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UNIVERSITY OF SAN DIEGO

Hahn School of Nursing and Health Science

DOCTOR OF PHILOSOPHY IN NURSING

A RETROSPECTIVE ANALYSIS OF MATERNAL AND CHILD OUTCOMES  
FOLLOWING AN OBESITY INTERVENTION PROGRAM

by

Melinda S. Bender

A dissertation presented to the

FACULTY OF THE HAHN SCHOOL OF NURSING AND HEALTH SCIENCE

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requirements for the degree

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July/2011

Dissertation Committee

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## Abstract

**Background:** One of the highest risk groups for childhood obesity and associated co-morbidities in the United States are low-income Hispanic preschool children. To reduce obesity, effective interventions are being sought to improve health behaviors among high risks groups.

**Objectives:** To evaluate a subset of data from a larger 9-month promotora facilitated obesity intervention study. The aims were to determine: 1) pre- to post- program differences in health behaviors including: (a) children's consumption of high carbohydrate beverages (HCB); and (b) maternal walking, beliefs, knowledge, self-efficacy, and relationship building regarding nutrition and physical activity; and 2) which covariates were significant for change in outcome variables.

**Methods:** A retrospective data analysis, pre post single group design was used to analyze a subset of data from the larger study consisting of a case sample of 33 low-income, Hispanic mothers (18- to 35- year- olds) with pre-school children (3- to 5- year-olds). Differences in outcome variables for related samples between baseline and 9 months were examined using: descriptive statistics, a matched-pairs *t*-test, the Wilcoxon signed-ranks test, and the chi-square test. Pearson and Spearman correlations were performed to assess relationships between covariates and outcome variables, and if regression analysis assumptions were met. A backward step-wise linear regression was run to determine covariates significant for change in health behaviors.

**Results:** From baseline to 9 months, there was a 56% decrease in children's overall HCB consumption (soda, 100% juice, and sugary drinks); a 47% increase in water consumption; and a 58% increase in total maternal steps (Tuesday and Saturday). By 9 months, maternal beliefs were more positive about walking, knowledge increased about healthy drinks, and maternal self-efficacy improved regarding role modeling healthy behaviors. Gravidity was correlated with increased Saturday steps and increased water consumption; and promotora visits were correlated with increased consumption of soda.

**Implications:** Findings suggest a 9-month childhood obesity intervention program was effective in improving the target health behaviors for a low-income Mexican American community and identifying effective means for reducing the incidence of obesity in high risks groups. A larger randomized control trial is needed to further test the feasibility of this intervention program.

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**“When you cease to make a contribution you begin to die.”**

*Eleanor Roosevelt*

**To all those on the front lines of community service  
dedicated to making life better for those in need.**

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## CHAPTER 1

### **Introduction**

Low-income and ethnic minority children are disproportionately affected by obesity and account for the majority of U.S. obesity-related pediatric health care costs (Snethen, Hewitt, & Petering, 2007; Trasande, Liu, Fryer, & Weitzman, 2009; Wang, Gortmaker, & Taveras, 2010). Hispanics represent the largest, youngest, and fastest growing ethnic group in the United States (Elder, Ayala, Parra-Medina, & Talavera, 2009; Fry, 2008; Johnson & Lichter, 2008) and Hispanic children (2-19 years) exhibit a high prevalence for overweight and obesity (Ogden, Carroll, Curtin, Lamb, & Flegal, 2010; Ogden, Carroll, & Flegal, 2008; Wang, et al., 2010). Recent studies found Alaskan Indian/Native American have the highest rates for obesity among 2- to 4- year-old preschool children in the United States, followed by low-income Hispanic preschool children, then non-Hispanic blacks, non-Hispanic whites and Asians (Anderson & Whitaker, 2009; Lutfiyya, Garcia, Dankwa, Young, & Lipsky, 2008).

Obesity is a complex, multi-factorial problem making the overall causes difficult to assess, reverse and prevent (Institutes of Medicine, 2007; Taveras, Gillman, Kleinman Rich-Edwards, & Rifas-Shiman, 2010). Evidence has shown childhood obesity tracks

into adulthood (Nader et al. 2006), placing overweight and obese children at risk for long-term co-morbidities, such as cardiovascular disease, diabetes, psychosocial problems, and premature death (Franks, et al, 2010). Studies have reported that overweight and obese Hispanic children have one of the highest risks for developing Type 2 diabetes (Dabelea, et al., 2007; Goran, Lane, Toledo-Corral, & Weigensberg, 2008).

There are now national directives for studies to identify effective childhood obesity interventions to mitigate this major public health problem, especially among high-risk groups (Daniels, Jacobson, McCrindle, Eckel, & Sanner, 2009; National Heart Lung and Blood Institute, 2007). To help safeguard against developing overweight or obesity, early childhood is an opportune time to teach and instill healthy lifestyle behaviors while children are still young.

In response to these national directives, this study was a retrospective data based analysis of a subset of data from a larger childhood obesity intervention study to determine: 1) pre- to post- program differences in the outcome variables, and 2) significant covariates for predicting change in the outcome variables. Findings may contribute preliminary evidence for identifying an effective childhood obesity intervention program for low-income Hispanic preschool children and their mothers.

### **Background and Significance**

Currently, there is a paucity of intervention studies focusing on preschool children (Bluford, Sherry, & Scanlon, 2007; Procter, 2007). Obesity interventions targeting low-income ethnic minority preschool children are nascent and limited (Olstad & McCargar, 2009; Wilson, 2009), with few culturally or contextually adapted studies, especially for

Hispanic children and their families (Branner, Koyama, & Jensen, 2008; Elder, Ayala, Slymen, Arredondo, & Campbell, 2009).

Although the Child and Adolescent Trial for Cardiovascular Health study (Nader et al., 1999) and the Golan study (2004) demonstrated sustained healthy nutrition behavior changes over time, other more recent childhood obesity intervention studies showed limited or inconsistent healthy behaviors changes (Connelly, Duaso, & Butler, 2007; Small, Anderson, & Melnyk, 2007; Wilfley et al., 2007). To mitigate major public health problems secondary to obesity, there is an urgent need for effective obesity interventions targeting high-risk preschool children, while their lifestyle behaviors are still developing (Kimbro, Brooks-Gunn, & McLanahan, 2007; Lutfiyya et al., 2008).

### **Culture and Socioeconomic Factors**

Modern-day life can exacerbate the risks for obesity for many reasons, including: socio-economic status, cultural practices, parental influence, the home environment, increased consumption of high carbohydrate beverages (HCB), and reduced levels of physical activity (Taveras et al., 2010). Hispanic cultures, and their perspectives on obesity, present unique challenges and require correspondingly innovative solutions to deal with these risk factors (Elder, Ayala, Parra-Medina et al., 2009). For example, some Hispanic families harbor cultural beliefs and habits promoting obesity, such as perceiving plump children as healthier than thinner children (Johnson, Clark, Goree, O'Connor, & Zimmer, 2008; Sussner, Lindsay, Greaney, & Peterson, 2008). Many low-income families also face multiple environmental risk factors for obesity, such as food insecurities limiting access to healthy foods and substandard built environments discouraging physical activity (Merchant, Dehghan, Behnke-Cook, & Anand, 2007;

Powell, Slater, Mirtcheva, Bao, & Chaloupka, 2007; Singh et al., 2010; Zhu & Lee, 2008).

### **Culturally Adapted Interventions**

For interventions to be effective, they should be culturally appropriate and relevant for the ethnic group (“The Surgeon General’s Vision for a Healthy and Fit Nation,” 2010). The Institute of Medicine (IOM) (2007) and the National Heart Lung and Blood Institute (National Heart Lung and Blood Institute, 2007) have recommended a community engaged approach when designing childhood obesity intervention programs. For instance, studies reported the effectiveness of utilizing qualified, trained Promotora Health/Educators (PHE) from the local communities to promote healthy behavior changes among Hispanic groups (Balcazar, Alvarado, Cantu, Pedregon, & Fulwood, 2009; Deitrick et al., 2010; Elder, Ayala, Slymen et al., 2009). Intervention programs are more likely to succeed if they take into account unique cultural values, beliefs, and lifestyles regarding nutrition and physical activities of the at-risk group (Elder, Ayala, Parra-Medina et al., 2009; Hurst & Nader, 2006).

### **Parental Influence**

Of the many determinates for healthy behaviors, parents are one of the most important. They play a crucial role in influencing their children’s lifelong health behaviors, preventing obesity risks through: role modeling, discipline/control styles, attitudes, and feedback, (Nader & Zive, 2010; Sutherland et al., 2008). The home environment plays a major role in determining children’s lifestyle behaviors, and parents are pivotal in reducing their family’s obesogenic (obesity promoting) environment (Procter, 2007).

Study results are somewhat equivocal, but a preponderance of evidence indicates parental influence on children's healthy behaviors is significant. A review of 34 studies by Gustafson and Rhodes (2006) reported mixed results in the association between parental influence and children's physical activities. In contrast, a recent longitudinal intervention study by Ornelas, Perreira, and Ayala (2007) reported a positive relationship between parental influence and moderate to vigorous physical activity in adolescents, suggesting children's physical activity improves with parental involvement and support. Other studies also reported significant correlations between the parental attitudes and children's eating behaviors, such as amount of food intake, eating motivations, and body image (Scaglioni, Salvioni, & Galimberti, 2008). A few promising studies reported family/parent-based interventions to be effective in producing sustained healthy behavior changes (Bluford et al., 2007). In the Golan, Kaufman and Shahar (2006) study of 32 families with school age children, the parent-only intervention group had a greater influence on children's eating behaviors resulting in children's weight loss, compared to the combined parent and child intervention group. A seven-year follow-up evaluation reported sustained healthy behaviors and weight loss.

Ample evidence exists that parents can positively influence their children's health behaviors (Clark, Goyder, Bissell, Blank, & Peters, 2007; Mattocks et al., 2008). Despite this evidence, intervention studies focusing exclusively on parents are still lagging. More studies are needed to better understand how parents affect their children's behaviors (Bluford et al., 2007; Hinkley, Crawford, Salmon, Okely, & Hesketh, 2008).



## **Obesity Promoting Behaviors**

The American Heart Association (2010) and Rodearmel et al. (2007) suggested obesity interventions focus on simple, achievable behavior changes, in contrast to focusing on multiple, complex behavior changes that are often more difficult to implement and sustain. Of the many multi-factorial predictors of childhood obesity are two potentially modifiable behavior trends contributing to obesity in United States. In the last twenty years, children have increased their HCB consumption (Babey, Jones, Yu, & Goldstein, 2009; Wang, Ludwig, Sonnevile, & Gortmaker, 2009) and increased sedentary lifestyles (Brown et al., 2009; Nader, Bradley, Houts, McRitchie, & O'Brien, 2008). Lower HCB consumption has been linked to decreased risks for overweight (Ebbeling et al., 2006; Rodearmel et al., 2007). Similarly, increased physical activity in children has been linked to lower risk for obesity related cardiovascular disease (Fogelholm, 2008).

**Increased consumption of high carbohydrate beverages.** The impact of HCB consumption (e.g., 100 % fruit juice, soda, and sugar sweetened beverages) on obesity is somewhat controversial. Lorson, Melgar-Quinoz and Taylor's descriptive study (2009) of a U.S. representative sample of 6,513 children and adolescents (2- to 18- years) reported the leading source of fruit consumed by children was 100% fruit juice. Children, age 2- to 5- years, drank significantly more juice (> 40%) than 6- to-11- year old and 12- to 18- year-old children. No significant correlation, however, was found between fruit juice intake and weight. O'Connor, Yang and Nicklas (2006) studied a nationally representative sample of 2-to 5- year-old preschool children prior to their adiposity rebound and found a significant increase in total energy intake (calories) in children who

consumed HCB, but also found no significant difference in their HCB intake and body mass index (BMI). Future longitudinal studies are recommended to follow preschool (2- to 5- year-old) children through their adiposity rebound in order to accurately assess the relationship between HCB consumption and weight gain.

BMI is used as a reliable indicator of adiposity and calculated as weight (kg) / height (m<sup>2</sup>) (Center for Disease Control and Prevention, 2009b). For children, BMI reported in percentiles is age and gender dependent, based on the current accepted standard 2000 Center for Disease Control (CDC) BMI-for age and gender growth charts (2- to 20 years of age), developed to account for children's developmental height and weight growth patterns (Barlow, 2007; Dietz & Bellizzi, 1999; Mei et al., 2002).

As children grow and develop, body fatness or BMI typically declines to a nadir around 5-years of age. Adiposity rebound is a subsequent period (from 5- to 6-years of age) in childhood development when BMI begins to increase. Early adiposity rebound (prior to 5- to 6-years) is a predictor of higher risk for obesity (Rolland-Cachera et al., 1984).

In contrast to the previously referenced HCB studies, a systematic review (Malik, Schulze, & Hu, 2006) and a meta-analysis review (Vartanian, Schwartz, & Brownell, 2007) both concluded there was a positive relationship between increased intake of HCB and weight gain in children. Recent studies also confirmed an association between HCB consumption and increased weight (Collison et al., 2010; Lim et al., 2009; Nelson, Neumark-Sztainer, Hannan, & Story, 2009; Wang et al., 2009). Similarly, studies of Mexican American preschool children found a significant correlation between increased

HCB consumption (fruit juice and soda) and overweight (Melgar-Quinonez & Kaiser, 2004; Warner, Harley, Bradman, Vargas, & Eskenazi, 2006).

Another study of a national representative sample of U.S. preschool children found 83% of the children drank milk (O'Connor et al., 2006). Of these children, 46% drank whole milk, while only 8.6% of the children drank the recommended skim or 1% low-fat milk. The preschool children drank an average of 12.32 oz. of milk per day, more than the recommended 8 oz. per day (Gidding et al., 2006).

In summary, children are consuming excess calories in the form of sugar and fat. The CDC (2010a) recommends children consume more water and skim milk or 1% low fat milk, in place of HCB and high fat milk. This would help reduce children's excess energy intake and decrease their risk for obesity.

**Increased sedentary lifestyle.** Evidence has also been mixed regarding the relationship between physical activity and obesity. Among 4- to 19-year -old Hispanic children, one study reported a decline in physical activity with age and increased sedentary lifestyles among overweight children versus non-overweight children (Butte, Puyau, Adolph, Vohra, & Zakeri, 2007). In contrast, some studies reported no association between physical activity levels or increased caloric intake with increased weight gain in adults and children (Pahkala et al., 2008). In their systematic review of studies examining the relationship between physical activity and weight, Summerbell and colleagues (2009) postulated that the inconsistent results might be due to the design, methodological limitations, confounding variables, and biased interpretations of the outcomes. Nevertheless, physical activity is positively related to overall health and decreased risk for obesity related co-morbidities (Fogelholm, 2008).

## **Background Of The Larger Intervention Study – Vida Saludable**

### **Purpose and Objectives**

This retrospective data analysis study was based on data previously generated from a larger obesity intervention study – Vida Saludable. The purpose of the Vida Saludable study was to test the feasibility of a culturally appropriate obesity intervention program incorporating a promotora model for low-income Hispanic preschool children and their mothers. The intervention focused on mothers as the primary change agent influencing healthy behaviors in their children. The primary objectives were to decrease the consumption of HCB in the children and increase the mother’s walking to role model physical activity.

### **Vida Saludable Intervention Program**

This larger study was a dynamic, 9-month, obesity intervention program designed to be culturally and contextually relevant for low-income, Hispanic mothers and their preschool children. The intervention utilized a community engagement approach and a promotora model. The program had two distinct, sequential segments. First, all participants attended four interactive group lessons over two months followed by six monthly community group activities culminating with a final review lesson. Mothers were asked to walk daily for at least 30 minutes and given pedometers with instructions to measure their walking steps.

### **Sample**

A purposive sample of 44, low-income, Hispanic mothers with preschool children was recruited from a southern California community health center. Inclusion criteria: low-income Hispanic mothers (18 – to 35- years) with preschool children (3- to 5- years),

regardless of BMI. Exclusion criteria: (a) children who were unable to walk, swallow, and drink, or on special diet plans; and (b) mothers who were unable to walk with their children. Sample size was budget constrained, limited to one PHE for 44 mother/child dyads. A final sample of 33 mother/child dyads completed the program. Reasons for non-participation was due to work commitments.

### **Setting**

This study was conducted at a southern California urban community health center serving over 60,000 adults and children, of whom over 60% were low-income Hispanics. Health promotion programs using a promotora model were also provided, and well attended by the Hispanic community.

### **Program Implementation**

Research investigators trained the PHE to facilitate the intervention program, conduct study surveys, and collect data. A research investigator supervised the intervention program.

In the program's first phase, the interactive group lessons were conducted in Spanish (per participants' request) and focused on raising strong healthy children, encouraging mothers to offer their children more water and 1% low-fat milk in place of HCB. Mothers were also encouraged to role model daily walking for their children to promote physical activities. During the program, mothers could schedule extra visits with the PHE for non-program health and social services. The program's second phase had six monthly community group activities including field trips to local grocery stores, fast food restaurants, parks, and trial walks. Phone follow-ups were also conducted by the PHE for

support and reinforcement of desired health behaviors. Following the community group activities, a final review lesson was conducted to further reinforce the healthy behaviors.

The PHE facilitated the program surveys at pre- (baseline), mid- (post lessons), and post- program (9 months) and recorded pedometer steps for Tuesday and Saturday at: baseline, 1 month, 4 months, and 9 months (post-program). Details on the survey instruments are found in Chapter 3.

### **Theoretical Perspective**

An integrated conceptual framework for this retrospective data analysis study was based on: 1) The theory of reasoned action and planned behavior (Ajzen, 1985; I. Ajzen, Fishbein, M, 1980; Fishbein, 1975), and 2) the social cognitive learning theory (SLT) (Bandura, 1989, 2005). The conceptual framework helped to guide this study (see Figure 1).

#### **Theory of Reasoned Action and Planned Behaviors**

The theory of reasoned action and planned behavior postulates a person's predictive behavior is motivated by their intention to perform the behavior. Intention is based on several constructs, such as a person's attitudes and control beliefs/self-efficacy. Attitude is an individual's beliefs and knowledge regarding a particular behavior(s). Control Beliefs/Self-Efficacy is an individual's perception of their ability to successfully perform a particular behavior(s).

Two internal constructs from the theory of reasoned action and planned behavior were included in the conceptual framework: 1) Attitude – involving personal beliefs and knowledge regarding children's consumption of HCB and mother's walking; and 2)

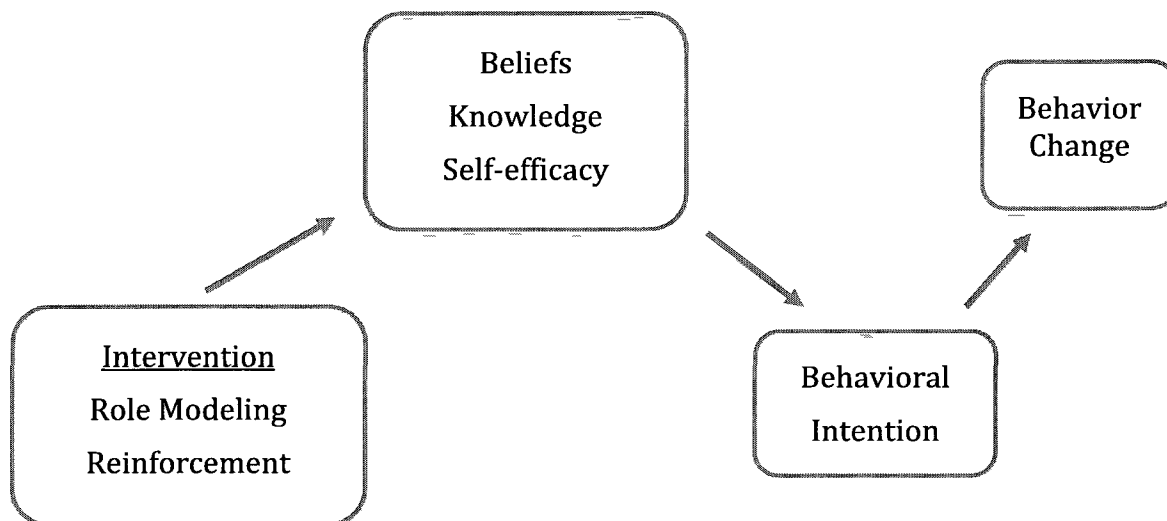
Control Beliefs/Self-efficacy - individual's perception of their ability to role model healthy behaviors.

### **Social Cognitive Learning Theory**

The SLT postulates learning occurs in a social context by observing behaviors of significant role models. The observed behaviors are reproduced and influenced through reinforcement and feedback (negative or positive) from the social environment, and self-efficacy (Bandura, 1997; National Institutes of Health, 2005).

Several SCL constructs were included in the conceptual framework: 1) Role modeling - presenting desired behaviors for observation and reproduction by the intended subject. In the original study, desired behaviors were presented via a top down stepwise sequence, whereby study investigators taught and role modeled target behaviors for the PHE who, in turn, taught and role modeled these behaviors for the mothers who, in turn, taught and role modeled the healthy behaviors for their children; 2) Reinforcement - encouragement and support from the social environment to reproduce the desired behaviors. Reinforcement was provided via interactive group lessons and activities; and through relationships built between the mothers, and the mothers and the PHE; and 3) Self-efficacy – belief in one's ability to perform a given behavior successfully. Interactive group activities and practice at home reinforced individual's beliefs in their abilities to successfully reproduce the behaviors.

**Figure 1.**  
**Reasoned Action and Planned Behavior + Social Cognitive Learning**



### **Implications for Nursing Practice**

A wide variety of roles are available enabling nurses to become proactively involved in helping reduce risks for childhood obesity, especially among high-risk groups. Areas of public health interventions where nurses can be particularly effective include clinical practice, cultural and contextual relevant patient care, program management, advocacy, and research (Barlow, 2007; "NAPNAP position statement on the identification and prevention of overweight and obesity in the pediatric population," 2009; U.S. Department of Health and Human Services, 2010).

First and foremost, to be effective in combating obesity in our multicultural society, nurses must become culturally familiar and competent with respect to the ethnic groups served. Cultural competence involves understanding the health related socio/cultural beliefs and values practiced by the patient, as well as awareness of significant barriers to patient's health, such as environment, economics, language and



literacy. As culturally sensitive practitioners, nurses can improve intervention effectiveness and patient compliance by helping to tailor health care and education to be culturally and contextually relevant for the patient.

As primary care givers, while following standardized guidelines to assess and identify children at risk for obesity and overweight (Barlow, 2007), nurses can be involved in developing care plans, and providing appropriate treatments and referrals. Nurses can further insure patients receive culturally appropriate counseling and educational materials, and encourage parents to role model healthy behaviors for their children. As administrators, experts, and program managers, nurses can also help design intervention programs incorporating effective evidence based strategies to reduce risks for childhood obesity.

In collaboration with organizations on multiple levels (schools, health and community groups, businesses, to state and federal government), nurses can advocate for public health policies (U.S. Department of Health and Human Services, 2010). Advocacy includes: 1) promoting access to healthy foods in low-income communities; 2) limiting advertisements promoting high-fat, sugar, and empty calorie-rich foods directed at children (Veerman, Van Beeck, Barendregt, & Mackenbach, 2009); 3) creating safe parks, recreation centers, and play areas (Brown et al., 2009; Sallis & Glanz, 2006); and 4) lobbying for access to quality health care (Giger et al., 2007; US Department of Health and Human Services: Agency for Healthcare Research and Quality, 2007).

