect child eating behaviors, and understanding the breadth of these influences is crucial for childhood obesity prevention (Lindsay et al., 2006). To appropriately tailor preventive interventions, it is necessary to examine all parenting practices that may play a direct or indirect role in the development of eating and activity behaviors affecting weight status. While many studies have focused on food-parenting practices that affect child eating behaviors, few have examined the relationship between the broader home environment and child eating behaviors (Kremers, Brug, de Vries, & Engels, 2003; Luther, 2007; Rhee, 2008; Schmitz et al., 2002; Ventura & Birch, 2008).

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One such non-food parenting practice that may affect eating behaviors is support of the child's cognitive environment. This environment, including both the home literacy environment (HLE) and preschool enrollment, is critical to cognitive development of young children (Diamond, Barnett, Thomas, & Munro, 2007; Melhuish et al., 2008). It may affect future decision making skills regarding eating behaviors that play a role in the development of child overweight and obesity (Batty, Deary, Schoon, & Gale, 2007; Cortese et al., 2008; Guxens et al., 2009). A number of studies have established a relationship between cognitive development or performance and overweight in both children and adults (Braet, Claus, Verbeke, & Van Vlierberghe, 2007; Cawley & Spiess, 2008; Cournot et al., 2006; Cserjesi, Luminet, Poncelet, & Lenard, 2009; Elias, Elias, Sullivan, Wolf, & D'Agostino, 2003; Emerson, 2009; Fergenbaum et al., 2009; Greenwood & Winocur, 2005; Gunstad et al., 2007; Guxens et al., 2009; Li, Dai, Jackson, & Zhang, 2008). These findings may in part be a result of early parenting practices that affect both the cognitive environment and eating behaviors. The relationship between HLE and eating behaviors has not been previously studied. However, lower scores on the Home Observation for Measurement of the Environment (HOME) cognitive stimulation inventory have been associated with overweight, even when controlling for income and other socioeconomic factors (Lumeng, Gannon, Appugliese, Cabral, & Zuckerman, 2005; Strauss & Knight, 1999). Similarly, although preschool enrollment has been linked with a decreased risk of overweight (Koleilat, Harrison, McGregor, & Jenks, 2008), its relationship with healthy eating behaviors is not known. These measures of cognitive environment as well as eating behaviors may be affected by demographic characteristics, such as child sex, ethnicity, and family income status (Bruss, Applegate, Quitugua, Palacios, & Morris, 2007; Keels, 2009; Melhuish et al., 2008; Reynolds et al., 1999).

The crucial question is whether early cognitive stimulation at home or preschool plays a role in developing healthier eating habits in the short and long term. In this study, we measure the cognitive environment by assessing preschool enrollment, the home literacy environment, and frequency of reading to the child in a sample of low-income families participating in WIC. The objective of this research is to determine what, if any, relationships exist between the cognitive environment and healthy eating behaviors for young children in low-income households, and whether these relationships vary for different genders and ethnicities. Understanding the relationships between cognitive aspects of the home environment and eating behaviors are expected to shed light on how obesity prevention interventions in early childhood can be most successful.

Methods

Subjects

A statistical random sample of 10,000 WIC participants out of the 400,000 who received WIC services in Los Angeles County in January 2008 were selected as potential survey recipients. Only persons who could complete the survey in English or Spanish, and reported that they or a child in the household was enrolled in the WIC program, were eligible for the survey. The survey was completed with a total of 5005 WIC participants in Los Angeles County between the period of April 8 and July 22, 2008.

For this study, children less than 1-year old were excluded from analysis due to the unique feeding practices of this age group. Pregnant women with no children were also excluded, yielding a sample size of 3645 families with children ages 12–65 months.

Only those children ages 2 y and older ($n = 2637$) were included in analyses including preschool enrollment.

Survey

The 2008 WIC survey was based on the 2005 Los Angeles County Health Survey ("Los Angeles County Health Survey," 2005) and adapted with extensive input from the California State WIC Program and WIC Local Agency staff. Surveys were conducted by Field Research Corporation (Field), an independent public opinion research organization. Up to eight attempts were made to reach and interview eligible respondents from each telephone listing dialed. The overall cooperation and response rates were 90.3% and 59.6%, respectively. Only 4.9% of those who did not respond were refusals or partial interviews. Instead, many WIC participants could not be reached at home within eight call attempts. Upon completion of surveys, WIC program staff mailed a \$10 gift card to all households completing a survey. Approval from the Independent Review Consulting Institutional Review Board was obtained for all protocols prior to commencement of the study, and verbal consent was obtained over the phone.

The objectives of the survey were to assess key health indicators and health-related behaviors, as well as home and community indicators of support for families with young children. Surveys were written in English and translated into Spanish. To capture the combined effect of language and ethnicity, the following language-ethnicity categories were created for data analysis: Spanish-speaking Hispanic, English-speaking Hispanic, non-Hispanic black, non-Hispanic white, and other. The "other" category collapsed a number of different ethnicities, including Asian and American Indian, due to the small numbers in each group. Ethnic and racial categories were defined by the survey instrument, and respondents self-identified their race/ethnicity.

Fruit, vegetable, soft drink, and milk intake were assessed by asking the parent how many servings of each the child consumed on an average day, and responses were recorded as whole numbers. This is a typical food frequency questionnaire (FFQ) in a short form and has been used extensively with the target population and validated through pilot testing with English and Spanish-speaking WIC participants. Milk intake was further explored with a question on the kind of milk the child mostly drinks. If breastmilk or formula was reported as the primary type of milk consumed, the case was excluded from analyses involving milk intake. Reported values greater than five for any food item were assigned a value of five, thus creating the categorical responses of zero, one, two, three, four, and greater than or equal to five. Categorical responses were used to assess frequency of fast food intake as follows: four or more times per week; one to three times per week; less than once a week but at least once a month; less than once a month; or never.

To better distinguish the relationships between the cognitive environment and eating behaviors, food intakes were also dichotomized based on dietary recommendations for young children. At least two servings of fruit and three servings of vegetables are recommended in *Healthy People, 2010* for children ages 2 y or older (Healthy People, 2010). Two or more servings of milk are recommended by the American Heart Association for children ages one and older (AHA et al., 2006). Therefore, cut-offs for healthy eating behaviors were established as follows: fruit, two or more servings per day; vegetables, three or more servings per day; milk, two or more servings per day; soft drinks, zero servings per day; fast food, less than once a week.

Three measures were used to describe the cognitive environment: two assessed by single items on the survey and one created by combining variables. Preschool enrollment and frequency of reading to the child were assessed with single items. A Home

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