Finally, as members of multidisciplinary research teams, nurse scientists have opportunities to help: 1) identify and design effective research strategies, 2) conduct and participate in research projects, and 3) disseminate research findings not only to other

researchers and the health care community, but also to the stakeholders and the public ((U.S. Department of Health and Human Services, 2010).

### **Summary**

Obesity is especially prevalent in low-income, Hispanic preschool children, subjecting them to higher risks for obesity related co-morbidities, such as Type 2 diabetes and cardiovascular disease. Children's lifestyle habits can be influenced while they are young and still developing by modifying obesity promoting behaviors, such as high carbohydrate beverage consumption and sedentary lifestyles. This could play an important role in preventing early onset of obesity.

Due to the complex interaction of multiple environmental, socio-economic, genetic, ethnic, and various demographic factors, obesogenic (obesity promoting) causes are difficult to assess, reverse, or prevent. There are few effective obesity intervention strategies targeting low-income ethnic minority preschool children addressing both the culture and context. The risks of developing obesity related co-morbidities early in life, along with the rapidly escalating health care costs, creates an urgent demand for innovative studies to identify effective obesity interventions, especially for low-income, Hispanic preschool children.

This retrospective data based study analyzed a subset of data from a larger obesity intervention study. The objectives were to determine: 1) pre- to post- program differences in the children's consumption of HCB and healthy beverages; maternal walking, attitude, self-efficacy, and relationship building regarding nutrition and physical activities, and 2) which covariates were significant predictors of change for the outcome variables.

Findings from this study may contribute preliminary evidence to identify effective strategies for reducing childhood obesity. Overall, the study's findings will add to the limited body of knowledge about obesity interventions for high-risk preschool and ethnic minority children. Findings may also lend support for a larger, randomized controlled trial to further test the feasibility of the Vida Saludable intervention program.

## CHAPTER 2 - LITERATURE REVIEW

### **Background**

Obesity rates in the United States have risen to epidemic proportions, especially in very young children. Approximately one-fourth of all toddler and pre-school children in the United States are overweight or obese (Ogden et al., 2008). Low-income ethnic minority preschool children (2 – 4 year olds) are disproportionately affected by high rates of obesity (Center for Disease Control and Prevention, 2010b; Wang & Beydoun, 2007). One nationally representative study (Anderson & Whitaker, 2009) of 8,550 four- year-olds found increased rates of obesity among racial/ethnic groups. Alaskan Indian/Native American preschool children (31.2%) are at highest risk for obesity, followed by Hispanics (22%) and non-Hispanic blacks (20.8%), compared to non-Hispanic whites (15.9%) and Asian (12.8%) children.

Childhood obesity can track into adulthood. In a longitudinal study of 1,042 children in the United States, Nader and colleagues (2006) reported overweight preschool children were five times more likely to be overweight by 12 years old than non-overweight children. Another study found overweight adolescents were likely to become overweight or obese adults (Guo et al., 2000). This places overweight and obese children

at risk for long-term chronic illnesses. A retrospective study examining the Muscatine Longitudinal Study Adult Cohort found high body mass index in childhood was the strongest predictor for adult metabolic syndrome in the study population (Burns, Letuchy, Paulos, & Witt, 2009). Body Mass Index (BMI), a number calculated from a person's weight and height, is a reliable indicator of body fatness for most people (Center for Disease Control and Prevention, 2009a). Other studies suggest children who are obese or overweight are in jeopardy of developing early onset obesity related co-morbidities, such as Type 2 Diabetes and cardiovascular diseases, leading to premature death (Bao, Srinivasan, Wattigney, & Berenson, 1994; Franks et al., 2010; Goran et al., 2008).

Obesity related co-morbidities account for a majority of pediatric obesity related health care costs. Trasande and associates (2009) evaluated a nationally representative sample of children's obesity-associated hospitalizations, charges, and costs from 1999-2005. Obesity related hospitalizations for children nearly doubled, with Medicaid responsible for a majority of the costs (\$237.6 million) (Finkelstein, Ruhm, & Kosa, 2005). In response to growing obesity related public health concerns, the U.S. Surgeon General (2010) and the Institute of Medicine (IOM) (2007) announced research directives to identify effective interventions aimed at reducing obesity prevalence, especially among high-risk low-income ethnic minority children.

The basic mechanism for developing obesity is the imbalance between excess dietary energy intake and inadequate energy expenditure. Among other dietary factors, children's increased consumption of high carbohydrate beverages (HCB) in the past 20 years has contributed to excess energy intake (e.g., fruit drinks, 100% juices and sodas) (Ariza, Chen, Binns, & Christoffel, 2004; Wang, Bleich, & Gortmaker, 2008; Warner et

al., 2006). Multiple systematic reviews reported excess calorie consumption from HCB rose in tandem with obesity rates (Malik et al., 2006; Pereira, Bagatin, & Zanoni, 2006; Vartanian et al., 2007), suggesting there might be an association between HCB and obesity. In a 24-hour dietary recall analysis of two nationally representative population survey studies of children (2-19 years), Wang and associates (2008) found fruit drinks contributed to a majority of HCB calories among 2- to 5- years-olds. One concern was HCB consumption had replaced milk consumption, reducing important nutrients needed for growth and development (Marshall, Eichenberger Gilmore, Broffitt, Stumbo, & Levy, 2005). Based on their cross-sectional study, Wang and associate (2009) proposed substituting water in place of HCB could reduce excess calorie intake, improve nutrition, and mitigate obesity.

Physical activity is another important obesity preventive measure. In the past several decades, increasing sedentary lifestyles have contributed to obesity among preschool children (Taylor et al., 2009), especially among low-income ethnic minority children (Butte et al., 2007; Dugas et al., 2008; Singh, Kogan, Siahpush, and van Dyck, 2008). Some suggest physical inactivity and sedentary lifestyles may begin at preschool ages within the home environment (Anderson, Economos, and Must, 2008), or outside the home in the preschool setting (Brown et al., 2009). A combination of excess energy intake from HCB and an increasing sedentary lifestyle may explain the increasing prevalence of overweight among young children.

Teaching young children healthy behaviors, such as decreased HCB consumption and increased physical activity, may help reduce the risk for obesity later in life. Parents play a crucial role in influencing their children's lifelong health attitudes and behaviors

through role modeling, feedback, encouragement, and discipline/control styles (Klohe-Lehman et al., 2007). Early home environments may be important in establishing a foundation to reinforce the beliefs, knowledge, and behaviors needed to maintain healthy weights later in life. One study reported children do incorporate, learn, and copy their parent's choices of healthy or unhealthy foods and beverages (Sutherland et al., 2008). A 12-year longitudinal study of 560 children (Pahkala et al., 2008) concluded young children, whose parents actively promoted physical activity, maintained healthy weights, and continued to be physically active adolescents. Parents can have a positive influence on healthy behaviors in their children while their children's lifestyle behaviors are still developing.

Currently, there is a paucity of obesity intervention studies focusing on preschool children (Bluford et al., 2007; Procter, 2007). Interventions targeting vulnerable, low-income ethnic minorities for early childhood obesity prevention are nascent and limited (Olstad & McCargar, 2009; Wilson, 2009). The National Heart Blood and Lung Institute (2007) posits simple, achievable behavior changes may be more effective than multiple comprehensive behavior changes that can be more difficult to sustain. For example, incremental interventions aimed at decreasing HCB and increasing physical activity may be effective in improving young children's healthy behaviors. Another effective strategy is to focus on parents as the primary change agent to influence healthy behaviors in young children (Golan, Kaufman, & Shahar, 2006). To help rectify the research gap, intervention studies incorporating the above strategies directed at low-income Hispanic preschool children may be effective in helping reduce the prevalence of obesity in this high-risk population.

### **Literature Review Matrix Table**

A list of current and seminal research studies related to childhood obesity was cataloged in a matrix table (see Appendix A).



## CHAPTER 3 – METHODOLOGY

### Design

This study was a retrospective data analysis of a subset of data from a larger obesity intervention study using a pre- and post- program single group design.

### Research Aims

**Aim 1:** To determine pre- to post- program differences in the dependent variables.

**Aim 2:** To determine which covariates were significant predictors for change in the dependent variables.

### Operational Definitions

- Consumption of high carbohydrate beverages (HCB) – daily amount of a naturally or artificially sugar sweetened HCB (e.g., soda, 100% fruit juice, sugar sweetened drinks) orally ingested.
- Healthy drinks – water and 1% low fat milk.
- Walking – to move over a surface by placing one foot in front of the other at a pace slower than a run.
- Attitude – a person's beliefs and knowledge about a particular health behavior.

- Control Belief/ Self-efficacy - person's perception of their ability to successfully perform a given behavior.
- Role Modeling - displaying desired behaviors for observation and reproduction by an intended subject.
- Maternal relationship building – the mother's ability to make connections with other mothers in the study and with the promotora/ health educator (PHE).

### **Cases**

Data from 33 participant cases were obtained from the larger intervention study's (Vida Saludable) secured database. Cases consisted of a purposive sample of low-income Hispanic mothers (18- to 35- years- old) and their preschool children (3-to 5- years- old) recruited from a southern California community health center.

### **Data Access**

Case data was accessed from the Vida Saludable database with prior permission from the principle investigator (see Appendix B). Data was retrieved from the secured database storage.

### **Ethics / Protection of Human Subjects**

University of San Diego, IRB approval was obtained prior to analyzing the data (see Appendix C). Because this proposed study was only a data analysis study, there was no contact with human subjects. All human subjects contact was completed during the Vida Saludable study completed December 1, 2010.

### **Vida Saludable Intervention and Data Base**

The Vida Saludable intervention was a 9-month, family-based program facilitated by a PHE. The study focused on the mother as the primary change agent to influence healthy behaviors in their preschool children through role modeling, encouragement, and support. The two-part interactive intervention program consisted of four bi-weekly lessons followed by six-monthly group activities.

Forty-four, mother/child dyads were recruited from a southern California community health center, yielding a final sample of 33 participants. Sample size was budget constrained, allowing for one PHE to oversee 44 mother-child dyads. Work commitments was the primary reason for drop-out. The mother/child dyads participated in four group lessons over two months emphasizing: (a) mothers offering health drinks (water and 1% low-fat milk) to children and ways to decrease HCB consumption in their children; and (b) maternal walking to role model and encourage their children to participate in physical activities. Following the lessons, the participants attended six-monthly community group field trips (e.g., to local grocery stores and parks) to emphasize, demonstrate, and practice the healthy behaviors learned in the lessons.

Mothers were given pedometers to count walking steps and asked to walk at least 30 minutes a day. Pedometer steps were recorded at baseline, one month, four months, and post- program (9 months).

Three customized program surveys were conducted at: pre- program (baseline), mid- program (post-lessons), and post- program (9 months). These surveys collected data on the mother's and child's health behaviors, maternal attitudes (beliefs and knowledge),

control belief/self-efficacy, and relationship building regarding healthy nutrition and physical activity. Surveys and program materials were provided in Spanish and English.

The surveys were facilitated by the PHE. To accommodate all literacy levels, each question was projected on an overhead power point screen, read aloud in Spanish, with individual assistance provided for those who could not read.

### **Vida Saludable Study Instruments**

**Survey instruments.** Four research investigators (with expertise in childhood obesity and ethnically diverse populations) along with stakeholders (promotores, health promotion program coordinators, and health care providers) reviewed historically valid and reliable instruments used in many similar research projects: “WE CAN!” Ways to Enhance Children’s Activity & Nutrition Survey (National Heart Lung and Blood Institute 2007), the Block Kids Food Questionnaire (Cullen, Watson, & Zakeri, 2008), and the Hutchinson Food Frequency Questionnaire (Fred Hutchinson Cancer Research Center, 2009). These particular instruments either focused on school aged or adolescent children, or were not culturally and contextually suitable for the study population. Using a community engagement approach, the investigators, therefore developed three survey instruments adapted and tailored to the participants’ culture, context, dominant language, and literacy levels. The PHE, program coordinators, clinic medical director, and culturally sensitive staff helped guide the development of the measurement instruments: 1) The Health Behavior Survey, 2) The Program Evaluation Questionnaire, and 3) The Promotora /Health Educator Survey. The instrument’s measures were based on the study’s conceptual framework regarding attitudes (beliefs and knowledge), control

beliefs/self-efficacy, and relationship building about health behaviors related to nutrition and walking.

***The Health Behaviors Survey (HBS).*** The 19-item questionnaire determined the child's consumption of milk, water, soda, 100% fruit juice, and sugar sweetened drinks; and the amount of walking by the mother.

***The Program Evaluation Questionnaire (PEQ).*** The PEQ was developed to determine maternal attitudes (beliefs and knowledge), self-efficacy, social support and reinforcement for children's consumption of healthy drinks and decreased consumption of HCB; and maternal walking. This 17-item questionnaire used a 5-point response scale with options ranging from strongly agree to strongly disagree.

***Promotora / Health Educator Survey (PHES).*** The PHES was developed to determine maternal relationship building (the mother's ability to build relationships with other mothers in the study and with the PHE). This two-item PHE self-administered survey used a 5-point response scale with options ranging from strongly agree to strongly disagree.

**Pedometers.** Each mother received a HJ-113 pedometer (OMRON Healthcare, 2007) with instructions, to wear while walking. Pedometer steps were recorded at: pre-program (baseline), one month, four months, and post- program (nine months).

### **Demographic Data**

Demographic data was collected during enrollment and from participants' medical charts. Socio-demographics included: age, gender, education, socioeconomic status, and health insurance, total numbers of adults and children living at home and the number of biological children living at home. Additional demographic data included: marital status,

number of pregnancies (gravida), number of live births, primary language spoken, literacy, years lived in the United States, and the numbers of non-program visits with the PHE.

### **Translation of Program Materials and Pilot Test**

The program materials (e.g., consent forms and handouts), curriculum, and measurement instruments were translated from English to Spanish per standard guidelines (Eremenco, Cella, & Arnold, 2005). To assess preliminary validity of the measurement instruments, a pilot test was conducted to obtain feedback regarding the concepts and constructs using a homogenous population. Based on the pilot-test feedback, cultural adaptations were made to the instruments.

### **Data Analysis**

The Statistical Package for the Social Sciences (SPSS), version 18.0 was employed for statistical analysis (“Statistical Package for the Social Sciences,” 2009).

### **Variables**

- Independent variable: 9-month Vida Saludable Intervention Program
- Co-variables: (a) gravida (number of pregnancies), (b) number of adults living in home, and (c) numbers maternal visits with the PHE.
- Dependent variables: (a) children’s consumption of HCB and healthy drinks, (b) maternal walking, (c) maternal attitudes (beliefs and knowledge), control belief/self-efficacy, and relationship building.

### **Aims 1**

To determine pre- to post- program differences in the dependent variables

**Descriptive statistics.**

Preliminary descriptive statistics were used to analyze the data: mean, median, mode, and standard deviation. Histograms were used to visually examine the distribution for normality and outliers. Scatter plots and line graphs were also used to examine linear relationships between paired variables.

**Pre- to post- program differences.**

- (a) Matched pairs *t*-test was used for two related groups for continuous normally distributed variables.
- (b) Wilcoxon signed-ranks test was used to measure the rank differences in the matched pairs for non-parametric variables.
- (c) A chi-square test was used to measure the differences for categorical variables.

**Aim 2**

To determine which covariates were significant predictors of change the dependent variables.

**Multiple regressions analysis.**

A backward step-wise, multiple linear regression analysis was performed for continuous variables to determine significant correlations of more than one co-variable on a dependent variable while controlling for the other co-variables. The following procedures were done prior to applying a multiple linear regression analysis assuring assumptions for this test were met. Assumptions included: normal distribution of the variables, and significant linear correlations between variables.

Prior to running the multiple linear regression analysis, preliminary statistical analyses were conducted as follows:

- 1) Descriptive statistics, histograms, and scatter plot graphs were employed as previously described.
- 2) Bivariate correlations were used to determine the relationship between the variables, including:
  - (a) Pearson's correlation coefficient for normally distributed continuous variables
  - (b) Spearman's Correlation Coefficient for non-normally distributed continuous variables (ordinal or rank-ordered)
  - (c) Chi-square test for categorical variables.
- 3) Factor analysis was also performed to assess collinearity between the covariates.
- 4) If assumptions for regression analysis were met (normal distribution and significant linear correlation) a backward step-wise multiple linear regression analysis was run to determine if there were significant associations between the covariates and the dependent variables. The most parsimonious models were selected using a backward step-wise linear regression, starting with all candidate variables and testing them one by one for statistical significance within the model, and deleting those that were not significant.

The small sample size of 33 cases limited statistical power, allowing analysis of only three co-variables as possible predictors for change in the outcome variables. In addition, some co-variables were homogenous in the sample. Therefore, co-variables with adequate statistical variation were selected. Those



included: gravida, number of adults in the household and the number of maternal visits with the PHE.

- 5) Due to the small sample size, if the assumption were not met, no further statistical analysis were run.

### **Strengths and Limitations**

To overcome the lack of statistically reliable and valid tools for data collected during the Vida Saludable study, a rigorous multistep process was employed to build three customized survey instruments. Four research experts provided face validity for the survey instruments. The instrument measures were based on the study's clearly defined conceptual framework.

To further insure validity, cultural adaptation strategies employed standard guidelines for translating measurement instruments and program materials from English to Spanish (Eremenco, et al., 2005). This process provided preliminary validity to ensure measurement instruments and program materials were culturally equivalent to the original constructs and concepts of the instruments and program materials. A pilot test of the surveys from a homogeneous population provided feedback for further preliminary validity for the instruments. In tandem, these efforts provided credibility for the collected data and subsequent results.

Although the customized survey instruments met rigorous face validity criteria, they posed two internal threats to the study. First, the newly customized instruments did not undergo psychometric testing. Using such instruments may have introduced measurement errors. Employing a PHE to facilitate the intervention may have helped strengthen the internal validity of the program outcomes. To limit the introduction of

errors in the results, the PHE facilitated the surveys by reading each question out loud in Spanish, displaying individual questions on an overhead projection, and providing individual assistance for participants. These cultural adaptation strategies used to facilitate the curriculum and collect data served to limit study bias and measurement errors.

Another weakness threatening internal validity of the data may have been the dynamic adaptive nature of the Vida Saludable study design. Modification made to the measurement instruments from pre-test to post-test data collection may have introduced measurement error influencing the study results. Lack of reliability in the mother's self-reported surveys may also have introduced measurement bias in assessments of health behaviors, attitudes, and perceptions.

Recorded maternal pedometer steps provided objective data to corroborate the mother's self-reported walking steps. There was no guarantee, however, the recorded pedometer steps were only those of the mother, and not of other users. Inability to validate who used the pedometer may have introduced measurement error and a threat to internal validity.

The small sample size limited: sample power for statistical analysis, the type of statistical tests used, and the inability to generalize the results beyond the study population. Purposive sampling may also have led to possible selection bias, another threat to internal validity, and a potential source for measurement bias.

### **Summary**

This retrospective data based study was a pre- and post program single group design analyzing a subset of data from a larger obesity intervention study. The objectives

were to determine: 1) pre- and post- program differences in the outcome variables; and 2) which covariates were significant predictors of change in the outcome variables.

Prior to analysis, IRB approval was obtained from the University of San Diego. Retrospective data from 33 cases obtained from the larger Vida Saludable study were analyzed with permission from Vida Saludable PI. Case data were derived from: (a) three survey instruments used to measure outcomes of the dependent variables at baseline and 9-months (post-program), (b) recorded maternal pedometer steps, and (c) the participants' socio-demographic information.

Statistical analysis included preliminary descriptive statistics. For Aim 1, paired t-tests and chi-squared tests were used to determine the pre- and post- program differences in the outcome variables. For Aim 2, to determine which covariates were significant predictors for change in the dependent variables, descriptive statistics and bivariate correlations were first performed to determine if the variables met the assumptions for a multiple linear regression analysis. If assumptions were met, a backward stepwise multiple linear regression analysis was performed. A factor analysis was also performed to determine collinearity between the covariates.

To overcome the study instruments lack of statistical validity and reliability, four expert researchers who developed the three customized study instruments, provided face validity. The instruments were also culturally adapted and translated into Spanish following standard translating guidelines, to ensure culturally equivalent measures to the original instruments. The instruments were subsequently pilot-tested with a homogenous sample population, providing preliminary validity for the instrument measures. To limit introduction of measurement errors, a PHE facilitated the intervention in Spanish.

Pedometer steps were also recorded by the PHE to corroborate maternal self-reports on walking.

There were several threats to the internal validity of this study. Survey instruments lacking psychometric testing may have introduced measurement error. The dynamic process of adapting the surveys during the study may have compromised pre- to post- program survey results. Additional weakness was attributed to the inability to insure that pedometers steps were exclusively those of the mother, introducing possible error in the recorded steps. The purposive sampling may have introduced selection bias. Finally, the small sample size also limited sample power, statistical tests, and the ability to generalize beyond the study population.

## REFERENCES

### Chapter 1 - 3

- Ajzen, I. (1985). From intentions to actions: A theory of planned behaviors. In I. J. K. J. Beckmann (Ed.), *Action control: From cognition to behavior*. Berlin, Heidelberg, New York: Springer-Verlag.
- Ajzen, I., Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ: Prentice-Hall.
- American Heart Association. (2010). Overweight Children. Retrieved from <http://www.americanheart.org/presenter.jhtml?identifier=4670>
- Anderson, S. E., Economos, C. D., & Must, A. (2008). Active play and screen time in US children aged 4 to 11 years in relation to sociodemographic and weight status characteristics: a nationally representative cross-sectional analysis. *BMC Public Health*, 8, 366. doi: 1471-2458-8-366 [pii]10.1186/1471-2458-8-366
- Anderson, S. E., & Whitaker, R. C. (2009). Prevalence of obesity among US preschool children in different racial and ethnic groups. *Arch Pediatr Adolesc Med*, 163(4), 344-348. doi: 163/4/344 [pii]10.1001/archpediatrics.2009.18
- Ariza, A. J., Chen, E. H., Binns, H. J., & Christoffel, K. K. (2004). Risk factors for overweight in five- to six-year-old Hispanic-American children: a pilot study. *J Urban Health*, 81, 150-161. doi: 10.1093/jurban/jth09
- Babey, S. H., Jones, M., Yu, H., & Goldstein, H. (2009). Bubbling over: soda consumption and its link to obesity in California. *Policy Brief UCLA Cent Health Policy Res*(PB2009-5), 1-8.

- Balcazar, H., Alvarado, M., Cantu, F., Pedregon, V., & Fulwood, R. (2009). A promotora de salud model for addressing cardiovascular disease risk factors in the US-Mexico border region. *Prev Chronic Dis*, 6, A02. doi: A02 [pii]
- Bandura, A. (1989). Social Cognitive Theory. *Annals of Child Development*, 6, 1-60.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.
- Bandura, A. (2005). The evolution of social cognitive theory. In K. J. Smith, Hitt, M.A. (Ed.), *Great Minds Management* (pp. 9-35). Oxford: Oxford University Press.
- Bao, W., Srinivasan, S. R., Wattigney, W. A., & Berenson, G. S. (1994). Persistence of multiple cardiovascular risk clustering related to syndrome X from childhood to young adulthood. The Bogalusa Heart Study. *Arch Intern Med*, 154, 1842-1847.
- Barlow, S. E. (2007). Expert committee recommendations regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity: summary report. *Pediatrics*, 120 Suppl 4, S164-192. doi: 120/Supplement\_4/S164 [pii]10.1542/peds.2007-2329C
- Bluford, D. A., Sherry, B., & Scanlon, K. S. (2007). Interventions to prevent or treat obesity in preschool children: a review of evaluated programs. *Obesity (Silver Spring)*, 15, 1356-1372. doi: 15/6/1356 [pii]10.1038/oby.2007.163
- Branner, C. M., Koyama, T., & Jensen, G. L. (2008). Racial and ethnic differences in pediatric obesity-prevention counseling: national prevalence of clinician practices. *Obesity (Silver Spring)*, 16, 690-694. doi: oby200778 [pii] 10.1038/oby.2007.78
- Brown, W. H., Pfeiffer, K. A., McIver, K. L., Dowda, M., Addy, C. L., & Pate, R. R. (2009). Social and environmental factors associated with preschoolers'

nonsedentary physical activity. *Child Dev*, 80, 45-58. doi: CDEV1245

[pii]10.1111/j.1467-8624.2008.01245.x

Burns, T. L., Letuchy, E. M., Paulos, R., & Witt, J. (2009). Childhood predictors of the metabolic syndrome in middle-aged adults: the Muscatine study. *J Pediatr*, 155,

S5 e17-26. doi: S0022-3476(09)00458-2 [pii]10.1016/j.jpeds.2009.04.044

Butte, N. F., Puyau, M. R., Adolph, A. L., Vohra, F. A., & Zakeri, I. (2007). Physical activity in nonoverweight and overweight Hispanic children and adolescents. *Med Sci Sports Exerc*, 39(8), 1257-1266. doi:

10.1249/mss.0b013e3180621fb600005768-200708000-00008 [pii]

Center for Disease Control and Prevention. (2009a). Body Mass Index. Retrieved from

<http://apps.nccd.cdc.gov/dnpabmi/>

Center for Disease Control and Prevention. (2009b). Healthy Weight, Body Mass Index:

About BMI for Adults. Retrieved from <http://apps.nccd.cdc.gov/dnpabmi/>

Center for Disease Control and Prevention. (2010a). The CDC Guide to Strategies for

Reducing the Consumption of Sugar-Sweetened Beverages. Retrieved from

[http://www.eatsmartmovemorenc.com/TheEvidence/Texts/StratstoReduce\\_Sugar\\_Sweetened\\_Bevs.pdf](http://www.eatsmartmovemorenc.com/TheEvidence/Texts/StratstoReduce_Sugar_Sweetened_Bevs.pdf)

Center for Disease Control and Prevention. (2010b). Obesity Prevalence among Low-

Income, Preschool-Aged children 1998 -2008. Retrieved from

<http://www.cdc.gov/obesity/childhood/lowincome.html>

Clark, H. R., Goyder, E., Bissell, P., Blank, L., & Peters, J. (2007). How do parents' child-feeding behaviours influence child weight? Implications for childhood

obesity policy. *J Public Health (Oxf)*, 29, 132-141. doi: fdm012

[pii]10.1093/pubmed/fdm012

Collison, K. S., Zaidi, M. Z., Subhani, S. N., Al-Rubeaan, K., Shoukri, M., & Al-Mohanna, F. A. (2010). Sugar-sweetened carbonated beverage consumption correlates with BMI, waist circumference, and poor dietary choices in school children. *BMC Public Health*, 10, 234. doi: 1471-2458-10-234 [pii]10.1186/1471-2458-10-234

Connelly, J. B., Duaso, M. J., & Butler, G. (2007). A systematic review of controlled trials of interventions to prevent childhood obesity and overweight: a realistic synthesis of the evidence. *Public Health*, 121, 510-517. doi: S0033-3506(07)00006-6 [pii]10.1016/j.puhe.2006.11.015

Cullen, K. W., Watson, K., & Zakeri, I. (2008). Relative reliability and validity of the Block Kids Questionnaire among youth aged 10 to 17 years. *J Am Diet Assoc*, 108, 862-866. doi: S0002-8223(08)00174-0 [pii]10.1016/j.jada.2008.02.015

Dabelea, D., Bell, R. A., D'Agostino, R. B., Jr., Imperatore, G., Johansen, J. M., Linder, B., ... Waitzfelder, B. (2007). Incidence of diabetes in youth in the United States. *JAMA*, 297, 2716-2724. doi: 297/24/2716 [pii]10.1001/jama.297.24.2716

Daniels, S. R., Jacobson, M. S., McCrindle, B. W., Eckel, R. H., & Sanner, B. M. (2009). American Heart Association Childhood Obesity Research Summit Report. *Circulation*, 119, e489-517. doi: CIRCULATIONAHA.109.192216 [pii]10.1161/CIRCULATIONAHA.109.192216

Deitrick, L. M., Paxton, H. D., Rivera, A., Gertner, E. J., Biery, N., Letcher, A. S., ... Salas-Lopez, D. (2010). Understanding the role of the promotora in a



- Hispanic diabetes education program. *Qual Health Res*, 20, 386-399. doi: 20/3/386 [pii]10.1177/1049732309354281
- Dietz, W. H., & Bellizzi, M. C. (1999). Introduction: the use of body mass index to assess obesity in children. *Am J Clin Nutr*, 70, 123S-125S.
- Dugas, L. R., Ebersole, K., Schoeller, D., Yanovski, J. A., Barquera, S., Rivera, J.,... Luke, A. (2008). Very low levels of energy expenditure among pre-adolescent Mexican-American girls. *Int J Pediatr Obes*, 3, 123-126. doi: 790122968 [pii]10.1080/17477160801902248
- Ebbeling, C. B., Feldman, H. A., Osganian, S. K., Chomitz, V. R., Ellenbogen, S. J., & Ludwig, D. S. (2006). Effects of decreasing sugar-sweetened beverage consumption on body weight in adolescents: a randomized, controlled pilot study. *Pediatrics*, 117, 673-680. doi: 117/3/673 [pii]10.1542/peds.2005-0983
- Elder, J. P., Ayala, G. X., Parra-Medina, D., & Talavera, G. A. (2009). Health communication in the Latino community: issues and approaches. *Annu Rev Public Health*, 30, 227-251. doi: 10.1146/annurev.publhealth.031308.100300
- Elder, J. P., Ayala, G. X., Slymen, D. J., Arredondo, E. M., & Campbell, N. R. (2009). Evaluating psychosocial and behavioral mechanisms of change in a tailored communication intervention. *Health Educ Behav*, 36, 366-380. doi: 1090198107308373 [pii]10.1177/1090198107308373
- Eremenco, S. L., Cella, D., & Arnold, B. J. (2005). A comprehensive method for the translation and cross-cultural validation of health status questionnaires. *Eval Health Prof*, 28, 212-232. doi: 28/2/212 [pii]10.1177/0163278705275342

- Finkelstein, E. A., Ruhm, C. J., & Kosa, K. M. (2005). Economic causes and consequences of obesity. *Annu Rev Public Health, 26*, 239-257. doi: 10.1146/annurev.publhealth.26.021304.144628
- Fishbein, M., Ajzen, I. (1975). *Belief, attitude, intention and behavior: An interoduction to theory and research*. Reading, MA: Addison-Wesley.
- Fogelholm, M. (2008). How physical activity can work? *Int J Pediatr Obes, 3 Suppl 1*, 10-14. doi: 790630690 [pii]10.1080/17477160801896481
- Franks, P. W., Hanson, R. L., Knowler, W. C., Sievers, M. L., Bennett, P. H., & Looker, H. C. (2010). Childhood obesity, other cardiovascular risk factors, and premature death. *N Engl J Med, 362*, 485-493. doi: 362/6/485 [pii]10.1056/NEJMoa0904130
- Fred Hutchinson Cancer Research Center. (2009). Food Frequency Questionnaires, from [http://www.fhrc.org/science/shared\\_resources/nutrition/ffq/index.html](http://www.fhrc.org/science/shared_resources/nutrition/ffq/index.html)
- Fry, R. (2008). *Latino Settlement in the New Century* (pp. 1-26). Washington D.C.: Pew Hispanic Center.
- Gidding, S. S., Dennison, B. A., Birch, L. L., Daniels, S. R., Gillman, M. W., Lichtenstein, A. H.,... Van Horn, L. (2006). Dietary recommendations for children and adolescents: a guide for practitioners. *Pediatrics, 117*, 544-559. doi: 117/2/544 [pii]10.1542/peds.2005-2374
- Giger, J., Davidhizar, R. E., Purnell, L., Harden, J. T., Phillips, J., & Strickland, O. (2007). American Academy of Nursing Expert Panel report: developing cultural competence to eliminate health disparities in ethnic minorities and other vulnerable populations. *J Transcult Nurs, 18*, 95-102. doi: 18/2/95 [pii]10.1177/1043659606298618

- Golan, M., & Crow, S. (2004). Targeting parents exclusively in the treatment of childhood obesity: long-term results. *Obes Res*, *12*, 357-361. doi: 10.1038/oby.2004.45
- Golan, M., Kaufman, V., & Shahar, D. R. (2006). Childhood obesity treatment: targeting parents exclusively v. parents and children. *Br J Nutr*, *95*, 1008-1015. doi: S0007114506001322 [pii]
- Goran, M. I., Lane, C., Toledo-Corral, C., & Weigensberg, M. J. (2008). Persistence of pre-diabetes in overweight and obese Hispanic children: association with progressive insulin resistance, poor beta-cell function, and increasing visceral fat. *Diabetes*, *57*, 3007-3012. doi: db08-0445 [pii]10.2337/db08-0445
- Guo, S. S., Huang, C., Maynard, L. M., Demerath, E., Towne, B., Chumlea, W. C.,... Suervogel, R. (2000). Body mass index during childhood, adolescence and young adulthood in relation to adult overweight and adiposity: the Fels Longitudinal Study. *Int J Obes Relat Metab Disord*, *24*, 1628-1635.
- Gustafson, S. L., & Rhodes, R. E. (2006). Parental correlates of physical activity in children and early adolescents. *Sports Med*, *36*, 79-97. doi: 3616 [pii]
- Hinkley, T., Crawford, D., Salmon, J., Okely, A. D., & Hesketh, K. (2008). Preschool children and physical activity: a review of correlates. *Am J Prev Med*, *34*, 435-441. doi: S0749-3797(08)00155-4 [pii]10.1016/j.amepre.2008.02.001
- Hurst, S., & Nader, P. (2006). Building community involvement in cross-cultural Indigenous health programs. *Int J Qual Health Care*, *18*, 294-298. doi: mzl013 [pii]10.1093/intqhc/mzl013

- Institutes of Medicine. (2007). *Progress In Prevention Childhood Obesity, How Do We Measure Up?* Washington, D.C.: The National Academies Press.
- Johnson, K. M., & Lichter, D. T. (2008). Natural Increase: A New Source of Population Growth in emerging Hispanic Destinations in the United States. *Population and Development Review*, 34, 327-346.
- Johnson, S., Clark, L., Goree, K., O'Connor, M., & Zimmer, L. M. (2008). Healthcare providers' perceptions of the factors contributing to infant obesity in a low-income Mexican American community. *J Spec Pediatr Nurs*, 13, 180-190. doi: JSPN152 [pii]10.1111/j.1744-6155.2008.00152.x
- Kimbrow, R. T., Brooks-Gunn, J., & McLanahan, S. (2007). Racial and ethnic differentials in overweight and obesity among 3-year-old children. *Am J Public Health*, 97, 298-305. doi: AJPB.2005.080812 [pii]10.2105/AJPB.2005.080812
- Klohe-Lehman, D. M., Freeland-Graves, J., Clarke, K. K., Cai, G., Voruganti, V. S., Milani, T. J.,... Bohman, T.M. (2007). Low-income, overweight and obese mothers as agents of change to improve food choices, fat habits, and physical activity in their 1-to-3-year-old children. *J Am Coll Nutr*, 26, 196-208. doi: 26/3/196 [pii]
- Lim, S., Zoellner, J. M., Lee, J. M., Burt, B. A., Sandretto, A. M., Sohn, W.,... Lepokowski, J.M. (2009). Obesity and sugar-sweetened beverages in African-American preschool children: a longitudinal study. *Obesity (Silver Spring)*, 17, 1262-1268. doi: oby2008656 [pii]10.1038/oby.2008.656

- Lorson, B. A., Melgar-Quinonez, H. R., & Taylor, C. A. (2009). Correlates of fruit and vegetable intakes in US children. *J Am Diet Assoc, 109*, 474-478. doi: S0002-8223(08)02185-[pii]10.1016/j.jada.2008.11.022
- Lutfiyya, M. N., Garcia, R., Dankwa, C. M., Young, T., & Lipsky, M. S. (2008). Overweight and obese prevalence rates in African American and Hispanic children: an analysis of data from the 2003-2004 National Survey of Children's Health. *J Am Board Fam Med, 21*, 191-199. doi: 21/3/191 [pii]10.3122/jabfm.2008.03.070207
- Malik, V. S., Schulze, M. B., & Hu, F. B. (2006). Intake of sugar-sweetened beverages and weight gain: a systematic review. *Am J Clin Nutr, 84*, 274-288. doi: 84/2/274 [pii]
- Marshall, T. A., Eichenberger Gilmore, J. M., Broffitt, B., Stumbo, P. J., & Levy, S. M. (2005). Diet quality in young children is influenced by beverage consumption. *J Am Coll Nutr, 24*, 65-75. doi: 24/1/65 [pii]
- Mattocks, C., Deere, K., Leary, S., Ness, A., Tilling, K., Blair, S. N.,...Riddoch, C. (2008). Early life determinants of physical activity in 11 to 12 year olds: cohort study. *Br J Sports Med, 42*, 721-724. doi: 42/9/721 [pii]
- Mei, Z., Grummer-Strawn, L. M., Pietrobelli, A., Goulding, A., Goran, M. I., & Dietz, W. H. (2002). Validity of body mass index compared with other body-composition screening indexes for the assessment of body fatness in children and adolescents. *Am J Clin Nutr, 75*, 978-985.
- Melgar-Quinonez, H. R., & Kaiser, L. L. (2004). Relationship of child-feeding practices to overweight in low-income Mexican-American preschool-aged children. *J Am*

*Diet Assoc, 104*, 1110-1119. doi: 10.1016/j.jada.2004.04.030S0002822304005759  
[pii]

Merchant, A. T., Dehghan, M., Behnke-Cook, D., & Anand, S. S., (2007). Diet, physical activity, and adiposity in children in poor and rich neighbourhoods: a cross-sectional comparison. *Nutr J, 6*, 1. doi: 1475-2891-6-1 [pii]10.1186/1475-2891-6-1

Nader, P. R., Bradley, R. H., Houts, R. M., McRitchie, S. L., & O'Brien, M., (2008). Moderate-to-vigorous physical activity from ages 9 to 15 years. *JAMA, 300*, 295-305. doi: 300/3/295 [pii]10.1001/jama.300.3.295

Nader, P. R., O'Brien, M., Houts, R., Bradley, R., Belsky, J., Crosnoe, R.,...Susman E. J., (2006). Identifying risk for obesity in early childhood. *Pediatrics, 118*, e594-601. doi: 118/3/e594 [pii]10.1542/peds.2005-2801

Nader, P. R., Stone, E. J., Lytle, L. A., Perry, C. L., Osganian, S. K., Kelder, S.,...Luepker, R.V. (1999). Three-year maintenance of improved diet and physical activity: the CATCH cohort. Child and Adolescent Trial for Cardiovascular Health. *Arch Pediatr Adolesc Med, 153*, 695-704.

Nader, P. R., & Zive, M. M. (2010). *You Can Prevent Childhood Obesity* (Second ed.). United States: Nader, P.R., Zive, M.M.

NAPNAP position statement on the identification and prevention of overweight and obesity in the pediatric population. (2009). *J Pediatr Health Care, 23*, A15-16.

National Heart Lung and Blood Institute (2007). *We Can! Ways to Enhance Children's Actovoty & Nutrition*. Washington D.C.: US Dept. of Health and Human

Services, NIH. Retrieved from

<http://www.nhlbi.nih.gov/health/public/heart/obesity/wecan/whats-we-can/>.

National Heart Lung and Blood Institute. (2007). Working Group Report on Future Research Directions in Childhood Obesity Prevention and Treatment. Retrieved from <http://www.nhlbi.nih.gov/meetings/workshops/child-obesity/index.htm>

National Institutes of Health. (2005). *Theory At A Glance, A Guide For Health Promotion Practice* (Second Edition ed. Vol. 05-3869). Washington D.C.: U.S. Dept of Health and Human Services.

Nelson, M. C., Neumark-Sztainer, D., Hannan, P. J., & Story, M. (2009). Five-Year Longitudinal and Secular Shifts in Adolescent Beverage Intake: Findings from Project EAT (Eating Among Teens)-II. *J Am Diet Assoc, 109*, 308-312. doi: S0002-8223(08)02036-1 [pii]10.1016/j.jada.2008.10.043

O'Connor, T. M., Yang, S. J., & Nicklas, T. A. (2006). Beverage intake among preschool children and its effect on weight status. *Pediatrics, 118*, e1010-1018. doi: 118/4/e1010 [pii]10.1542/peds.2005-2348

Ogden, C. L., Carroll, M. D., Curtin, L. R., Lamb, M. M., & Flegal, K. M. (2010). Prevalence of high body mass index in US children and adolescents, 2007-2008. *JAMA, 303*, 242-249. doi: 2009.2012 [pii]10.1001/jama.2009.2012

Ogden, C. L., Carroll, M. D., & Flegal, K. M. (2008). High body mass index for age among US children and adolescents, 2003-2006. *JAMA, 299*, 2401-2405. doi: 299/20/2401 [pii]10.1001/jama.299.20.2401

Olstad, D. L., & McCargar, L. (2009). Prevention of overweight and obesity in children under the age of 6 years. *Appl Physiol Nutr Metab*, *34*, 551-570. doi: h09-016 [pii]10.1139/h09-016

OMRON Healthcare, Inc., (2007). HJ-113 Pocket Pedometer. Retrieved from [www.omronhealthcare.com](http://www.omronhealthcare.com)

Ornelas, I. J., Perreira, K. M., & Ayala, G. X. (2007). Parental influences on adolescent physical activity: a longitudinal study. *Int J Behav Nutr Phys Act*, *4*, 3. doi: 1479-5868-4-3 [pii]10.1186/1479-5868-4-3

Pahkala, K., Heinonen, O. J., Lagstrom, H., Hakala, P., Sillanmaki, L., Kaitosaari, T.,...Simell, O. (2008). Parental and childhood overweight in sedentary and active adolescents. *Scand J Med Sci Sports*. doi: SMS870 [pii]10.1111/j.1600-0838.2008.00870.x

Pereira, M. A., Bagatin, M. C., & Zanoni, J. N. (2006). Effects of the ascorbic acid supplementation on NADH-diaphorase myenteric neurons in the duodenum of diabetic rats. *Biocell*, *30*, 295-300.

Powell, L. M., Slater, S., Mirtcheva, D., Bao, Y., & Chaloupka, F. J. (2007). Food store availability and neighborhood characteristics in the United States. *Prev Med*, *44*, 189-195. doi: S0091-7435(06)00334-3 [pii]10.1016/j.ypmed.2006.08.008

Procter, K. L. (2007). The aetiology of childhood obesity: a review. *Nutr Res Rev*, *20*, 29-45. doi: S0954422407746991 [pii]10.1017/S0954422407746991

Rodearmel, S. J., Wyatt, H. R., Stroebele, N., Smith, S. M., Ogden, L. G., & Hill, J. O. (2007). Small changes in dietary sugar and physical activity as an approach to



preventing excessive weight gain: the America on the Move family study.

*Pediatrics*, 120, e869-879. doi: 10.1542/peds.2006-2927

Rolland-Cachera, M. F., Deheeger, M., Bellisle, F., Sempe, M., Guilloud-Bataille, M., & Patois, E. (1984). Adiposity rebound in children: a simple indicator for predicting obesity. *Am J Clin Nutr*, 39, 129-135.

Sallis, J. F., & Glanz, K. (2006). The role of built environments in physical activity, eating, and obesity in childhood. *Future Child*, 16, 89-108.

Scaglioni, S., Salvioni, M., & Galimberti, C. (2008). Influence of parental attitudes in the development of children eating behaviour. *Br J Nutr*, 99 Suppl 1, S22-25. doi: S0007114508892471 [pii]10.1017/S0007114508892471

Singh, G. K., Kogan, M. D., Siahpush, M., & van Dyck, P. C. (2008). Independent and joint effects of socioeconomic, behavioral, and neighborhood characteristics on physical inactivity and activity levels among US children and adolescents. *J Community Health*, 33, 206-216. doi: 10.1007/s10900-008-9094-8

Singh, G. K., Siahpush, M., & Kogan, M. D. (2010). Neighborhood socioeconomic conditions, built environments, and childhood obesity. *Health Aff (Millwood)*, 29, 503-512. doi: 29/3/503 [pii]10.1377/hlthaff.2009.0730

Small, L., Anderson, D., & Melnyk, B. M. (2007). Prevention and early treatment of overweight and obesity in young children: a critical review and appraisal of the evidence. *Pediatr Nurs*, 33, 149-152, 155-161, 127.

Snethen, J. A., Hewitt, J. B., & Petering, D. H. (2007). Addressing childhood overweight: strategies learned from one Latino community. *J Transcult Nurs*, 18, 366-372. doi: 18/4/366 [pii]10.1177/1043659607305197

Statistical Package for the Social Sciences (Version 18.0). (2009) [CD]. Chicago, Illinois:

Microsoft

Summerbell, C. D., Douthwaite, W., Whittaker, V., Ells, L. J., Hillier, F., Smith,

S.,...MacDonald, I. (2009). The association between diet and physical activity and subsequent excess weight gain and obesity assessed at 5 years of age or older: a systematic review of the epidemiological evidence. *Int J Obes (Lond)*, *33 Suppl 3*, S1-92. doi: ijo200980 [pii]10.1038/ijo.2009.80

The Surgeon General's Vision for a Healthy and Fit Nation. (2010). Rockville, MD: U.S.

Department of Health and Human Services, Office of the Surgeon General.

Retrieved from [www.surgeongeneral.gov/library/obesityvision/obesityvision2010.pdf](http://www.surgeongeneral.gov/library/obesityvision/obesityvision2010.pdf).

Sussner, K. M., Lindsay, A. C., Greaney, M. L., & Peterson, K. E. (2008). The influence of immigrant status and acculturation on the development of overweight in Latino families: a qualitative study. *J Immigr Minor Health*, *10*, 497-505. doi: 10.1007/s10903-008-9137-3

Sutherland, L. A., Beavers, D. P., Kupper, L. L., Bernhardt, A. M., Heatherton, T., &

Dalton, M. A. (2008). Like parent, like child: child food and beverage choices during role playing. *Arch Pediatr Adolesc Med*, *162*, 1063-1069. doi: 10.1001/archpedi.162.11.1063 [pii]

Taveras, E. M., Gillman, M. W., Kleinman, K., Rich-Edwards, J. W., & Rifas-Shiman, S.

L. (2010). Racial/Ethnic Differences in Early-Life Risk Factors for Childhood Obesity. *Pediatrics*. doi: peds.2009-2100 [pii]10.1542/peds.2009-2100

Taylor, R. W., Murdoch, L., Carter, P., Gerrard, D. F., Williams, S. M., & Taylor, B. J.

(2009). Longitudinal study of physical activity and inactivity in preschoolers: the

FLAME study. *Med Sci Sports Exerc*, *41*, 96-102. doi:

10.1249/MSS.0b013e3181849d81

Trasande, L., Liu, Y., Fryer, G., & Weitzman, M. (2009). Effects of childhood obesity on

hospital care and costs, 1999-2005. *Health Aff (Millwood)*, *28*, w751-760. doi:

hlthaff.28.4.w751 [pii]10.1377/hlthaff.28.4.w751 a systematic review of the

epidemiological evidence. *Int J Obes (Lond)*, *33* Suppl 3, S1-92. doi: ijo200980

[pii]10.1038/ijo.2009.80

US Department of Health and Human Services: Agency for Healthcare Research and

Quality. (2007). Key Themes and Highlights from the Healthcare Disparities

Report. In U. D. o. H. a. H. S. A. f. H. R. a. Quality (Ed.). Washington DC: US

Department of Health & Human Services.

Vartanian, L. R., Schwartz, M. B., & Brownell, K. D. (2007). Effects of soft drink

consumption on nutrition and health: a systematic review and meta-analysis. *Am J*

*Public Health*, *97*, 667-675. doi: AJPH.2005.083782

[pii]10.2105/AJPH.2005.083782

Veerman, J. L., Van Beeck, E. F., Barendregt, J. J., & Mackenbach, J. P. (2009). By how

much would limiting TV food advertising reduce childhood obesity? *Eur J Public*

*Health*. doi: ckp039 [pii]10.1093/eurpub/ckp039

Wang, Y., & Beydoun, M. A. (2007). The obesity epidemic in the United States--gender,

age, socioeconomic, racial/ethnic, and geographic characteristics: a systematic

review and meta-regression analysis. *Epidemiol Rev*, 29, 6-28. doi: mxm007  
[pii]10.1093/epirev/mxm007

Wang, Y. C., Bleich, S. N., & Gortmaker, S. L. (2008). Increasing caloric contribution from sugar-sweetened beverages and 100% fruit juices among US children and adolescents, 1988-2004. *Pediatrics*, 121, e1604-1614. doi: 121/6/e1604  
[pii]10.1542/peds.2007-2834

Wang, Y. C., Gortmaker, S. L., & Taveras, E. M. (2010). Trends and racial/ethnic disparities in severe obesity among US children and adolescents, 1976-2006. *Int J Pediatr Obes*. doi: 10.3109/17477161003587774

Wang, Y. C., Ludwig, D. S., Sonneville, K., & Gortmaker, S. L. (2009). Impact of change in sweetened caloric beverage consumption on energy intake among children and adolescents. *Arch Pediatr Adolesc Med*, 163, 336-343. doi: 163/4/336 [pii]10.1001/archpediatrics.2009.23

Warner, M. L., Harley, K., Bradman, A., Vargas, G., & Eskenazi, B. (2006). Soda consumption and overweight status of 2-year-old mexican-american children in california. *Obesity (Silver Spring)*, 14, 1966-1974. doi: 14/11/1966  
[pii]10.1038/oby.2006.230

Wilfley, D. E., Stein, R. I., Saelens, B. E., Mockus, D. S., Matt, G. E., Hayden-Wade, H. A.,... Epstein, L.H. (2007). Efficacy of maintenance treatment approaches for childhood overweight: a randomized controlled trial. *JAMA*, 298, 1661-1673. doi: 298/14/1661 [pii]10.1001/jama.298.14.1661

Wilson, D. K. (2009). New Perspective on Health Disparities and Obesity Interventions in Youth. [review of literature]. *Journal of Pediatric Psychology*, 34, 231-244.

Zhu, X., & Lee, C. (2008). Walkability and safety around elementary schools economic and ethnic disparities. *Am J Prev Med*, 34(4), 282-290. doi: S0749-3797(08)00088-3 [pii]10.1016/j.amepre.2008.01.024

**CHAPTER 4**

**GRANT PROPOSAL**

University of California, San Diego  
Comprehensive Research Center for Health Disparities  
Grant Application  
For  
Vida Saludable

Melinda S. Bender, PhD(c), CPNP

Philip R. Nader, MD

Kathy James, DNSc, APRN

Sheila Gahagan, MPH, MD (PI)

## Melinda Bender's Involvement in Vida Saludable Study

Doctor Philosophy Nursing Program  
 University of San Diego  
 Hahn School of Nursing and Science  
 5998 Alcalá Park  
 San Diego CA 92110

February 9, 2011

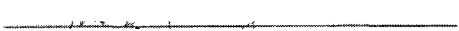
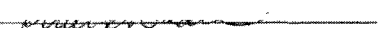
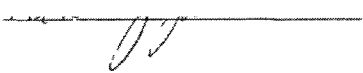
To Whom It May Concern


We the undersigned investigators for the Vida Saludable Pilot Study are writing this letter to describe Melinda Bender's involvement in the NIH funded grant #090715 – Vida Saludable

Melinda was the driving force behind the Vida Saludable study. She initiated efforts for the collaboration of the participating institutions and key personnel in developing the research concept. She was subsequently assigned the primary author responsibility for the grant proposal and submission. Melinda was responsible for approximately 85% of the grant content including grant text, references, budget, consent forms and IRB application. Additions, edits and feedback were provided by the undersigned.

We have worked closely with Melinda developing and overseeing the implementation of the study. From its inception, Melinda has invested approximately 900 hours on the grant and significantly more time on the project including analyzing and disseminating the research results.

Signed

Dr. Sheila Cahagan, PI		Date	<u>2/9/11</u>
Dr. Phil Nader, Co-Investigator		Date	<u>2/9/11</u>
Dr. Kathy James, Co-Investigator		Date	<u>2/9/11</u>

<b>NIH, National Center on Minority Health &amp; Health Disparities</b> <b>University of California San Diego (UCSD)</b> <b>Comprehensive Research Center in Health Disparities (CRCHD)</b>		 <b>UCSD</b> <b>CRCHD</b> <b>Application</b> <b>Pilot Feasibility Project Grant</b>	
Principal Investigator & Academic Title Sheila Cahagan M.D., MPH	Affiliation & Address UCSD Pediatrics Chief, Community Pediatrics 9500 Gilman Drive #9207 La Jolla, CA 92093-0927	Telephone, Fax & E-mail (619) 681-0639 (619) 681-0666 scahagan@ucsd.edu	
Project Title: Vida Saludable		UCSD/SDSU Faculty Program Leader Sheila Cahagan M.D., MPH	
This project involves <input checked="" type="checkbox"/> Human Subjects <input type="checkbox"/> Animal Subjects <input type="checkbox"/> Recombinant DNA Research		Have you received CRCHD funds in the last 24 months? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
<i>Note: If you are involving any of these three categories requires IRB approval before funding.</i>			
This project involves (check applicable boxes) <input type="checkbox"/> Translation of laboratory finding from clinical application <input type="checkbox"/> Phase I clinical investigation with laboratory correlations <input type="checkbox"/> Improving access to health care for underserved populations <input type="checkbox"/> Preliminary efforts leading to a program type application related to health disparities			
Signature: Principal Investigator <i>Sheila Cahagan M.D., MPH</i>		Date <i>February 26, 2009</i>	
Signature: Department Head <i>[Signature]</i>		Date <i>2/26/09</i>	
Signature: UCSD/SDSU Program Leader <i>[Signature]</i>		Date <i>February 26, 2009</i>	
Please prepare the application in the following format, with parts A-C not to exceed 5 pages. Use blank pages as needed. A Scientific Abstract (up to 100 words) B Specific Aims and Significance C Research Design and Methods D Human Subjects E Vertebrate Animals F Literature Cited G Biographical sketches of Key Personnel (up to 2 pages each) H Other Support of Key Personnel I Amount Requested \$47,817 (\$10,000-70,000 total costs) J Budget Justification (1 page)			
Note: For additional information please see following Appendices: 1) Appendix A - Paragraph of Eligibility, 2) Appendix B - Faculty Descriptions, 3) Appendix C - Letters of Support, and 4) Appendix D - Participant Consent Form			
<b>A. SCIENTIFIC ABSTRACT</b>  This study investigates feasibility of a culturally adapted childhood obesity prevention program involving 30 low-income, urban Hispanic mothers and their 3- to 5-year-old children. We will assess feasibility using surveys and participant and healthcare staff focus-group data. Expected outcomes include decreased consumption of high-carbohydrate beverages by the children, increased walking in mothers, and improved knowledge about healthy nutrition and physical activity. This project is planned as the first step in a series of feasibility studies leading up to a clinical trial of a cluster of family focused, multi-level and multi-system, community-based interventions to prevent childhood obesity in low-income, Hispanic families.			



**A. SCIENTIFIC ABSTRACT** - This study investigates feasibility of a culturally adapted childhood obesity prevention program involving 30 low-income, urban, Hispanic mothers and their 3- to 5-year-old children. We will assess feasibility using surveys and participant and healthcare staff focus-group data. Expected outcomes include decreased consumption of high-carbohydrate beverages by the children, increased walking in mothers, and improved knowledge about healthy nutrition and physical activity. This project is planned as the first step in a series of feasibility studies leading up to a clinical trial of a cluster of family-focused, multi-level and multi-system, community-based interventions to prevent childhood obesity in low-income, Hispanic families.

## **B. SPECIFIC AIMS AND SIGNIFICANCE**

In response to the Comprehensive Research Center in Health Disparities request for proposals for health disparities research, we propose a 12-month feasibility study for early childhood obesity prevention for low-income Hispanic 3- to 5-year-olds and their mothers. Our childhood obesity program, "Vida Saludable", will test the feasibility of an obesity-prevention strategy, planned as the basis of a larger, multilevel obesity prevention program for a targeted community. A multidisciplinary group of researchers from UCSD, USD School of Nursing and Vista Community Clinic (VCC) aims to further develop culturally appropriate, experiential, parent-educational programs with social support to prevent childhood obesity based on this project.

**Study Aims** - We propose 3 specific aims

**1) Aim 1:** Assess the feasibility of adapting a family-based, early childhood obesity program to be culturally and contextually appropriate for a group of low-income 18- to 35-year-old Hispanic mothers and their preschool children. **Hypothesis:** Pre- and post-program evaluations will identify a) barriers to effective program implementation, b) needed cultural and contextual adaptations and c) other necessary modifications including alternative lesson plans or increased follow-up support to optimize retention and behavior change.

**2) Aim 2:** Decrease consumption of high carbohydrate beverages (HCB) in Hispanic preschool children and increase physical activity, specifically walking, in their mothers.

**Hypothesis:** There will be a decrease in the consumption of HCB in the 3- to 5-year-old children and an increase in mothers' walking in response to the intervention.

**3) Aim 3:** Describe BMI percentile distribution of 3- to 5-year-old children from VCC, to a) assess the extent of overweight/obesity in this community, and b) establish a baseline as justification for future research.

**B1. Childhood Obesity: A Major Health Disparity** – The prevalence of childhood obesity has tripled over the last three decades in the U.S., with more than 30% of children and adolescents (over 23 million) either overweight or obese.<sup>1, 2</sup> Low-income and ethnic minority children are disproportionately affected,<sup>1, 3, 4</sup> and account for the majority of U.S. obesity-related pediatric health care costs.<sup>5</sup> Hispanics represent the largest youngest and fastest growing racial/ethnic group in the U.S.<sup>2, 6-8</sup> They are disproportionately affected by childhood obesity along with African Americans and Native Americans as compared to their Caucasian counterparts.<sup>9, 14</sup> This obesity disparity is even more evident in low-income Hispanic preschool children as compared to African American and Caucasian preschool children, and more affluent children.<sup>15, 23</sup> Consequently, they are at higher risk for obesity-related co-morbidities,<sup>24, 28</sup> For example, Type 2 Diabetes is more prevalent in overweight Hispanic children than in overweight children from other racial/ethnic groups.<sup>28, 33</sup> To mitigate potentially catastrophic, public health problems secondary to obesity, there is an urgent need for effective obesity prevention initiatives targeting high-risk preschool children, while behaviors and lifestyles are developing.<sup>2, 11, 18, 34, 37</sup>

Many characteristics of modern life impart risk for childhood obesity. Both culture and socio-economic status can contribute to healthy or unhealthy lifestyles.<sup>28, 38</sup> Hispanic families harbor cultural beliefs and habits that promote childhood obesity, such as the perception that a "fat child is a healthy child."<sup>39-41</sup> Moreover, low-income families face multiple environmental risk factors leading to higher obesity risks such as food insecurity and built environments that inhibit physical activity.<sup>28, 42-47</sup>

Identification of modifiable risk factors in at-risk children could play an important role in decreasing new incident cases of obesity. While many current nutritional practices increase risk for obesity, we focus on one such practice: consumption of high-carbohydrate beverages (HCB). There has been an alarming increase in HCB consumption.<sup>22, 48, 54</sup> Physical activity is also important, as increasingly sedentary lifestyles<sup>55, 59</sup> contribute to obesity among children in the U.S.<sup>57, 60, 61</sup>, especially in the low-income Hispanic preschool children.<sup>62, 63</sup> The proposed project focuses on reduction of HCB consumption in preschool-age children and increasing physical activity in their mothers.

**B2. Research Gaps: Obesity Prevention is Complex and Causes Difficult to Identify** - The causes for obesity are complex and multi-factorial, involving extensive environmental influences<sup>2 61 64</sup> that determine health behaviors<sup>57 64</sup>. The NHLBI Working Group Report concluded that the overall environment is key to preventing childhood obesity and recommended research in population based, multi-level approaches utilizing families and younger preschool populations addressing environmental influences<sup>12 57 61 65 66</sup>.

**1) Family-Based Approach:** Most individual directed obesity interventions have shown limited sustainable weight control<sup>35 67-69</sup>. However, the most promising approaches are Family Based interventions,<sup>68 70</sup> targeting parents as the main change agent rather than the child<sup>67 70-72</sup>. Studies utilizing the parent as the primary change agent show longer-term weight control compared to parent and child focused interventions<sup>71 73-75</sup>, fewer investigators have evaluated this approach for preschool children<sup>35 68</sup>.

**2) Cultural/Contextual:** Studies targeting low-income ethnic minorities for early childhood obesity prevention are nascent and limited,<sup>11 18 41 68 76 77</sup> with few that are culturally or contextually adapted to focus on Hispanic, preschool children, their families, environment, or culture<sup>14 15 76</sup>. Such childhood obesity prevention studies are clearly needed, taking into account culture/ context and community by incorporating participatory research methods including, collaboration with stake holders, in designing the interventions<sup>25 34 78 79</sup>.

**3) Diet/Exercise Behaviors:** Of the many multi-factorial predictors of childhood obesity that contribute to the disproportionately high prevalence of obesity among Hispanic preschool children, we have chosen 2 important and potentially modifiable behaviors: 1) increased consumption of HCB<sup>22 50 52 53 80-84</sup> and 2) a more sedentary lifestyle compared to their counterparts<sup>11 13 61 63 85 86</sup>. However, there is a paucity of effective obesity prevention interventions with respect to these key contributors targeting Hispanic preschool children<sup>35 68</sup>.

**B3. Conceptual Framework** -To address the complex, multi-factorial, etiology of childhood obesity<sup>61</sup>, the framework for "Vida Saludable" is based on an Ecological Model<sup>61 87</sup> and Social Cognitive Learning Theory<sup>88</sup>. The Ecological Model postulates that effects on health behavior are multilevel, involving internal individual factors, as well as external social/cultural factors and the physical environment<sup>61</sup>. Interactions and interplay between these factors influence the individual's choice of health behaviors. Social Cognitive Learning Theory incorporates both a) Behavioral Learning (environment influences behaviors) and b) Cognitive Learning (individual expectations and self efficacy influences behaviors)<sup>88 89</sup>.

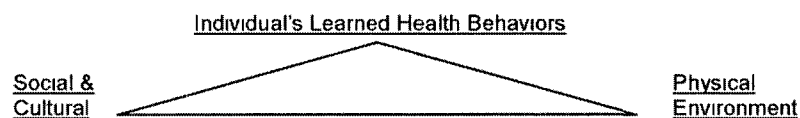


Figure 1: Combined Ecological Model / Social Cognitive Learning

#### B4. Promising Intervention Adaptations and Approaches

**1) Culture:** Social and cultural factors can shape the environment to either increase or reduce obesity risk (obesigenic compared to healthy environments)<sup>90 91</sup>. Hispanic cultures as well as their perspectives on obesity present unique challenges. Intervention programs are more likely to succeed when strategies take into account unique cultural values, beliefs, lifestyles regarding eating/physical activities, and address the context (community/ home environment) of the at-risk group<sup>2 12 14 92 94</sup>.

**2) Educational:** When designing educational curriculum to be culturally appropriate, studies recommend addressing the cultural perception and nutritional beliefs and behaviors of the participants<sup>2 14 39 50 93</sup>. For instance, Hispanic mothers are more likely to perceive overweight children as healthier and thinner children as unhealthy<sup>21 39 40 95</sup>. Furthermore, research has identified feeding practices that may increase risk for childhood obesity including overfeeding and bribing or rewarding with unhealthy food<sup>92 96</sup>. Crawford et al,<sup>41</sup> thus proposes focusing primarily on the benefits of a healthy lifestyle rather than on weight. The "Vida Saludable" program will therefore emphasize healthy lifestyles rather than weight control. The, NIH/NHLBI Ways to Enhance Children's Activities and Nutrition, "WE CAN!" program<sup>97</sup> that promotes healthy nutrition and physical activity education for parents and youth, will serve as the foundation for the educational curriculum, which will be culturally and contextually adapted for the target study population.

**3) Learning:** A key to affecting change is adapting learning approaches to match the cognitive needs and behavioral habits of participants<sup>2 89 98 99</sup>. For instance, Hispanics' values center on family and social cohesiveness<sup>41 100 101</sup>. However, acculturation of Latinos in the US has been linked to social isolation<sup>21 100 102</sup>. Past health promotion program interventions that include a family focus, group education and activities, and promoters for social support have been shown to increase adoption of healthful lifestyles in Hispanic population<sup>73 76 89 102-105</sup>. Moreover, there is evidence that demonstrations, practice and interactive teaching

improves learning among low-income Hispanics<sup>98</sup>. "Vida Saludable" will implement 3 culturally adapted learning approaches: a) interactive education that is enjoyable, b) social support (promotoras, group classes and activities), and c) experiential format (demonstration and practice of target behaviors).

**4) Parent-focused:** Parents play a crucial role in influencing their children's lifelong health attitudes and behaviors,<sup>56, 106, 107</sup> through: role modeling, discipline/control styles, attitudes, feedback, instruction and the home environment<sup>72, 90, 108</sup>. In addition, parents exert powerful influence on how their preschool children will regulate food intake later in life. Controlling/restrictive parenting styles have been associated with poor regulation and supportive/encouraging parenting styles have been associated with typical normal regulation in middle-class white children<sup>107, 109, 110</sup>. Studies have shown that active parents have active children<sup>111-113</sup>. Given the strong parental influence, "Vida Saludable" will educate, demonstrate and have practice session to teach parents how to be effective role models to influence healthy nutrition and increase physical activities in their children.

**5) Incremental:** A recommended intervention by the American Health Association (AHA) calls for "small but permanent changes in eating, which may work better than many series of short-term changes that can't be sustained", e.g. reducing caloric intake, by reducing HCB consumption<sup>68, 114-116</sup>, is an easier change rather than highly restrictive diets. By way of a "small" intervention, "Vida Saludable" will focus on reducing HCB consumption. In addition, given the strong parental influence on children's physical activity, "Vida Saludable" will focus on small, sustainable changes, specifically motivating mothers to increase their physical activity by frequent walks and thereby increase their children's physical activity as well.

**B5. An Ideal Collaborative Research & Scientific Setting (VCC, USD, and UCSD)** - VCC has identified a need for an obesity prevention program for their clientele and has requested assistance from UCSD and USD in developing a culturally/contextually appropriate program. VCC, the proposed research site, has been providing health and social services for low-income families, in collaboration with community leaders and businesses, for over 36 years. They are well integrated into the community. VCC serves a predominately Hispanic (68%), and poor (> 50% below federal poverty level) population; with a high prevalence of obesity. VCC employs a successful community-centered, program model that utilizes bilingual/bicultural, Promotora/Case Managers (PCMs), which is culturally/contextually appropriate for their low-income Hispanic population. Utilizing their program model, VCC provides counseling, education, and activities for a variety of preventive health programs such as: CVD, diabetes, asthma, HIV, and drug abuse. There is a strong history of clientele participation in VCC health promotion programs. UCSD and USD are ideally suited academic collaborators because of their proximity to VCC, as well as their unique research qualifications involving health disparities, obesity prevention/weight management, and multiple ethnic health care promotions. Finally, VCC is in the unique position to recruit appropriate study candidates, and solicit input from community leaders and VCC staff to provide feedback in the design, implementation, and execution of the study.

### C. DESIGN AND METHOD

"Vida Saludable", is a twelve-month childhood obesity prevention program consisting of: program planning, implementation, intervention, data collection, analysis and dissemination.

**Table 1. Program Overview Timeline**

ACTIVITY / MONTHS	1	2	3	4	5	6	7	8	9	10	11	12	18
Start-up Planning / Hire Personnel / Training													
Community Survey/Adapt "WE CAN!" Curricula													
Recruit Participants / Home Visit													
Focus Groups / Program Adaptation													
4 "WE CAN!" Classes & Final Review Session													
6 Monthly Group Activities													
3 Month Phone Follow-up Support													
Data Collection & Management													
Existing Data Analysis / New Data Analysis													
Manuscript Prep / Dissemination													

**C1. Planning & Implementation** - Startup includes: planning/coordination with research partners; hiring/training PCM(s), reviewing program content, and planning monthly meeting content.

**C2. Sample selection** – VCC health care providers will recruit a convenience sample of 44 low-income Hispanic mothers (18-35 years old) with 3- to 5-year-old children in 2 groups and obtain informed consent. Each mother will be given written “WE CAN!” study information along with a meeting schedule. We plan to recruit 44 mother-child pairs for an estimated final sample of 30, accounting for up to 32% attrition. **Inclusion criteria:** Mothers 1) with children 3- to 5 years of age 2) willing to participate in group lessons/activities and 1 home visit by PCM. **Exclusion criteria:** Mothers with disabled children who are unable to drink.

**C3. Program Adaptation** - The established health promotion project, NHLBI, ‘WE CAN!’<sup>97</sup>, is a multi-level, population based strategy aimed at reducing the prevalence of obesity and physical inactivity in order to decrease obesity-related co-morbidities (i.e., coronary heart disease and type 2 diabetes). “WE CAN!” is unique among existing youth obesity-prevention initiatives in its focus on programs and activities for parents and families as the mediators of youth behavior. The “WE CAN!” *Energize our Families Curriculum for Parents* aims to increase healthful nutrition and physical activity and serves as the foundation for our proposed educational curriculum. NHLBI has already translated some ‘WE CAN!’ parenting materials into Spanish.<sup>97</sup> We will adapt these materials culturally and contextually for “Vida Saludable”. Employing PCMs from the Hispanic community will ensure that “Vida Saludable” is culturally and contextually presented, appropriately understood, and useful to the participants, and enhances the community social support.<sup>117-119</sup>

Pre- and post-program focus groups will be conducted in a semi-structured taped interview format to elicit information regarding cultural beliefs and practices. Focus groups will also provide evaluation of the program and suggestions for improvements. We will request ongoing feedback from participants during the intervention. In addition, we will solicit pre- and post-evaluation suggestions from PCMs and VCC staff. Furthermore, a walking/auto survey<sup>120</sup> will describe the community built environment. From the feedback, cultural and contextual adaptations will be made to the curriculum, group activities and PCM support. We expect to linguistically and conceptually clarify the written materials, curriculum, and visual aids, and modify the program (e.g., schedule, field trips and personnel) to be socio-culturally acceptable.

**C4. Program Design** - “Vida Saludable” incorporates a combination of parent-focused and culturally-adapted interventions to decrease HCB consumption by children and increase maternal walking through 3 key cognitive/behavioral learning approaches: interactive education, social support and experiential learning. **Interactive Education** is realized through enjoyable, non-didactic group discussions based on the culturally adapted ‘WE CAN!’ curriculum. Participants will have the opportunity to discuss ways to develop advocacy skills to access healthy foods and to improve their community’s built environment. **Social Support** is provided by a PCM program model, fun classes and group activities, including neighborhood walks, field trips to parks, grocery stores and restaurants. **Experiential Learning** is fostered through demonstrations and practice, group skits, group walks and parent/child playtime.

**1) Program Intervention Sequence:** a) The PCM will contact each participant to set up a home visit to collect demographic data, outline the program schedule, answer questions and perform a home assessment. b) Mothers will attend 4 biweekly, “WE CAN!” group lessons conducted by the PCM addressing the goals of decreasing child HCB consumption and increasing mothers’ walking. c) The PCM will contact the mothers by phone 3 months after the last lesson to provide support for behavior change, problem solving and answer questions. d) After completion of the lessons, mothers will participate in 6 monthly group activities. e) At the end of the program, there will be a group review session to reinforce healthy nutrition and physical activities. **2) Program Impact** Evaluation surveys will be given by the PCM, at the initial visit, after the 4-lesson program, and at the final review. The surveys include: a) the “WE CAN!” evaluation survey<sup>97</sup>, to evaluate parent beliefs, habits and knowledge about nutrition and physical activity, b) the Fred Hutchinson Cancer Research Center’s food frequency questionnaire<sup>121</sup> to document children’s daily HCB consumption and c) the “SQUASH” walking frequency questionnaire<sup>122</sup> to assess frequency and distance walked.

### C5. Data Collection

**Aim 1: Feasibility of family-based, early childhood obesity program** - 1) **Demographic data** will be collected (family income, maternal age, maternal education, parity, number of years in U.S., child age, child sex, sex of child). 2) **Height and weight** of mother and child measured at first lesson following the CDC guidelines.<sup>123</sup> 3) **Focus group data** - Pre- and post-program surveys. 4) **Built environment survey data** - Land Use Environment, Analytic Version (walking/auto) survey<sup>120</sup> will be used to assess the obesigenic factors of the built environment.

**Aim 2: Decrease child consumption of HCB and increase maternal walking** - The PCM will collect pre-program, post-lessons, and post-program: 1) Food frequency survey<sup>121</sup> - mother’s report on child’s weekly

HCB consumption, and 2) Walking frequency survey<sup>122</sup> - mother's weekly self-reported walking frequency/distance. In addition, mothers will be given a pedometer and instructed to wear it 2 days per week, one active day and one inactive day and report these results. The pedometer readings will be used to corroborate the self-report data.

**Aim 3: Describe BMI percentiles in the target population** - We will analyze BMI data from the electronic medical record of children who have had health care maintenance visits during the last year<sup>124</sup>

**C6. Data Management** - Standard research data management guidelines will be followed to ensure the strictest anonymity/privacy of participants and security of all data (surveys, interviews, personal info, measurements, etc.) Data will be password protected and access limited to researchers and statistician. Data will be analyzed and stored at VCC and UCSD CRCHD.

**C7. Data Analysis** - Descriptive statistics (e.g., means, percentages, standard deviations, standard errors) will be computed for each variable as appropriate along with confidence intervals to provide a measure of the magnitude of effects and degree of precision. Because the proposed study will investigate the feasibility of the prevention program and is not intended to conduct a definitive evaluation of effectiveness, analyses will emphasize description and estimation. To explore whether there are changes over time in outcome measures, generalized estimating equations (GEE)<sup>125, 126</sup> will be used to fit repeated measures models. GEE is a multivariate version of generalized linear models and is very flexible with a selection of link functions and error terms capable of analyzing normal, binary, and count outcomes. It is designed to allow all available data to be used even though some subjects may not have complete data for all time periods. The GENMOD procedure of SAS Version 9.1 (SAS Institute Inc., 1999-2001) will be used for these analyses.

**Aim 1: Feasibility of family-based, early childhood obesity program** - Pre- and post-program surveys will be analyzed using t-tests for continuous variables and chi-square tests for frequencies. Pre-intervention, post-lessons and 6-month post-intervention focus group data will be transcribed verbatim by bilingual transcribers and crosschecked. Participants' responses to questions will be analyzed to identify themes regarding 1) understanding of the curriculum lesson content, materials and concepts, 2) the cultural/contextual relevance of the lesson content and information regarding foods, cuisine and physical activities, 3) overall program schedule and plan, 4) barriers to and facilitators for success, 5) identification of what is working/not working, and 6) suggestions for program improvement or additional content. Minutes of discussion with VCC staff will be analyzed for the same 6 themes above. The Land Use Environment - walking/auto survey will be analyzed to describe the community built environmental factors contributing to obesity and support for healthy nutrition and physical activity.

**Aim 2: Decrease child consumption of HCB and increase maternal walking** - Change in child consumption of HCB and change in maternal walking will be assessed using paired t-tests for continuous variables and generalized estimating equations for repeated measures at 3 time-points.

**Aim 3: Describe BMI percentiles in the target population** - BMI for 3- to 5-year-old children from VCC will be assessed using electronic-medical record data from clinic visits. BMI percentile, adjusted for age in days and gender, will be expressed as means (and standard deviation). This value will be compared to nationally representative data including data for Hispanic children and low-income children using the z-test.

**C8. Dissemination and Conclusions** - Results of our research will be disseminated locally, regionally and nationally. We will share knowledge gained with participants, the staff and the board of VCC. In addition, we plan to present our findings at local and national meetings and submit our results as manuscripts for peer-reviewed publication.

In summary, we propose to test a targeted program for low-income, Hispanic, preschool children to prevent obesity based on a sound theoretical model using components of an NIH-developed curriculum. We have chosen health behaviors that could be easily modified and are known to contribute to increased risk for childhood obesity: high-carbohydrate beverage consumption and physical inactivity. This proposal is strengthened by significant investment by a community-based organization, Vista Community Clinic and by a strong multidisciplinary research team. We believe that this feasibility study will lead to future larger multilevel research projects also aimed at preventing childhood obesity. In response to this call for proposals, we note that childhood obesity is, experienced, disproportionately by poor and minority children in the U.S. Strategies that might work for more advantaged children may not be appropriate for these populations. Therefore, it is essential that this type of research be done with the highest risk groups.

## **D. HUMAN SUBJECTS**

This pilot study investigates feasibility of a culturally, adapted childhood obesity prevention program for low-income Hispanic mothers and their preschool children, with an aim to decrease high carbohydrate beverage consumption in the children and increased walking in the mothers. It also seeks to describe the distribution of the BMI percentiles of the pediatric patients at Vista Community Clinic (VCC) from the existing data in the VCC database.

### **D1. Risks to Human Subjects**

#### **D1.1 Human Subjects Involvement and Characteristics**

The participants will consist of 30 low low-income, Hispanic women (18- to 35-years-old) with 3- to 5-year-old children receiving services at Vista Community Clinic (VCC) who are identified by VCC health care providers. Mothers are being targeted as the primary agent of change. The 3- to 5-year-old children are being targeted in an attempt to prevent early childhood obesity.

#### **D1.2 Sources of Materials**

The source of data will be the Vista Community Clinic population and the local community. Both quantitative and qualitative data will be collected including: 1) study participant enrollment demographic data, 2) height and weight measurements of study mothers and children as well as existing historical data from the VCC Hispanic population, 3) study evaluation instrument data from focus group questionnaires and behavior survey questionnaires, and 4) walking/auto survey data of the built community environment. 5) Existing data of BMI percentiles of pediatric patients that is stored in the VCC database.

### **D2. Potential Risks**

There are no known serious health or psychological risks associated with participation in this study. If any subject develops health problems during the study, a VCC medical provider will be notified. If subjects become anxious or uncomfortable, they are welcome to discontinue their participation. Potential privacy risks are minimal. Procedures to minimize risk of loss of confidentiality are presented below. If any participant develops health problems during the study, a VCC medical provider will be notified.

#### **D2.1 Adequacy of Protection Against Risks**

##### **Recruitment and Informed Consent**

A convenience sample of participants will be identified and recruited by the VCC health care providers. Parents will be asked to complete a consent form and children will give verbal assent for height and weight measurements. Consent/assent forms and other study related material will be available in English and Spanish.

##### **Protections Against Risk**

The research assistants will be trained to handle parents' concerns about participation in the study or any issues that arise out of their completion of the enrollment questionnaire and/or interviews. Participants may request to stop their participation at any time without jeopardy to the services they receive at VCC. If the parent has any concerns, they will be advised to talk to or call one of the co-investigators. Several steps will be taken to ensure participant confidentiality. First, the information obtained will not be attached to the parent or child's medical record in any way, unless the parent requests that we communicate information to their provider and signs a release form. Second, all research interviews and other paper-based research materials will be kept in a locked file cabinet in a locked office at VCC and/or UCSD CRCHD, digital data will be kept at a secure computer database at VCC and/or UCSD CRCHD that can be accessed only by authorized research investigators and personnel and will require a secure password. After data is collected, information that would identify the participant will be removed and code numbers will be used instead. This applies also to any data entered into computer files. Any audiotape recordings will be destroyed after 3 years. Any presentations or publications arising from this research will not use subject names or other information that would allow subjects to be identified.

### **D3. Potential Benefits of the Proposed Research to Human Subjects and Others**

Subjects may benefit from the knowledge they receive about nutrition, physical activity, and their community. Whether or not participants experience therapeutic benefit, those involved in similar studies have experienced gratification from participating in a study designed to improve health care. The study may also have an impact in identifying enhancements to improve weight management for low-income diverse families, who are known to receive fewer health services.

### **D4. Importance of the Knowledge to be Gained**

This is the first step in a series of feasibility studies followed by a clinical trial of a family focused, multi-level and multi-system, community-based intervention to prevent childhood obesity targeting low-income, Hispanic families. By seeking to improve the knowledge of nutrition and physical activity and support healthy eating and physical activity behaviors, this study will seek to identify effective interventions to ultimately prevent obesity in the Hispanic population. The findings from this research will be published and disseminated to provide information to 1) assist other research by helping to identify effective interventions targeting low-income Hispanics and their families, 2) to advocate for policy change to improve healthy nutrition and support for physical activity in the community, and 3) to begin mobilizing the Hispanic community to practice healthy eating and participate in physical activities.

### **D5. Data and Safety Monitoring Plan**

Personally identifying information about participants in this research will be stored in databases that will be encrypted and have access passwords known only by authorized investigators and research personnel associated with the study.

1) All hard copies of data will be stored in locked filing cabinets, and only research identification numbers will be used on data collection forms. Data forms will be destroyed within 7 years of the completion of data collection.

2) Digital data will be kept at a secure computer database that can be accessed only by authorized research investigators and personnel and will require a secure password.

3) Audiotape recordings of focus groups and surveys will be stored in locked filing cabinets and will be labeled using ID numbers only. After transcription and data coding are completed, all audiotapes will be destroyed after three years.

4) Research data collected in any research step will only be coded with a participant's unique identifier (a number). Personally identifying information will not be kept in any paper or electronic research data records specific to individual participants (e.g. questionnaire responses collected on paper or by computer). This means that any individual handling a data set containing only research data will be unable to identify any specific research participant using that information.

5) All patient identification from existing data in the VCC database will be coded to ensure patient anonymity. All reports will be stored in locked cabinets, as stated above and/or a secure computer database that can be accessed only by authorized investigators and research personnel, and will require a secure password.

### **D6. Inclusion of Women and Minorities**

**Inclusion of Women:** Low-income Hispanic mothers (18- to 35-years-old) will be exclusively recruited because this study focuses on low-income Hispanic mothers as the primary agent of change to influence their pre-school children toward health eating and participation in physical activity behaviors and ultimately prevent childhood obesity.

**Inclusion of Minorities:** Low-income Hispanic mothers 18- to 35-years-old and their 3- to 5-year-old children will be exclusively recruited because this study focuses on early childhood obesity prevention in low socioeconomic status children.

### **D7. Targeted/Planned Enrollment**

Enrollment will target 100% Hispanics from the VCC population, where 68% of the population served are Hispanics, with a majority of them earning below the poverty level, and at high risk for obesity.

**D8. Inclusion of Children**

Only Hispanic children between the ages of 3- to 5-years old will be included. The study is focusing on obesity prevention through behavior modification in pre-school children in hopes of influencing their still developing lifestyle behaviors toward healthy nutrition and participation in physical activities.



## F. LITERATURE CITED

1. Miller JL, Silverstein JH. Management approaches for pediatric obesity. *Nat Clin Pract Endocrinol Metab.* 2007 Dec;3(12):810-8.
2. Institutes of Medicine. *Progress In prevention Childhood Obesity, How Do We Measure Up?* Washington, D C.: The National Academies Press; 2007.
3. Ogden CL, Carroll MD, Curtin LR, McDowell MA, Tabak CJ, Flegal KM. Prevalence of overweight and obesity in the United States, 1999-2004. *JAMA.* 2006 Apr 5;295(13):1549-55
4. Singh GK, Kogan MD, van Dyck PC. A multilevel analysis of state and regional disparities in childhood and adolescent obesity in the United States. *J Community Health.* 2008 Apr;33(2):90-102.
5. Thompson Medstat. *Childhood obesity: costs, treatment patterns, disparities in care, and prevalent medical conditions 2005* [cited; Available from: [http://www.medstat.com/pdfs/childhood\\_obesity.pdf](http://www.medstat.com/pdfs/childhood_obesity.pdf)
6. Johnson B. *Key Facts About Childhood Obesity in the Latino Community 2008* [cited; Available from: [http://www.nclr.org/content/publications\\_detail/52523](http://www.nclr.org/content/publications_detail/52523).
7. Cohen I. Hispanics in the United States. In: Caribbean ECFLAat, editor. *Santiago: United Nation,, ; 2007.* p. 1-49.
8. Wall Street Journal. *The United States 2009, By The Numbers.* The Wall Street Journal. 2009 Jan 20, 2009;Sect. R4.
9. Ogden CL, Carroll MD, Flegal KM. High body mass index for age among US children and adolescents, 2003-2006. *JAMA.* 2008 May 28;299(20):2401-5
10. Hedley AA, Ogden CL, Johnson CL, Carroll MD, Curtin LR, Flegal KM. Prevalence of overweight and obesity among US children, adolescents, and adults, 1999-2002. *JAMA.* 2004 Jun 16;291(23):2847-50.
11. Lutfiyya MN, Garcia R, Dankwa CM, Young T, Lipsky MS. Overweight and obese prevalence rates in African American and Hispanic children. an analysis of data from the 2003-2004 National Survey of Children's Health. *J Am Board Fam Med.* 2008 May-Jun;21(3):191-9.
12. Wang Y, Beydoun MA. The obesity epidemic in the United States--gender, age, socioeconomic, racial/ethnic, and geographic characteristics: a systematic review and meta-regression analysis. *Epidemiol Rev.* 2007;29:6-28.
13. Singh GK, Kogan MD, Van Dyck PC, Siahpush M. Racial/Ethnic, socioeconomic, and behavioral determinants of childhood and adolescent obesity in the United States: analyzing independent and joint associations. *Ann Epidemiol.* 2008 Sep;18(9):682-95.
14. Branner CM, Koyama T, Jensen GL. Racial and ethnic differences in pediatric obesity-prevention counseling. national prevalence of clinician practices. *Obesity (Silver Spring).* 2008 Mar;16(3):690-4.
15. Freedman DS, Khan LK, Serdula MK, Ogden CL, Dietz WH. Racial and ethnic differences in secular trends for childhood BMI, weight, and height. *Obesity (Silver Spring).* 2006 Feb;14(2):301-8.
16. Kim J, Peterson KE, Scanlon KS, et al. Trends in overweight from 1980 through 2001 among preschool-aged children enrolled in a health maintenance organization. *Obesity (Silver Spring)* 2006 Jul;14(7):1107-12.
17. Whitaker RC, Orzol SM. Obesity among US urban preschool children: relationships to race, ethnicity, and socioeconomic status. *Arch Pediatr Adolesc Med.* 2006 Jun;160(6):578-84.
18. Kimbro RT, Brooks-Gunn J, McLanahan S. Racial and ethnic differentials in overweight and obesity among 3-year-old children. *Am J Public Health.* 2007 Feb;97(2):298-305
19. Mei Z, Scanlon KS, Grummer-Strawn LM, Freedman DS, Yip R, Trowbridge FL. Increasing prevalence of overweight among US low-income preschool children: the Centers for Disease Control and Prevention pediatric nutrition surveillance, 1983 to 1995. *Pediatrics.* 1998 Jan;101(1):E12.
20. Maher EJ, Li G, Carter L, Johnson DB. Preschool child care participation and obesity at the start of kindergarten. *Pediatrics.* 2008 Aug;122(2):322-30.
21. Fuentes-Afflick E, Hessol NA. Overweight in young Latino children. *Arch Med Res.* 2008 Jul;39(5):511-8.
22. Wang YC, Bleich SN, Gortmaker SL. Increasing caloric contribution from sugar-sweetened beverages and 100% fruit juices among US children and adolescents, 1988-2004. *Pediatrics.* 2008 Jun;121(6):e1604-14.

23. Sherry B, Mei Z, Scanlon KS, Mokdad AH, Grummer-Strawn LM. Trends in state-specific prevalence of overweight and underweight in 2- through 4-year-old children from low-income families from 1989 through 2000. *Arch Pediatr Adolesc Med.* 2004 Dec;158(12):1116-24.
24. Paxson C, Donahue, E., Orleans, C.T., & Grisso, J.A. Introducing The Issue. *The Future of Children.* 2006;16(1):3-17.
25. Krebs NF, Jacobson MS. Prevention of pediatric overweight and obesity. *Pediatrics.* 2003 Aug;112(2):424-30.
26. Wang G, Dietz WH. Economic burden of obesity in youths aged 6 to 17 years: 1979-1999. *Pediatrics.* 2002 May;109(5):E81-1.
27. Rhodes ET, Ludwig DS. Childhood obesity as a chronic disease: keeping the weight off. *JAMA.* 2007 Oct 10;298(14):1695-6.
28. Cossrow N, Falkner B. Race/ethnic issues in obesity and obesity-related comorbidities. *J Clin Endocrinol Metab.* 2004 Jun;89(6):2590-4.
29. Davis JN, Ventura EE, Weigensberg MJ, et al. The relation of sugar intake to beta cell function in overweight Latino children. *Am J Clin Nutr.* 2005 Nov;82(5):1004-10.
30. Goran MI, Lane C, Toledo-Corral C, Weigensberg MJ. Persistence of pre-diabetes in overweight and obese Hispanic children: association with progressive insulin resistance, poor beta-cell function, and increasing visceral fat. *Diabetes.* 2008 Nov;57(11):3007-12.
31. Ogden CL, Flegal KM, Carroll MD, Johnson CL. Prevalence and trends in overweight among US children and adolescents, 1999-2000. *JAMA.* 2002 Oct 9;288(14):1728-32.
32. Kobaissi HA, Weigensberg MJ, Ball GD, Cruz ML, Shaibi GQ, Goran MI. Relation between acanthosis nigricans and insulin sensitivity in overweight Hispanic children at risk for type 2 diabetes. *Diabetes Care.* 2004 Jun;27(6):1412-6.
33. Gahagan S, Silverstein J. Prevention and treatment of type 2 diabetes mellitus in children, with special emphasis on American Indian and Alaska Native children. American Academy of Pediatrics Committee on Native American Child Health. *Pediatrics.* 2003 Oct;112(4):e328.
34. Kumanyika S, Grier S. Targeting interventions for ethnic minority and low-income populations. *Future Child.* 2006 Spring;16(1):187-207.
35. Small L, Anderson D, Melnyk BM. Prevention and early treatment of overweight and obesity in young children: a critical review and appraisal of the evidence. *Pediatr Nurs.* 2007 Mar-Apr;33(2):149-52, 55-61, 27.
36. Summerbell CD, Waters E, Edmunds LD, Kelly S, Brown T, Campbell KJ. Interventions for preventing obesity in children. *Cochrane Database Syst Rev.* 2005(3):CD001871.
37. Nader PR, O'Brien M, Houts R, et al. Identifying risk for obesity in early childhood. *Pediatrics.* 2006 Sep;118(3):e594-601.
38. Gable S, Britt-Rankin J, Krull J. Ecological Predictors and Developmental Outcomes of Persistent Childhood Overweight. Columbia: US Dept. of Agriculture.; 2008. Report No.: 42.
39. Eckstein KC, Mikhail LM, Ariza AJ, Thomson JS, Millard SC, Binns HJ. Parents' perceptions of their child's weight and health. *Pediatrics.* 2006 Mar;117(3):681-90.
40. Taveras EM, Gortmaker SL, Mitchell KF, Gillman MW. Parental perceptions of overweight counseling in primary care: the roles of race/ethnicity and parent overweight. *Obesity (Silver Spring).* 2008 Aug;16(8):1794-801.
41. Crawford PB, Gosliner W, Anderson C, et al. Counseling Latina mothers of preschool children about weight issues: suggestions for a new framework. *J Am Diet Assoc.* 2004 Mar;104(3):387-94.
42. Merchant AT, Dehghan M, Behnke-Cook D, Anand SS. Diet, physical activity, and adiposity in children in poor and rich neighbourhoods: a cross-sectional comparison. *Nutr J.* 2007;6:1.
43. Day K. Active Living and Social Justice: Planning for Physical Activity in Low-income Black, and Latino Communities. *Journal of the American Planning Association.* 2006;72(1):88-99.
44. Drewnowski A, Specter SE. Poverty and obesity. the role of energy density and energy costs. *Am J Clin Nutr.* 2004 Jan;79(1):6-16.
45. Powell LM, Slater S, Mirtcheva D, Bao Y, Chaloupka FJ. Food store availability and neighborhood characteristics in the United States. *Prev Med.* 2007 Mar;44(3):189-95.

46. Zhu X, Lee C. Walkability and safety around elementary schools economic and ethnic disparities. *Am J Prev Med*. 2008 Apr;34(4):282-90.
47. Palmer TA, Jaworski CA. Exercise prescription for underprivileged minorities. *Curr Sports Med Rep*. 2004 Dec;3(6):344-8.
48. Gaby AR. Adverse effects of dietary fructose. *Altern Med Rev*. 2005 Dec;10(4):294-306.
49. Malik VS, Schulze MB, Hu FB. Intake of sugar-sweetened beverages and weight gain: a systematic review. *Am J Clin Nutr*. 2006 Aug;84(2):274-88.
50. Ariza AJ, Chen EH, Binns HJ, Christoffel KK. Risk factors for overweight in five- to six-year-old Hispanic-American children: a pilot study. *J Urban Health*. 2004 Mar;81(1):150-61.
51. Siener K, Rothman D, Farrar J. Soft drink logos on baby bottles: do they influence what is fed to children? *ASDC J Dent Child*. 1997 Jan-Feb;64(1):55-60.
52. Warner ML, Harley K, Bradman A, Vargas G, Eskenazi B. Soda consumption and overweight status of 2-year-old mexican-american children in california. *Obesity (Silver Spring)*. 2006 Nov;14(11):1966-74.
53. O'Connor TM, Yang SJ, Nicklas TA. Beverage intake among preschool children and its effect on weight status. *Pediatrics*. 2006 Oct;118(4):e1010-8.
54. Walling A. Families and work: Labour Market Trends, July London: Office for National Statistics; 2005.
55. Zapata LB, Bryant CA, McDermott RJ, Hefelfinger JA. Dietary and physical activity behaviors of middle school youth: the youth physical activity and nutrition survey. *J Sch Health*. 2008 Jan;78(1):9-18; quiz 65-7.
56. Daniels SR. The consequences of childhood overweight and obesity. *Future Child*. 2006 Spring;16(1):47-67.
57. Anderson PM, Butcher KE. Childhood obesity. trends and potential causes. *Future Child*. 2006 Spring;16(1):19-45.
58. Harbaugh BL, Jordan-Welch M, Bounds W, Blom L, Fisher W. Childhood obesity. Part I. Nurses and families rising to the challenge of overweight children. *Nurse Pract*. 2007 Mar;32(3):30-5; quiz 41-3.
59. Fiore K. Preschoolers More Sedentary Than Thought. 2009 [cited; Available from: <http://www.medpagetoday.com/Pediatrics/GeneralPediatrics/12779>
60. Wolff E, Dansinger ML. Soft drinks and weight gain: how strong is the link? *Medscape J Med*. 2008;10(8):189.
61. Procter KL. The aetiology of childhood obesity: a review. *Nutr Res Rev*. 2007 Jun;20(1):29-45.
62. Anderson SE, Economos CD, Must A. Active play and screen time in US children aged 4 to 11 years in relation to sociodemographic and weight status characteristics: a nationally representative cross-sectional analysis. *BMC Public Health*. 2008;8:366.
63. Butte NF, Puyau MR, Adolph AL, Vohra FA, Zakeri I. Physical activity in nonoverweight and overweight Hispanic children and adolescents. *Med Sci Sports Exerc*. 2007 Aug;39(8):1257-66.
64. Swinburn B, Egger G. Preventive strategies against weight gain and obesity. *Obes Rev*. 2002 Nov;3(4):289-301.
65. National Heart Lung and Blood Institute. Working Group Report on Future Research Directions in Childhood Obesity Prevention and Treatment. 2007 [cited; Available from: <http://www.nhlbi.nih.gov/meetings/workshops/child-obesity/index.htm>
66. Robert Wood Johnson Foundation. Childhood Obesity - The Challenge. 2008 [cited; Available from: <http://www.rwjf.org/childhoodobesity/challenge.jsp>
67. Wilfley DE, Stein RI, Saelens BE, et al. Efficacy of maintenance treatment approaches for childhood overweight: a randomized controlled trial. *JAMA*. 2007 Oct 10;298(14):1661-73.
68. Stice E, Shaw H, Marti CN. A meta-analytic review of obesity prevention programs for children and adolescents: the skinny on interventions that work. *Psychol Bull*. 2006 Sep;132(5):667-91.
69. Thomas H. Obesity prevention programs for children and youth: why are their results so modest? *Health Educ Res*. 2006 Dec;21(6):783-95.
70. Bluford DA, Sherry B, Scanlon KS. Interventions to prevent or treat obesity in preschool children: a review of evaluated programs. *Obesity (Silver Spring)*. 2007 Jun;15(6):1356-72.

71. Epstein LH, Valoski A, Wing RR, McCurley J. Ten-year follow-up of behavioral, family-based treatment for obese children. *JAMA*. 1990 Nov 21;264(19):2519-23.
72. Klohe-Lehman DM, Freeland-Graves J, Clarke KK, et al. Low-income, overweight and obese mothers as agents of change to improve food choices, fat habits, and physical activity in their 1-to-3-year-old children. *J Am Coll Nutr*. 2007 Jun;26(3):196-208.
73. Golan M, Kaufman V, Shahar DR. Childhood obesity treatment: targeting parents exclusively v. parents and children. *Br J Nutr*. 2006 May;95(5):1008-15.
74. Golan M, Crow S. Targeting parents exclusively in the treatment of childhood obesity: long-term results. *Obes Res*. 2004 Feb;12(2):357-61.
75. Shelton D, Le Gros K, Norton L, Stanton-Cook S, Morgan J, Masterman P. Randomised controlled trial: A parent-based group education programme for overweight children. *J Paediatr Child Health* 2007 Dec;43(12):799-805.
76. Van Duyn MA, McCrae T, Wingrove BK, et al. Adapting evidence-based strategies to increase physical activity among African Americans, Hispanics, Hmong, and Native Hawaiians: a social marketing approach. *Prev Chronic Dis*. 2007 Oct;4(4):A102.
77. Fitzgibbon ML, Stolley MR, Schiffer L, Van Horn L, KauferChristoffel K, Dyer A. Hip-Hop to Health Jr. for Latino preschool children. *Obesity (Silver Spring)*. 2006 Sep;14(9):1616-25.
78. Davidson M, Knafelz KA. Dimensional analysis of the concept of obesity. *J Adv Nurs*. 2006 May;54(3):342-50.
79. Coleman KJ, Tiller CL, Sanchez J, et al. Prevention of the epidemic increase in child risk of overweight in low-income schools: the El Paso coordinated approach to child health. *Arch Pediatr Adolesc Med*. 2005 Mar;159(3):217-24.
80. Sweetman C, Wardle J, Cooke L. Soft drinks and 'desire to drink' in preschoolers. *Int J Behav Nutr Phys Act*. 2008;5:60.
81. Basch CE, Zybert P, Shea S. 5-A-DAY: dietary behavior and the fruit and vegetable intake of Latino children. *Am J Public Health*. 1994 May;84(5):814-8.
82. Hamasha AA, Warren JJ, Levy SM, Broffitt B, Kanellis MJ. Oral health behaviors of children in low and high socioeconomic status families. *Pediatr Dent*. 2006 Jul-Aug;28(4):310-5.
83. Kranz S, Hartman T, Siega-Riz AM, Herring AH. A diet quality index for American preschoolers based on current dietary intake recommendations and an indicator of energy balance. *J Am Diet Assoc*. 2006 Oct;106(10):1594-604.
84. Jaramillo SJ, Yang SJ, Hughes SO, Fisher JO, Morales M, Nicklas TA. Interactive computerized fruit and vegetable preference measure for African-American and Hispanic preschoolers. *J Nutr Educ Behav*. 2006 Nov-Dec;38(6):352-9.
85. Dugas LR, Ebersole K, Schoeller D, et al. Very low levels of energy expenditure among pre-adolescent Mexican-American girls. *Int J Pediatr Obes*. 2008;3(2):123-6
86. Martinez SM, Ayala GX, Arredondo EM, Finch B, Elder J. Active transportation and acculturation among Latino children in San Diego County. *Prev Med*. 2008 Sep;47(3):313-8.
87. Swinburn B, Egger G, Raza F. Dissecting obesogenic environments: the development and application of a framework for identifying and prioritizing environmental interventions for obesity. *Prev Med*. 1999 Dec;29(6 Pt 1):563-70.
88. Bandura A. Social Cognitive Theory. *Annals of Child Development*. 1989;6:1-60
89. National Institutes of Health. Theory at a Glance, A Guide For Health Promotion Practice. Second Edition ed: U.S. Dept. of Health and Human Services,; 2005.
90. Sutherland LA, Beavers DP, Kupper LL, Bernhardt AM, Heatherton T, Dalton MA. Like parent, like child: child food and beverage choices during role playing. *Arch Pediatr Adolesc Med*. 2008 Nov;162(11):1063-9.
91. Styles JL, Meier A, Sutherland LA, Campbell MK. Parents' and caregivers' concerns about obesity in young children. a qualitative study. *Fam Community Health*. 2007 Oct-Dec;30(4):279-95.
92. Sherry B, McDivitt J, Birch LL, et al. Attitudes, practices, and concerns about child feeding and child weight status among socioeconomically diverse white, Hispanic, and African-American mothers. *J Am Diet Assoc*. 2004 Feb;104(2):215-21.

- 93 Crawford PB, Story M, Wang MC, Ritchie LD, Sabry ZI Ethnic issues in the epidemiology of childhood obesity *Pediatr Clin North Am* 2001 Aug,48(4) 855-78
- 94 Ingram M, Gallegos G, Elenes J Diabetes is a community issue the critical elements of a successful outreach and education model on the U S -Mexico border *Prev Chronic Dis* 2005 Jan,2(1) A15
- 95 Crawford D, Timperio A, Telford A, Salmon J Parental concerns about childhood obesity and the strategies employed to prevent unhealthy weight gain in children *Public Health Nutr* 2006 Oct,9(7) 889-95
- 96 Arredondo EM, Elder JP, Ayala GX, Campbell N, Baquero B, Duerksen S Is parenting style related to children's healthy eating and physical activity in Latino families? *Health Educ Res* 2006 Dec,21(6) 862-71
- 97 National Institutes of Health We Can! Ways to Enhance Children's Activity & Nutrition [Program Manual] 2007 2008 [cited Oct 27, 2008, Available from <http://www.nhlbi.nih.gov/health/public/heart/obesity/wecan/whats-we-can>
- 98 Palmeri D, Auld GW, Taylor T, Kendall P, Anderson J Multiple perspectives on nutrition education needs of low-income Hispanics *J Community Health* 1998 Aug,23(4) 301-16
- 99 Howard KR Childhood overweight parental perceptions and readiness for change *J Sch Nurs* 2007 Apr,23(2) 73-9
- 100 Sussner KM, Lindsay AC, Greaney ML, Peterson KE The influence of immigrant status and acculturation on the development of overweight in Latino families a qualitative study *J Immigr Minor Health* 2008 Dec,10(6) 497-505
- 101 Domian EW Cultural practices and social support of pregnant women in a northern New Mexico community *J Nurs Scholarsh* 2001,33(4) 331-6
- 102 Clarke KK, Freeland-Graves J, Klohe-Lehman DM, Bohman TM Predictors of weight loss in low-income mothers of young children *J Am Diet Assoc* 2007 Jul,107(7) 1146-54
- 103 McGlade MS, Saha S, Dahlstrom ME The Latina paradox an opportunity for restructuring prenatal care delivery *Am J Public Health* 2004 Dec,94(12) 2062-5
- 104 Ramirez AG, Chalela P, Gallion K, Velez LF Energy balance feasibility study for Latinas in Texas a qualitative assessment *Prev Chronic Dis* 2007 Oct,4(4) A98
- 105 Bull S, Eakin E, Reeves M, Kimberly R Multi-level support for physical activity and healthy eating *J Adv Nurs* 2006 Jun,54(5) 585-93
- 106 McArthur LH, Anguiano R, Gross KH Are household factors putting immigrant Hispanic children at risk of becoming overweight a community-based study in eastern North Carolina *J Community Health* 2004 Oct,29(5) 387-404
- 107 Lindsay AC, Sussner KM, Kim J, Gortmaker S The role of parents in preventing childhood obesity *Future Child* 2006 Spring,16(1) 169-86
- 108 Fitzgibbon ML, Stolley MR, Dyer AR, VanHorn L, KauferChristoffel K A community-based obesity prevention program for minority children rationale and study design for Hip-Hop to Health Jr *Prev Med* 2002 Feb,34(2) 289-97
- 109 Spruijt-Metz D, Lindquist CH, Birch LL, Fisher JO, Goran MI Relation between mothers' child-feeding practices and children's adiposity *Am J Clin Nutr* 2002 Mar,75(3) 581-6
- 110 Birch LL, Fisher JO Mothers' child-feeding practices influence daughters' eating and weight *Am J Clin Nutr* 2000 May,71(5) 1054-61
- 111 Sallis JF, Patterson TL, McKenzie TL, Nader PR Family variables and physical activity in preschool children *J Dev Behav Pediatr* 1988 Apr,9(2) 57-61
- 112 Sallis JF, Nader PR, Broyles SL, et al Correlates of physical activity at home in Mexican-American and Anglo-American preschool children *Health Psychol* 1993 Sep,12(5) 390-8
- 113 Mattocks C, Deere K, Leary S, et al Early life determinants of physical activity in 11 to 12 year olds cohort study *Br J Sports Med* 2008 Sep,42(9) 721-4
- 114 American Heart Association Overweight in Children 2009 [cited, Available from <http://www.americanheart.org/presenter.jhtml?identifier=4670>
- 115 Agnas WS, Mascola AJ Risk factors for childhood overweight *Curr Opin Pediatr* 2005 Oct,17(5) 648-52
- 116 Lau PW, Lee A, Ransdell L Parenting style and cultural influences on overweight children's attraction to physical activity *Obesity (Silver Spring)* 2007 Sep,15(9) 2293-302

117. Callejas L, Monsalve-Serna M, Hernandex M. Linking Community Helpers & Services with Schools Serving Latino Families. In. U.S Dept. of Education, Dept of Health and Human Services... editor.: University of South Florida; 2006. p 1-12.
118. Witmer A, Seifer SD, Finocchio L, Leslie J, O'Neil EH. Community health workers: integral members of the health care work force. *Am J Public Health*. 1995 Aug;85(8 Pt 1):1055-8.
119. Ramos IN, May M, Ramos KS. Environmental health training of promotoras in colonias along the Texas-Mexico border. *Am J Public Health*. 2001 Apr;91(4):568-70.
120. Brownson R, Ramirez L, Hoehner C, Cook R. *Audit Tool Analytic Version Land Use Environment*. St Louis: CDC/Robert Wood Johnson Foundation; 2003
121. Fred Hutchinson Cancer Research Center. Food Frequency Questionnaires. 2009 [cited; Available from [http://www.fhcrc.org/science/shared\\_resources/nutrition/ffq/index.html](http://www.fhcrc.org/science/shared_resources/nutrition/ffq/index.html)
122. Wendel-Vos GC, Schuit AJ, Saris WH, Kromhout D. Reproducibility and relative validity of the short questionnaire to assess health-enhancing physical activity. *J Clin Epidemiol*. 2003 Dec;56(12):1163-9.
123. CDC, Maternal and Child Health Bureau - DHHS,. Growth Chart Training. 2007 [cited; Available from: <http://depts.washington.edu/growth/index.htm>
124. Baylor College of Medicine. Children's BMI-percentile-for-age Calculator. 2007 [cited; Available from <http://kidsnutrition.org/bodycomp/bmiz2.html>
125. Liang KY, Zeger, S.L. Longitudinal Data Analysis Using Genralized Linear Biometrika. 1986;73:13-22.
126. Zeger SL, Liang, K.L. Longitudinal Data Analysis For Discrete and Continuous Outcomes. *Biometrika*. 1986;42(1):121-30.

**CHAPTER 5**  
**MANUSCRIPT 1**

**Cultural Adaptation for Ethnic Diversity:**  
**A Review of Obesity Interventions for Preschool Children**

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### **Abstract**

Obesity disproportionately affects ethnic minority preschool children in the United States placing them at risk for obesity related chronic illnesses and premature death. Effective culturally appropriate interventions are needed to improve health behaviors and reduce obesity in young high-risk minority children, while their lifestyle behaviors are still developing. This literature review describes and analyzes cultural adaptations applied to obesity interventions specifically targeting ethnic minority preschool children (2- to 5-year-olds). All childhood obesity intervention studies (e.g., diet, physical activity, parent-focused) since 2000 specifically targeting ethnic minority preschool children in the United States were included. Intervention studies not identifying the specific ethnic groups involved were excluded. Ten peer-reviewed obesity interventions studies targeting ethnic minority preschool children were reviewed. Five electronic databases and eight published literature were used to identify the studies. Published cultural adaptation guidelines were used to develop a mechanism to analyze, score, and rank the intervention adaptations. Cultural adaptations for the interventions varied widely in rigor, depth, and breadth. Results indicated a relative absence of appropriately adapted obesity interventions for ethnic minority groups, suggesting a need for more rigorous cultural adaptation guidelines when designing obesity interventions for diverse ethnicities. Culturally appropriate interventions may enhance the relevance and effectiveness of health promotion programs, improving health behaviors for vulnerable populations at risk for obesity.

Key words: literature review, cultural adaptations, obesity intervention, preschool children



## **Introduction**

The obesity epidemic has become a major public health concern in the United States. One third of all children are overweight or at risk for becoming overweight. Of these children, one fourth are toddlers and preschoolers (2 to 5 years old) (Ogden, Carroll, & Flegal, 2008). All face possible deteriorating health from cardiovascular disease and diabetes, leading to premature death (Franks et al., 2010; Goran, Lane, Toledo-Corral, & Weigensberg, 2008). Among preschool children, a disparity in the prevalence of obesity is especially evident in low-income, ethnic groups (Anderson & Whitaker, 2009; Division of Nutrition, Physical Activity, and Obesity, 2009). Alaskan Indian/Native American preschool children are at highest risk for obesity, followed by Hispanics and non-Hispanic blacks, compared to non-Hispanic white and Asian children.

A promising strategy to help reduce childhood obesity is to instill healthy behaviors in high-risk preschool children while they are young and their lifestyle behaviors are still developing (Kimbrow, Brooks-Gunn, & McLanahan, 2007; Nader et al., 2006). Recent systematic reviews found limited obesity intervention studies focused on ethnic minority preschool children (Branner, Koyama, & Jensen, 2008; Brown, Kelly, & Summerbell, 2007; Wilson, 2009). The U.S. Surgeon General (U.S. Department of Health and Human Services [DHHS], 2010) and the Institute of Medicine (IOM) (2006) call for more research to identify effective interventions for groups at high risk for obesity. Additional recommendations are for research designs to be more culturally appropriate for diverse ethnic minorities.

## **Objective**

The purpose of this literature review was to evaluate obesity intervention studies targeting ethnic minority preschool children (2- to 5-year-olds) in terms of cultural adaptations made to the interventions. This article addresses the importance of culturally relevant interventions and suggests practical cultural adaptation strategies for improving health promotion interventions. Use of such strategies may address a growing demand for guidance in improving interventions to effectively influence healthy behaviors in ethnic populations at high risk for childhood obesity. This may also help improve the quality of health promotion programs for high-risk, vulnerable populations (Cluss, Ewing, Long, Krieger, & Lovelace, 2010; Sanders Thompson et al., 2008).

A literature search found no reviews evaluating cultural adaptation of obesity intervention studies for ethnically diverse preschool children. This lack highlights the need to examine obesity interventions with this population to determine the extent of cultural adaptation employed

## **Need for Culturally Appropriate Interventions**

Interventions may be less effective in improving health behaviors, or even counterproductive, if investigators disregard the need for cultural adaptation or inadequately adapt interventions for the target population (Marin, 2006). Some ethnic groups may perceive culturally inappropriate health promotion interventions as confusing, irrelevant, impractical, and/or offensive (Castro, Barrera, & Martinez, 2004; Marin, 2006). Failure to promote participant engagement, compliance, and retention renders interventions less effective. In addition, such oversight can compound the

problem of health disparities experienced by many ethnic groups, further marginalizing these vulnerable populations (Marin, 2006; Stewart & Napoles-Springer, 2003). When designing interventions, it is therefore important to take into account the unique cultural values, beliefs, socio-economic status (SES), and environment of ethnically diverse populations (Elder, Ayala, Parra-Medina, & Talavera, 2009; Hurst & Nader, 2006).

Although well intentioned, investigators may not have the cultural competence to decide how best to effectively adapt an intervention for a particular ethnic group. A common mistake is to equate culture with race and ethnicity (Kreuter, Lukwago, Bucholtz, Clark, & Sanders-Thompson, 2003). For example, African American and Hispanic designations consist of multiple distinct subgroups defined not only by race, but also by regional, national, and continental origin (Kreuter et al., 2003; Office Of Minority Health, 2009), such as Puerto Ricans and Columbians. Cultural values and practices often differ within these subgroups.

Another common mistake is to assume culture is independent of economic status, influencing both healthy and unhealthy behaviors (Fuentes-Afflick & Hessol, 2008 ; Singh, Siahpush, & Kogan, 2010). For instance, some low-income families face multiple environmental risks contributing to obesity, such as food insecurities, limiting healthy diets, and unsafe, substandard community environments discouraging physical activity (Merchant, Dehghan, Behnke-Cook, & Anand, 2007). Intervention programs are more likely to succeed when they take into account unique cultural, economic, and environmental characteristics of ethnic populations (Elder, Ayala, Parra-Medina, et al., 2009; Hurst & Nader, 2006).

### **Need for Culturally Appropriate Measurement Tools**

To ensure the integrity of research results, a primary aim for culturally adapting measurement instruments is to generate culturally equivalent versions of original measures (e.g., surveys, questionnaires, and interview guides) (Castro et al., 2004). Simply translating a measure verbatim into the dominant language of the target population is insufficient for adapting key constructs, concepts, and content (Ramirez, Ford, Stewart, & Teresi, 2005). Diverse ethnic populations differ in cultural perspectives, and many constructs and concepts may not be commonly shared (Castro et al., 2004). Variations among different ethnic groups can introduce error into self-reported measures, leading to invalid, unreliable, suboptimal, and misleading results (Ramirez et al., 2005; Smith & Reynolds, 2002). Reliability assesses whether measures are consistent across settings and validity assesses whether measures reflect the original concept and construct (Creswell, 2009). Original concepts and constructs are more likely to be understood by research participants when they are appropriately translated.

Inappropriate translation of measures can alter and invalidate the original instrument's test properties (Martinez, Ainsworth, & Elder, 2008). Translated instruments should be: (a) equivalent to the original instrument; (b) culturally, conceptually, and contextually relevant for the intended audience; and (c) reliable and valid. Invalid and unreliable instruments yielding biased study results may lead to irrelevant, ineffective, and financially wasteful policies and health services for ethnic minority groups (Davidson & Knafl, 2006; Ramirez et al., 2005). Unfortunately, the process for translating study measures can be difficult, time consuming, and expensive (Stewart &

Napoles-Springer, 2003). There is, however, a growing demand by investigators for culturally equivalent measures ensuring valid and reliable study outcomes (Byrne & Watkins, 2003; Eremenco, Cella, & Arnold, 2005).

### **Concepts for Culturally Adapting Interventions**

Resnicow, Baranowski, Ahluwalia, and Braithwaite (1999) conceptualized cultural sensitivity in two dimensions - surface structures and deep structures. Surface and deep structure adaptations are used to design relevant interventions, program materials, and measurement instruments for ethnically diverse groups.

Surface structure adaptations employ visual and auditory cues to deliver culturally appropriate messages reflecting the observed circumstances and settings in which ethnic groups live. This may include music, pictures, foods, clothing, certain locations, and people relevant to the target population.

Deep structure is more abstract and can be easily overlooked. It involves cultural sensitivity requiring a comprehensive understanding of the target population's core cultural values, norms, and stressors, such as economic, social, and environmental factors affecting their health behaviors. For example, it may be prudent to focus on health rather than obesity to avoid stigmatizing overweight participants or offending members of cultures favoring overweight (Tailor & Ogden, 2009). Adaptation strategies incorporating deep structure are usually more difficult to achieve than surface structure adaptations because they are more complicated and time consuming. Deep structure adaptations to an intervention may require input from the community and feedback from pilot tests of program materials. Incorporating a target population's deep structure can dramatically improve the effectiveness of health promotion interventions.

Additional cultural adaptation concepts include targeting and tailoring that address how broad or focused an intervention should be to effect change in the intended population. Targeting is a broadly tuned intervention approach designed to reach most group members and presumes sufficient population homogeneity. In contrast, tailoring creates a more fine-tuned intervention to reach one specific person or subgroup (Elder, Ayala, Slymen, Arredondo, & Campbell, 2009; Kreuter et al., 2003).

### **Cultural Adaptation Strategies for Interventions**

To effectively influence healthy behavior changes, cultural adaptations to interventions may require modifications tailored to a target group's worldview (Elder, Ayala, Slymen, et al., 2009). Depending on an ethnic group's characteristics, different cultural adaptation strategies may be required to modify interventions and program materials. Kreuter and associates (2003) organized commonly used intervention adaptation strategies into five categories: (a) peripheral, (b) evidential, (c) constituent-involving, (d) socio-cultural, and (e) linguistic.

*Peripheral strategies* target a culture's surface structure by incorporating audio and/or visual elements, (e.g., music, colors, pictures, clothing, ethnic foods, or people) easily recognized by the ethnic group. *Evidential strategies* present scientific evidence regarding health issues relevant to the intended audience (e.g., causes and prevalence of certain illnesses or diseases common in the target population). For example, noting that Hispanic children are at high risk for type 2 diabetes is an evidential strategy.

*Constituent-involving strategies* solicit participation, knowledge, and input from members of the target community (e.g., lay health workers, leaders, and focus groups) regarding the culture's deep structure (e.g., cultural norms, beliefs, social structure, and

SES). Community participation is essential to help develop a culturally appropriate intervention program (Horn, McCracken, Dino, & Brayboy, 2008). Community collaboration allows investigators to develop cultural sensitivity, employ local cultural resources, understand community health issues, and solicit stakeholders' input for the intervention design (Cardona et al., 2009). This is useful for incorporating both surface and deep structure within an intervention.

*Socio-cultural strategies* incorporate extensive social and cultural values into the intervention design to provide context and meaning or “deep structure” for the intended group. Examples of socio-cultural strategies might include seeking family approval when recruiting participants from Hispanic cultures or providing child-care and social services for participants with limited finances (Resnicow et al., 1999). Making the intervention meaningful and relevant for participants can promote participant engagement and retention, thus improving program effectiveness.

*Linguistic strategies* typically follow established guidelines to develop culturally equivalent translations of measurement instruments, consent forms, and so on. The intent of linguistic strategies is to retain the concepts and constructs of the original materials and instruments while using language easily understood by the target population. Most published translation methods follow similar guidelines using forward and backward translation, independent bilingual translators, and multiple reviewers.

For example, Eremenco, Cella, and Arnold (2005) introduced a universal translation method for program materials and instruments. This method attempts to limit measurement bias from self-reported health measures by producing an equivalent translation of the original instrument or materials. It has been successful in retaining

original concepts and constructs across many languages and cultures. It is applicable across countries where the same language is spoken (e.g., French speakers in France and Switzerland) and across subcultures within the same country (e.g., Spanish speakers in New York and Los Angeles). Program materials (e.g., educational handouts and consent forms) can also be translated using this method.

Translating program materials and measures using the universal translation method involves several steps: (a) forward translation into the target group language by independent bilingual translators; (b) backward translation to compare the new document with the original document; (c) a review by the original document developer to ensure consistency between documents; (d) pilot testing the translated document with members of the target community to guide additional adaptations; and finally, (e) a second review by independent bilingual translators. After people familiar with the document's intent achieve translation consensus, it is proofread and reproduced.

It is important to ensure integrity of the original concept and construct throughout this stepwise process. Appropriate adaptations and translations can limit possible cross-cultural measurement bias and improve the credibility of study outcomes (Ramirez et al., 2005).

Culturally appropriate intervention designs typically use strategies from several categories. Each intervention is unique, requiring a different set of strategies to achieve cultural relevance for the target population. For example, to achieve deep structure, socio-cultural adaptations may require incorporating constituent-involving strategies. To develop culturally equivalent measures, linguistic strategies may use strategies from the four other categories outlined above. For review purposes, the authors categorized and



evaluated cultural adaptation strategies used to modify selected interventions reported in the literature.

## **Methods**

### **Data Sources**

Topical searches were performed using five electronic databases: PubMed<sup>®</sup>, ERIC<sup>®</sup>, CINAHL<sup>®</sup>, PsycINFO<sup>®</sup> and Google Scholar<sup>®</sup>. Key words used included: children, intervention, prevention, education, program, cultural, adaptation, adapted, ethnic minority, ethnically diverse, low-income, preschool, weight, obesity, overweight, nutrition, diet, exercise, and physical activity.

### **Inclusion and Exclusion Criteria**

All childhood obesity intervention studies (e.g., diet, physical activity, parent- focused) since 2000 specifically targeting ethnic minority preschool children in the United States were included. Intervention studies not identifying the specific ethnic groups involved in the study were excluded.

### **Data Extraction**

The search identified eight systematic reviews (Bluford, Sherry, & Scanlon, 2007; Campbell & Hesketh, 2007; Connelly, Duaso, & Butler, 2007; Griffith, 2009; Hesketh & Campbell, 2010; Small, Anderson, & Melnyk, 2007; Stice, Shaw, & Marti, 2006; Summerbell et al., 2005) scanned for obesity intervention studies meeting the inclusion criteria. Of these eight reviews, five targeted children and adolescents of all ages (Connelly et al., 2007; Griffith, 2009; Small et al., 2007; Stice et al., 2006; Summerbell et al., 2005), and three specifically targeted preschool and younger children (Bluford et al., 2007; Campbell & Hesketh, 2007; Hesketh & Campbell, 2010). Intervention

effectiveness was the primary focus of most of the reviews (Bluford et al., 2007; Campbell & Hesketh, 2007; Connelly et al., 2007; Griffith, 2009; Small et al., 2007; Stice et al., 2006; Summerbell et al., 2005), while one review focused on intervention quality (Hesketh & Campbell, 2010). Another published review addressed cultural adaptations made to childhood obesity interventions, but targeted only school age and adolescent children (Wilson, 2009). No reviews were found evaluating cultural adaptation strategies for obesity interventions targeting ethnic minority preschool children.

The database and systematic review search identified 20 abstracts of interest. Full copies of these articles were retrieved and assessed. Ten intervention study articles met all the inclusion criteria (Alhassan, Sirard, & Robinson, 2007; Clarke, Freeland-Graves, Klohe-Lehman, & Bohman, 2007; Clarke, Freeland-Graves, Klohe-Lehman, Milani, et al., 2007; Fitzgibbon et al., 2005, 2006; Harvey-Berino & Rourke, 2003; Klohe-Lehman et al., 2007; McGarvey et al., 2004; Williams, Strobino, Bollella, & Brotanek, 2004; Worobey, Pisuk, & Decker, 2004). Related references for these interventions were examined and authors contacted for additional details about intervention adaptations. Information extracted from the intervention studies selected for review included: sample size, participants' race/ethnicity, study design, intervention design, measurement tools, cultural adaptations, and findings.

### **Data Synthesis**

The interventions were analyzed and scored using: (a) Kreuter and colleagues' (2003) five categories for cultural adaptation strategies (peripheral, evidential, constituent-involving, socio-cultural and linguistic strategies), (b) surface versus deep

structure concepts, and (c) targeted versus tailored approaches. The selected interventions were then ranked based on the total score achieved.

A weighted, point-based scoring system was developed by the primary author to evaluate the overall depth and breadth of each intervention's cultural adaptation. Each of the five categories was assigned a weighted base score of 1 to 4 points. Less weight (1 point) was assigned to peripheral strategies involving surface structure adaptations reflecting cultural appearances (e.g., visual aids) and to evidential strategies addressing scientific evidence (e.g., risks for cardiovascular disease in obese children). More weight (2 points) was given to constituent-involving and socio-cultural strategies addressing deep structure. Linguistic strategies received the most weight, based on the complex and time-consuming translation requirements for materials (2 points) and instruments (2 points). Finally, each category was assigned a weighted tailored score, based on the level of tailoring employed. The most weight was given to tailoring for individual participants (1 point), less to tailoring for a subgroup (0.67 points), and the least to tailoring for the ethnic group as a whole (0.33 points). Table 1 summarizes the scoring system.

A five-step procedure was used to analyze, score, and rank the interventions. Each intervention was first evaluated to determine which of the five cultural adaptation strategies were employed and whether the strategies were tailored. Next, each strategy category employed was analyzed and given a base score and a tailored score, then summed to create a total category score. All the category scores for each intervention were summed for a total adaptation score (15 maximum points). Finally, a normalized percent score was obtained by dividing the total adaptation score by 15, the maximum possible score.

Prior to scoring, three interval ranks were selected: minimal adaptation ( $\leq 50\%$ ), moderate adaptation ( $> 50\%$  and  $\leq 75\%$ ), and comprehensive adaptation ( $> 75\%$ ). The intervals were chosen so a moderately ranked intervention would employ at least two deep and one surface structure-based category, all tailored at the subgroup level. Table 2 presents the final scores and rank for each intervention reviewed.

## Results

Ten studies met the criteria for review (see Data Extraction section). Table 3 summarizes each study's design including documented details of cultural adaptation strategies. Eight of the ten interventions were family-based, focused on the mother and child (Clarke, Freeland-Graves, Klohe-Lehman, & Bohman, 2007; Clarke, Freeland-Graves, Klohe-Lehman, Milani, et al., 2007; Fitzgibbon et al., 2005, 2006; Harvey-Berino & Rourke, 2003; Klohe-Lehman et al., 2007; McGarvey et al., 2004; Worobey et al., 2004). The other two studies (Alhassan et al., 2007; Worobey et al., 2004) focused solely on the child. Of the ten interventions, two were home-based (Harvey-Berino & Rourke, 2003; Worobey et al., 2004), four were school-based (Alhassan et al., 2007; Fitzgibbon et al., 2005, 2006; Williams et al., 2004), and four were community-based (Clarke, Freeland-Graves, Klohe-Lehman, & Bohman, 2007; Clarke, Freeland-Graves, Klohe-Lehman, Milani, et al., 2007; Klohe-Lehman et al., 2007; McGarvey et al., 2004). All but one intervention (Williams et al., 2004) included measurement instruments. Of the five cultural adaptation categories, none of the interventions used evidential strategies.

### **Comprehensively Adapted Interventions**

The two Fitzgibbon et al. studies (2005, 2006) exhibited the highest cultural adaptation scores and comprehensive adaptation rank. Both used the same intervention design, targeting different ethnic groups. To tailor and culturally adapt their interventions, both studies used four of the five adaptation categories. For example, socio-cultural strategies incorporated participants' requests for specific education materials (e.g., newsletters), class schedules, and safety considerations. Linguistic strategies for translating program materials and measures followed established guidelines. Furthermore, step-wise procedures were reported for the interventions' adaptations.

### **Moderately Adapted Interventions**

Three interventions exhibited moderate cultural adaptation. Klohe-Leman et al. (2007) used four of the five categorical strategies: (a) three peripheral visual aids for nutrition education, (b) one constituent-involving strategy, (c) four socio-cultural strategies integrating norms regarding ethnic foods, as well as economic and environmental factors, and (d) a linguistic strategy for one valid and reliable instrument. No adaptations were reported for the other instrument or program materials (e.g., handouts, curriculum).

Both studies by Clarke and colleagues (Clarke, Freeland-Graves, Klohe-Lehman, & Bohman, 2007; Clarke, Freeland-Graves, Klohe-Lehman, Milani, et al., 2007) adopted the Klohe-Leman et al. (2007) intervention design including cultural adaptations. The linguistic strategy for both Clarke et al. interventions used the same valid and reliable instrument employed by Klohe-Leman et al. (2007). No adaptations were reported for other instruments or program materials.

### **Minimally Adapted Interventions**

Cultural adaptations for the Harvey-Berino and Rouke (2003) intervention documented two out of five adaptation categories. Socio-cultural adaptations were incorporated by constituent-involving community peer educators assigned to adapt the intervention. However, no specific adaptations were reported for the intervention, program materials, or instruments, resulting in a minimal ranking.

The Worobey, Pisuk, and Decker intervention (2004) also exhibited minimal adaptations. Only one of five adaptation categories was reported. A peripheral strategy addressing surface structure used bilingual public health nurses to facilitate the intervention. No cultural adaptations were reported for the intervention itself, materials, or instruments.

The McGarvey and associates' intervention (2004) also received a minimal rank. Cultural adaptations to the intervention included three out of five categories: peripheral, constituent involving, and linguistic. Spanish program materials were provided, but translation procedures for these materials were not described.

### **Intervention Outliers**

By design, two of the interventions required minimal cultural adaptation. Thus, their intervention did not warrant an adaptation score. The Williams and associates intervention (2004) required no oral or written input from participants. It simply directed the school foodservice to provide low saturated fat meals to the preschool children. No culturally adapted meals were provided. Educational materials were developmentally adapted, but cultural adaptation was not reported.

The Alhassan and colleagues' (2007) intervention was an observational study. No oral or written input was required from the children. This was, however, the only intervention reporting a culturally adapted consent form.

### **Discussion**

Major differences were identified between the comprehensively, moderately, and minimally adapted interventions. Interventions ranked highest for cultural adaptation (Clarke, Freeland-Graves, Klohe-Lehman, & Bohman, 2007; Clarke, Freeland-Graves, Klohe-Lehman, Milani, et al., 2007; Fitzgibbon et al., 2005, 2006; Klohe-Lehman et al., 2007) incorporated four of the five strategy categories and involved surface and deep structure, as well as tailoring. The Fitzgibbon et al. studies (2005, 2006) were ranked highest because they reported multiple tailored cultural adaptations of the interventions, program materials, and instruments.

A noteworthy feature elevating both the Fitzgibbon and colleagues' interventions above the others was the in-depth use of linguistic strategies. Both interventions adapted all program materials and instruments and documented detailed translation procedures based on established guidelines as outlined by Eremenco and associates (2005). In contrast, moderately and minimally adapted interventions either neglected or only partially documented cultural adaptations made to program materials and instruments. Thus, comprehensive interventions not only used multiple cultural adaptation strategies, but also thoroughly documented them.

After examining lower ranked interventions, a clear pattern of weakness emerged, including limited or missing documentation of adaptation strategies and limited or missing linguistic strategies for adapting program materials and instruments. This does

not necessarily mean these interventions were culturally inappropriate, but it may mean the interventions are difficult or impossible to validate or replicate. For example, the Harvey-Berino and Rourke intervention (2003) used a community-based participatory approach delegating responsibility for cultural adaptations to the Mohawk community. This is an effective strategy for incorporating the culture's surface and deep structure to design a relevant intervention (Horn et al., 2008), but the absence of documented adaptations and procedures precluded a higher rank.

Interestingly, none of the interventions used evidential strategies. Further research may be needed to evaluate the effectiveness of using this adaptation strategy with obesity interventions.

### **Limitations**

This review exhibited several limitations. No known scoring system for cultural adaptation was available. Therefore, a weighted scoring system was developed, as previously described. The weights assigned to each adaptation category, the rank thresholds, and scores for each study reviewed are open to debate. In addition, some interventions may have deserved a higher rank, but their adaptation strategies were inadequately documented. Since few studies qualified for review, it is difficult to draw universally valid inferences regarding cultural adaptations.

There were consistent deficiencies in the studies reviewed. Most striking was in the last decade; only 10 studies were identified targeting obesity interventions for ethnic minority preschool children. Given the severity of childhood obesity, more research is needed on culturally adapted obesity interventions for high-risk ethnic groups. The



paucity of studies on high-risk ethnic groups is an example of the health disparities facing vulnerable populations.

Another deficiency was the limited detail on adaptation and translation procedures for health promotion messages, materials, and measurement instruments. Elder, Ayala, Parra-Medina, and Talavera (2009) reported that a majority of U. S. ethnic minority group members are functionally illiterate (reading at or below fourth grade) or marginally illiterate (reading between fifth and eighth grade). A common practice is to simply translate directly from English to the dominant ethnic language. This can render the translations culturally and linguistically inappropriate, especially for populations with low literacy levels. Appropriate linguistic adaptations of measures and program materials improve comprehension among low-literacy ethnic populations, essential to reducing reporting bias and ensure credibility of study results.

Results seemed to indicate no correlation between the extent of cultural adaptation and intervention effectiveness. One reason may have been the lack of rigor in the study designs. Most of the studies reviewed were not randomized controlled trials. Therefore, influences from confounding variables were difficult to identify or control. Second, inadequate cultural adaptation of the intervention may have resulted in non-equivalent measures. Such inappropriate or inadequate translation of measures could have introduced significant bias, threatening the integrity of the study results (Martinez et al., 2008). A third reason may have been the lack of adaptation strategies to enhance the intervention's effectiveness. Strategies incorporating deep structure were also lacking and might have enhanced the relevance of interventions for ethnic groups.

Higher ranked interventions documented multiple deep structure strategies, whereas, lower ranked interventions used fewer strategies for deep structure. For example, constituent-involving strategies employed in the Fitzgibbons et al. interventions (2005; 2006) included stakeholder input, focus groups, and the use of bicultural/bilingual educators (Fitzgibbon, Stolley, Dyer, VanHorn, & KauferChristoffel, 2002). In contrast, Worobey and associates (2004) used no constituent-involving strategies. Other clinicians and investigators have expressed limited awareness of published guidelines for culturally adapting interventions and translating materials (Cluss et al., 2010; Sanders Thompson et al., 2008). This may explain the imbalance between higher and lower ranked interventions.

### **Implications**

Standardized guidelines recognized and endorsed by health organizations, such as the Institute of Medicine and the American Nurses Association, are needed to improve the quality of culturally adapted interventions and translated program materials and instruments. Making standardized guidelines available to health promotion practitioners and investigators could help address health disparities and the paucity of effective interventions for high-risk vulnerable populations. Standardizing adaptation guidelines may be difficult, but will pay large dividends by enhancing the ability of investigators to efficiently design and tailor effective interventions for ethnically diverse populations.

Clearly, research interventions should be appropriately adapted to be culturally relevant for the target ethnic group. One suggestion is for funding agencies to require grantees to adequately document details of adaptation strategies used for interventions targeting ethnically diverse populations. This may improve intervention effectiveness and

credibility of study results. It would place emphasis on culturally adapting interventions for ethnically diverse populations and help reduce disparity in the quality of health promotion programs available to vulnerable populations.

### **Conclusions**

This review underscored the relative absence of culturally adapted obesity interventions for ethnic populations. Comprehensively adapted interventions employed multiple cultural adaptation strategies specifically tailored to ethnic populations. Findings suggest three primary recommendations. Documenting cultural adaptation strategies is crucial to support the integrity of study outcomes and permit study replication. Standardized cultural adaptation guidelines are needed for clinicians and investigators involved in health promotion. Further research is needed for effective, culturally adapted interventions targeting ethnically diverse preschool children at risk for obesity.

## References

- Alhassan, S., Sirard, J. R., & Robinson, T. N. (2007). The effects of increasing outdoor play time on physical activity in Latino preschool children. *International Journal of Pediatric Obesity*, 2, 153-158. doi: 780590239  
[pii]10.1080/17477160701520108
- Anderson, S. E., & Whitaker, R. C. (2009). Prevalence of obesity among US preschool children in different racial and ethnic groups. *Archives of Pediatric and Adolescent Medicine*, 163, 344-348. doi: 163/4/344  
[pii]10.1001/archpediatrics.2009.18
- Bluford, D. A., Sherry, B., & Scanlon, K. S. (2007). Interventions to prevent or treat obesity in preschool children: A review of evaluated programs. *Obesity (Silver Spring)*, 15, 1356-1372. doi: 15/6/1356 [pii]10.1038/oby.2007.163
- Branner, C. M., Koyama, T., & Jensen, G. L. (2008). Racial and ethnic differences in pediatric obesity-prevention counseling: National prevalence of clinician practices. *Obesity (Silver Spring)*, 16, 690-694. doi: oby200778  
[pii]10.1038/oby.2007.78
- Brown, T., Kelly, S., & Summerbell, C. (2007). Prevention of obesity: A review of interventions. *Obesity Reviews*, 8(Suppl 1), 127-130. doi: OBR331  
[pii]10.1111/j.1467-789X.2007.00331.x
- Byrne, B., & Watkins, D. (2003). The issue of measurement invariance revisited. *Journal of Cross-Cultural Psychology*, 34, 155-175.
- Campbell, K. J., & Hesketh, K. D. (2007). Strategies which aims to positively impact on weight, physical activity, diet and sedentary behaviours in children from zero to

five years. A systematic review of the literature. *Obesity Reviews*, 8, 327-338. doi:  
OBR305 [pii]

10.1111/j.1467-789X.2006.00305.x

Cardona, J. P., Holtrop, K., Cordova, D., Jr., Escobar-Chew, A. R., Horsford, S., Tams, L., . . . Fitzgerald, H. E. (2009). "Queremos aprender": Latino immigrants' call to integrate cultural adaptation with best practice knowledge in a parenting intervention. *Fam Process*, 48, 211-231.

Castro, F. G., Barrera, M., Jr., & Martinez, C. R., Jr. (2004). The cultural adaptation of prevention interventions: Resolving tensions between fidelity and fit. *Prevention Science*, 5, 41-45.

Clarke, K. K., Freeland-Graves, J., Klohe-Lehman, D. M., & Bohman, T. M. (2007). Predictors of weight loss in low-income mothers of young children. *Journal of the American Dietetic Association*, 107, 1146-1154. doi: S0002-8223(07)00587-1 [pii]10.1016/j.jada.2007.04.016

Clarke, K. K., Freeland-Graves, J., Klohe-Lehman, D. M., Milani, T. J., Nuss, H. J., & Laffrey, S. (2007). Promotion of physical activity in low-income mothers using pedometers. *Journal of the American Dietetic Association*, 107, 962-967. doi: S0002-8223(07)00429-4 [pii]10.1016/j.jada.2007.03.010

Cluss, P. A., Ewing, L. J., Long, K. A., Krieger, W. G., & Lovelace, J. (2010). Adapting pediatric obesity treatment delivery for low-income families: A public-private partnership. *Clinical Pediatrics (Philadelphia)*, 49, 123-129. doi: 0009922809346572 [pii]10.1177/0009922809346572

- Connelly, J. B., Duaso, M. J., & Butler, G. (2007). A systematic review of controlled trials of interventions to prevent childhood obesity and overweight: A realistic synthesis of the evidence. *Public Health, 121*, 510-517. doi: S0033-3506(07)00006-6 [pii]10.1016/j.puhe.2006.11.015
- Creswell, J. W. (2009). *Research Design* (3<sup>rd</sup> ed.). Thousand Oaks, CA: Sage.
- Davidson, M., & Knafl, K. A. (2006). Dimensional analysis of the concept of obesity. *Journal of Advanced Nursing, 54*, 342-350. doi: JAN3812 [pii]10.1111/j.1365-2648.2006.03812.x
- Division of Nutrition, Physical Activity, and Obesity. (2009). Obesity prevalence among low-income, preschool-aged children - United States, 1998-2008. *Morbidity & Mortality Weekly Report, 58*, 769-773. doi: mm5828a1 [pii]
- Elder, J. P., Ayala, G. X., Parra-Medina, D., & Talavera, G. A. (2009). Health communication in the Latino community: Issues and approaches. *Annual Review of Public Health, 30*, 227-251. doi: 10.1146/annurev.publhealth.031308.100300
- Elder, J. P., Ayala, G. X., Slymen, D. J., Arredondo, E. M., & Campbell, N. R. (2009). Evaluating psychosocial and behavioral mechanisms of change in a tailored communication intervention. *Health Education & Behavior, 36*, 366-380. doi: 1090198107308373 [pii]10.1177/1090198107308373
- Eremenco, S. L., Cella, D., & Arnold, B. J. (2005). A comprehensive method for the translation and cross-cultural validation of health status questionnaires. *Evaluation and the Health Professions, 28*, 212-232. doi: 28/2/212 [pii]10.1177/0163278705275342

- Fitzgibbon, M. L., Stolley, M. R., Dyer, A. R., VanHorn, L., & KauferChristoffel, K. (2002). A community-based obesity prevention program for minority children: Rationale and study design for Hip-Hop to Health Jr. *Preventive Medicine, 34*, 289-297. doi: 10.1006/pmed.2001.0977S0091743501909776 [pii]
- Fitzgibbon, M. L., Stolley, M. R., Schiffer, L., Van Horn, L., KauferChristoffel, K., & Dyer, A. (2005). Two-year follow-up results for Hip-Hop to Health Jr.: A randomized controlled trial for overweight prevention in preschool minority children. *Journal of Pediatrics, 146*, 618-625. doi: S0022347604011710 [pii]10.1016/j.jpeds.2004.12.019
- Fitzgibbon, M. L., Stolley, M. R., Schiffer, L., Van Horn, L., KauferChristoffel, K., & Dyer, A. (2006). Hip-Hop to Health Jr. for Latino preschool children. *Obesity (Silver Spring), 14*, 1616-1625. doi: 14/9/1616 [pii]10.1038/oby.2006.186
- Franks, P. W., Hanson, R. L., Knowler, W. C., Sievers, M. L., Bennett, P. H., & Looker, H. C. (2010). Childhood obesity, other cardiovascular risk factors, and premature death. *New England Journal of Medicine, 362*, 485-493. doi: 362/6/485 [pii]10.1056/NEJMoa0904130
- Fuentes-Afflick, E., & Hessol, N. A. (2008). Overweight in young Latino children. *Archives of Medical Research, 39*, 511-518. doi: S0188-4409(08)00087-8 [pii]10.1016/j.arcmed.2008.02.008
- Goran, M. I., Lane, C., Toledo-Corral, C., & Weigensberg, M. J. (2008). Persistence of pre-diabetes in overweight and obese Hispanic children: Association with progressive insulin resistance, poor beta-cell function, and increasing visceral fat. *Diabetes, 57*, 3007-3012. doi: db08-0445 [pii]10.2337/db08-0445

- Griffith, J. R. (2009). Assessing childhood obesity programs in low-socioeconomic and diverse communities. *Journal of the National Medical Association, 101*, 421-429.
- Harvey-Berino, J., & Rourke, J. (2003). Obesity prevention in preschool native-american children: A pilot study using home visiting. *Obesity Research, 11*, 606-611. doi: 10.1038/oby.2003.87
- Hesketh, K. D., & Campbell, K. J. (2010). Interventions to prevent obesity in 0-5 year olds: An updated systematic review of the literature. *Obesity (Silver Spring), 18*(Suppl 1), S27-35. doi: oby2009429 [pii]10.1038/oby.2009.429
- Horn, K., McCracken, L., Dino, G., & Brayboy, M. (2008). Applying community-based participatory research principles to the development of a smoking-cessation program for American Indian teens: "Telling our story". *Health Education & Behavior, 35*, 44-69. doi: 1090198105285372 [pii]10.1177/1090198105285372
- Hurst, S., & Nader, P. (2006). Building community involvement in cross-cultural indigenous health programs. *International Journal for Quality in Health Care, 18*, 294-298. doi: mzl013 [pii]10.1093/intqhc/mzl013
- Institute of Medicine. (2006). *Progress in preventing childhood obesity, How do we measure up?* Washington, D.C.: The National Academies Press.
- Kimbrow, R. T., Brooks-Gunn, J., & McLanahan, S. (2007). Racial and ethnic differentials in overweight and obesity among 3-year-old children. *American Journal of Public Health, 97*, 298-305. doi: AJPH.2005.080812 [pii]10.2105/AJPH.2005.080812
- Klohe-Lehman, D. M., Freeland-Graves, J., Clarke, K. K., Cai, G., Voruganti, V. S., Milani, T. J., . . . Bohman, T. M. (2007). Low-income, overweight and obese mothers as agents of change to improve food choices, fat habits, and physical



- activity in their 1-to-3-year-old children. *Journal of the American College of Nutrition*, 26, 196-208.
- Kreuter, M. W., Lukwago, S. N., Bucholtz, R. D., Clark, E. M., & Sanders-Thompson, V. (2003). Achieving cultural appropriateness in health promotion programs: Targeted and tailored approaches. *Health Education & Behavior*, 30, 133-146.
- Marin, G. (2006). Defining culturally appropriate community interventions: Hispanics as a case study. *Journal of Community Psychology*, 21, 149 - 161.
- Martinez, S. M., Ainsworth, B. E., & Elder, J. P. (2008). A review of physical activity measures used among US Latinos: Guidelines for developing culturally appropriate measures. *Annals of Behavioral Medicine*, 36, 195-207. doi: 10.1007/s12160-008-9063-6
- McGarvey, E., Keller, A., Forrester, M., Williams, E., Seward, D., & Suttle, D. E. (2004). Feasibility and benefits of a parent-focused preschool child obesity intervention. *American Journal of Public Health*, 94, 1490-1495. doi: 94/9/1490 [pii]
- Merchant, A. T., Dehghan, M., Behnke-Cook, D., & Anand, S. S. (2007). Diet, physical activity, and adiposity in children in poor and rich neighbourhoods: A cross-sectional comparison. *Nutrition Journal*, 6, 1-7. doi: 1475-2891-6-1 [pii]10.1186/1475-2891-6-1
- Nader, P. R., O'Brien, M., Houts, R., Bradley, R., Belsky, J., Crosnoe, R., . . . Susman, E. J. (2006). Identifying risk for obesity in early childhood. *Pediatrics*, 118, e594-601. doi: 118/3/e594 [pii]10.1542/peds.2005-2801

Office Of Minority Health. (2009). Minority populations: Hispanic/Latino profile.

Retrieved from

<http://minorityhealth.hhs.gov/templates/browse.aspx?lvl=3&lvlid=31>

Ogden, C. L., Carroll, M. D., & Flegal, K. M. (2008). High body mass index for age among US children and adolescents, 2003-2006. *JAMA*, *299*, 2401-2405. doi: 299/20/2401 [pii]10.1001/jama.299.20.2401

Ramirez, M., Ford, M. E., Stewart, A. L., & Teresi, J. A. (2005). Measurement issues in health disparities research. *Health Services Research*, *40*, 1640-1657. doi: HESR450 [pii]10.1111/j.1475-6773.2005.00450.x

Resnicow, K., Baranowski, T., Ahluwalia, J. S., & Braithwaite, R. L. (1999). Cultural sensitivity in public health: Defined and demystified. *Ethnicity and Disease*, *9*(1), 10-21.

Sanders Thompson, V. L., Cavazos-Rehg, P. A., Jupka, K., Caito, N., Gratzke, J., Tate, K. Y., . . . Kreuter, M.W. (2008). Evidential preferences: Cultural appropriateness strategies in health communications. *Health Education Research*, *23*(3), 549-559. doi: cym029 [pii]10.1093/her/cym029

Singh, G. K., Siahpush, M., & Kogan, M. D. (2010). Neighborhood socioeconomic conditions, built environments, and childhood obesity. *Health Affairs (Millwood)*, *29*, 503-512. doi: 29/3/503 [pii]10.1377/hlthaff.2009.0730

Small, L., Anderson, D., & Melnyk, B. M. (2007). Prevention and early treatment of overweight and obesity in young children: A critical review and appraisal of the evidence. *Pediatric Nursing*, *33*, 149-152, 155-161, 127.

- Smith, A. M., & Reynolds, N. L. (2002). Measuring cross-cultural service quality: A framework for assessment. *International Marketing Review*, *19*, 450-482.
- Stewart, A. L., & Napoles-Springer, A. M. (2003). Advancing health disparities research: Can we afford to ignore measurement issues? *Medical Care*, *41*, 1207-1220. doi: 10.1097/01.MLR.0000093420.27745.48
- Stice, E., Shaw, H., & Marti, C. N. (2006). A meta-analytic review of obesity prevention programs for children and adolescents: The skinny on interventions that work. *Psychological Bulletin*, *132*, 667-691. doi: 2006-10465-002 [pii]10.1037/0033-2909.132.5.667
- Summerbell, C. D., Waters, E., Edmunds, L. D., Kelly, S., Brown, T., & Campbell, K. J. (2005). Interventions for preventing obesity in children. *Cochrane Database of Systematic Reviews* (3). Art. No.: CD001871. DOI: 10.1002/14651858.CD001871.pub2
- Taylor, A., & Ogden, J. (2009). Avoiding the term 'obesity': An experimental study of the impact of doctors' language on patients' beliefs. *Patient Education and Counseling*, *76*, 260-264. doi: S0738-3991(08)00658-7 [pii]10.1016/j.pec.2008.12.016
- U.S. Department of Health and Human Services. (2010). *The Surgeon General's vision for a healthy and fit nation*. Retrieved from <http://www.surgeongeneral.gov/library/obesityvision/obesityvision2010.pdf>
- Williams, C. L., Strobino, B. A., Bollella, M., & Brotanek, J. (2004). Cardiovascular risk reduction in preschool children: The "Healthy Start" project. *Journal of the American College of Nutrition*, *23*, 117-123.

Wilson, D. K. (2009). New perspective on health disparities and obesity interventions in youth. [review of literature]. *Journal of Pediatric Psychology, 34*, 231-244.

Worobey, J., Pisuk, J., & Decker, K. (2004). Diet and behavior in at-risk children: Evaluation of an early intervention program. *Public Health Nursing, 21*, 122-127.  
doi: 10.1111/j.0737-1209.2004.021205.xPHN21205 [pii]

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## CULTURAL ADAPTATION FOR ETHNIC DIVERSITY: A REVIEW

Table 1. Scoring System for Cultural Adaptations

Adaptation Strategy Category	Scoring Method and Strategy Examples	Category Base Score (Max)	Category Tailored Score (Max)	Category Total Score (Max)
Peripheral	<p><u>Base Score</u> = 1 if strategy used</p> <p>Ethnic food models Visual aids/colorful pictures Puppet food characters</p> <p><u>Tailored Score</u>: See footnote *</p>	1	1	2
Evidential	<p><u>Base Score</u> = 1 if strategy used</p> <p>Risk of Type 2 diabetes for obese Hispanic children Risk of sexual transmitted disease for sexually active teens</p> <p><u>Tailored Score</u>: See footnote *</p>	1	1	2
Constituent-involving	<p><u>Base Score</u> = 2 if strategy used</p> <p>Lay health care workers, culturally sensitive staff Focus groups of target group members Bilingual/bicultural interviewers, educators, etc. Community participatory approach</p> <p><u>Tailored Score</u>: See footnote*</p>	2	1	3
Socio-Cultural	<p><u>Base Score</u> = 2 if strategy or concept used</p> <p>Incorporating input from stakeholders Incorporating feedback from pilot-tests Child care Reflecting culture (e.g., norms, beliefs, values, SES and environment)</p> <p><u>Tailored Score</u>: See footnote *</p>	2	1	3
Linguistic	<p><u>Base Material Score</u> = <math>2 \times \frac{\# \text{ Translated Program Materials}}{\# \text{ Total Program Materials}}</math></p> <p><u>Base Instrument Score</u> = <math>2 \times \frac{\# \text{ V \&amp; R (or) Translated Instruments}}{\# \text{ Total Study Instruments}}</math></p> <p><u>Tailored Score</u>: See footnote *</p> <p><b>Category Total Score = Base Score + Tailored Score</b> <b>Total Adaptation Score = <math>\sum</math> Category Total Scores</b></p>	2 Mat.  2 Instr.	1	5
		Max 10	Max 5	Max 15

\* Tailored Score: None = 0, Group = .33, Subgroup = 0.67, Individual = 1

V & R = valid and reliable

$\sum$  = Sum

Mat. = Materials

Instr = Instrument

CULTURAL ADAPTATION FOR ETHNIC DIVERSITY

**Table 2. Cultural Adaptation Scores for Interventions**

Intervention Study	Adaptation Rank	Normalized Adaptation Score (%)	Total Adaptation Score	Total Peripheral Score (B + T)	Total Evidential Score (B + T)	Total Constituent-involving Score (B + T)	Total Socio-cultural Score (B + T)	Total Linguistic Score (Mat B + Instr. B + T)
Williams, Strobino, Bollella and Brotanck (2004) *	N/A	N/A	*	-	-	-	-	-
Alhassan, Sirard, and Robinson (2007) *	N/A	N/A	*	-	-	-	-	-
Worobey, Pisuk, and Decker (2004)	Minimal	7%	1	1 + 0	0	0	0	0
Harvey-Berino and Rourke (2003)	Minimal	36%	5.34	0	0	2 + 0.67	2 + 0.67	0 + 0
McGarvey et al. (2004)	Minimal	44%	6.67	1 + 0.67	0	2 + 0.67	0	0 + 2 + 0.33
Clark et al. (July 2007)	Moderate	53%	7.90	1 + 0.67	0	2 + 0.67	2 + 0.67	0 + 0.22 + 0.67
Klohe-Lehman et al. (2007)	Moderate	58%	8.68	1 + 0.67	0	2 + 0.67	2 + 0.67	0 + 1 + 0.67
Clark et al (June 2007)	Moderate	58%	8.68	1 + 0.67	0	2 + 0.67	2 + 0.67	0 + 1 + 0.67
Fitzgibbon et al. (2005)	Comprehensive	78%	11.68	1 + 0.67	0	2 + 0.67	2 + 0.67	2 + 2 + 0.67
Fitzgibbon et al. (2006)	Comprehensive	78%	11.68	1 + 0.67	0	2 + 0.67	2 + 0.67	2 + 2 + 0.67

\* Intervention design required minimal cultural adaptation  
 B + T = Base + Tailored scores  
 Mat. = Materials  
 Instr. = Instrument

CULTURAL ADAPTATION FOR ETHNIC DIVERSITY

**Table 3. Summary of Intervention Studies Including Cultural Adaptation Strategies and Procedures**

Author(s)	Design	Sample	Intervention & Measurement Tools	Cultural Adaptation Strategy and Procedures	Findings
Harvey-Beirno and Rourke (2003)	Pilot test, feasibility, comparative cohort study	American Indian, Mohawk mother & child 9 months to 3 years old  Group 1 (N = 20) parent support only  Group 2 (N = 20) parent support & obesity prevention intervention  St. Regis Mohawk Community (NY Ontario & Quebec)	16-week, obesity prevention intervention to assess change in mother's health behaviors to help reduce the risk of obesity in their children  Facilitated through home visits by lay health workers  Instruments 1) Outcome expectation report 2) Self-efficacy survey 3) Intention to change survey 4) Child Feeding Questionnaire (CFQ)	<i>Constituent-Involving</i> 1) Input from community peer educator (PE), project director and consultant 2) Intensive program training 3) Community culturally adapted intervention program  Tools. No reported cultural translation procedures	No significant differences in BMI, maternal eating or exercise behaviors  Grp 2 significantly decreased energy intake versus Grp 1  Decreased CFQ score for Grp 2 versus Grp 1 indicating less restrictive feeding by parents  No group differences in % of overweight or obese children before and after intervention
Williams, Strobino, Bollella, Brotanek (2004)	Quasi-experimental, multi-component, pretest, posttest study	Children 3 to 4 years old  Group 1 (N=242) meals & education  Group 2 (N=195) meals only  Control Group (N=350)  <u>G1%/G2%/C%</u> Hispanic 142 / 19 / 574 Black 542 / 449 / 398 White 316 / 532 / 28	9-month intervention to promote healthy behaviors and decrease CVD risk factors for children Health education and reduced saturated fat in school meals  Instruments None	<i>Socio-Cultural</i> Developmentally appropriate educational materials for children  No report of cultural adaptation of parent program materials  No report of culturally adapting meals	Reduction (30%) in total serum cholesterol in Groups 1 & 2 compared to control  Intervention effective in reducing serum cholesterol, positive in children "at risk"



CULTURAL ADAPTATION FOR ETHNIC DIVERSITY

**Table 3. Continued**

Author(s)	Design	Sample	Intervention & Measurement Tools	Cultural Adaptation Strategy and Procedures	Findings															
Worobey, Pisuk, Decker (2004)	One-group, pre- and posttest	Low income, families of children with iron deficiency or high lead levels and pre-existing developmental delays  Children's ages: < 6 years  Intervention (N=60)  Hispanics 74% Non-Hisp Whites 15% Eastern Indians 7% Asians 2% African-Am 2%	8-month, customized parent-focused home visits to improve health and developmental status in children and families  Instruments: Developmental Assessment of Young Children (DAYC)	No reported cultural adaptation of intervention  <i>Peripheral</i> Used bilingual nurses for home visits  No reported cultural translations of tool or program materials	Reduction in total caloric intake  Improvement in physical development scores for age  No change in cognitive scores  Effective in improving diet and remediating pre-existing developmental delays in children															
McGarvey, Keller, Forrester, Williams, Seward, Suttle (2004)	Quasi-experimental pretest, posttest, feasibility study	Low-income parents and children from birth to 4 years  Intervention (N=121) Control Grp (N=65)  <table border="1"> <thead> <tr> <th></th> <th>I%</th> <th>C%</th> </tr> </thead> <tbody> <tr> <td>Hispanics</td> <td>70</td> <td>37</td> </tr> <tr> <td>Black</td> <td>8</td> <td>23</td> </tr> <tr> <td>White</td> <td>15</td> <td>18</td> </tr> <tr> <td>Other</td> <td>7</td> <td>22</td> </tr> </tbody> </table>		I%	C%	Hispanics	70	37	Black	8	23	White	15	18	Other	7	22	FitWIC, a 1-year childhood overweight prevention program to promote 6 targeted parental behaviors related to nutrition and exercise  Instruments: Developed questionnaire for children's physical activity, nutrition, TV viewing and family role modeling	<i>Peripheral</i> Pictures with simple message (English & Spanish)  <i>Constituent Involving</i> 1) Culturally competent WIC staff 2) Community participation to disseminate FitWIC messages  <i>Linguistic</i> 1) Provided Spanish educational materials . but no reported translation procedures for target group  2) Questionnaires adapted per guidelines using 2 bilingual translators	Positive change in parental frequency of offering water to child, and engaging in physical activities with child  Feasible "Fit WIC" program
	I%	C%																		
Hispanics	70	37																		
Black	8	23																		
White	15	18																		
Other	7	22																		

CULTURAL ADAPTATION FOR ETHNIC DIVERSITY

Table 3. Continued

Author(s)	Design	Sample	Intervention & Measurement Tools	Cultural Adaptation Strategy and Procedures	Findings															
Fitzgibbon Stolleu Schifler Van Horn, KauterChristoffel, Dver (2005)	Cluster Randomized controlled trial	<p><u>Predominantly Black</u> 12 Head Start schools</p> <p>3- to 5-year-olds</p> <p>Intervention (N=212) Control (N=197)</p> <table border="1"> <thead> <tr> <th></th> <th>I %</th> <th>C%</th> </tr> </thead> <tbody> <tr> <td>Hispanic</td> <td>0</td> <td>12.7</td> </tr> <tr> <td>Black</td> <td>99</td> <td>80.7</td> </tr> <tr> <td>Multi-racial</td> <td>10</td> <td>6.6</td> </tr> <tr> <td>Female</td> <td>49.7</td> <td>50.5</td> </tr> </tbody> </table>		I %	C%	Hispanic	0	12.7	Black	99	80.7	Multi-racial	10	6.6	Female	49.7	50.5	<p>Hip-Hop to Health II 14-week school-based weight control for children &amp; parental-participation (diet/physical activity)</p> <p>Instruments 1) Health Start Quiz (HSQ) 2) Health Eating and Exercise Questionnaire (HEEQ) 3) Physical activity measures for parents (PAPQ) 4) Parental support and role modeling questionnaire (PSRMQ)</p>	<p>Tailored intervention</p> <p><i>Peripheral</i> 1) Puppet food characters 2) 1 wo &amp; three dimensional pictures</p> <p><i>Constituent-Involving</i> 1) Stakeholder input 2) Focus groups 3) Bilingual teachers 4) Intensive training for facilitators 5) Bilingual/bicultural interviewers</p> <p><i>Socio-Cultural</i> 1) Pilot tested intervention 2) Interactive hands-on learning 3) Program schedule and newsletters 4) Safe meeting location</p> <p><i>Linguistic</i> 1) Program materials and 2) tools translated per guidelines, considered all levels of literacy and obtained consensus with tool developers</p>	<p>No effect on total fat dietary fiber physical activity or TV viewing at post-intervention 1- and 2-year follow-ups</p> <p>Significant decreases in saturated fat intake at 1 yr but not post intervention or 2-yr follow-up versus control</p> <p>Reduced BMI levels in children age at 1 and 2 year follow-ups versus control</p> <p>Feasible and effective intervention</p>
	I %	C%																		
Hispanic	0	12.7																		
Black	99	80.7																		
Multi-racial	10	6.6																		
Female	49.7	50.5																		
Fitzgibbon Stolley Suffer Van Horn KauterChristoffel Dver (2006)	Cluster Randomized controlled trial	<p><u>Predominantly Hispanic</u> 3- to 5-year-olds</p> <p>Intervention (N=202) Control (N=199)</p> <table border="1"> <thead> <tr> <th></th> <th>I %</th> <th>C%</th> </tr> </thead> <tbody> <tr> <td>Hispanic</td> <td>73.3</td> <td>89.4</td> </tr> <tr> <td>Black</td> <td>15.8</td> <td>6.5</td> </tr> <tr> <td>Multiracial</td> <td>10.0</td> <td>4.0</td> </tr> <tr> <td>Female</td> <td>47.5</td> <td>51.3</td> </tr> </tbody> </table>		I %	C%	Hispanic	73.3	89.4	Black	15.8	6.5	Multiracial	10.0	4.0	Female	47.5	51.3	<p>Hip-Hop to Health II 14-week school-based weight control for children (diet/physical activity) intervention w/ parental-participation</p> <p>Instruments <i>Same as Fitzgibbon et al (2005) - plus -</i> 5) Short Acculturation Scale</p>	<p><i>Same as Fitzgibbon et al (2005)</i></p> <p><i>Linguistic</i> 1) PAPQ was being tested for reliability and validity 2) HSQ reliable for minorities in Head Start programs 3) HEQ was being tested for reliability and validity 4) PSRMQ - internal reliability for Black and Hispanic women 5) Short Acculturation Scale - valid and reliable for Hispanics, Mexican and Central Americans</p>	<p>No significant differences between intervention and control for primary or secondary outcomes post-intervention or at follow-up year 1 or year 2</p>
	I %	C%																		
Hispanic	73.3	89.4																		
Black	15.8	6.5																		
Multiracial	10.0	4.0																		
Female	47.5	51.3																		

CULTURAL ADAPTATION FOR ETHNIC DIVERSITY

Table 3. Continued

Author(s)	Design	Sample	Intervention & Measurement Tools	Cultural Adaptation Strategy and Procedures	Findings
Alhassan, Sirarrd, Robinson (2007)	Pilot Randomized controlled trial	Low-income, Latino children 3- to 5-yr-olds	3-month school-based intervention to increase children's daily physical activity levels, minimal parental involvement	No program materials or tools needed	No significant difference between groups
	Observation study	Intervention (N=18) Control Group (N=15)  Latino 100%	Instruments: ActiGraph accelerometer	<i>Linguistic</i> Parental Consent translated into Spanish No reported translation procedures	
Klohe-Lehman, Freeland-Graves, Clarke, Cai, et al (2007)	One-group pre- and posttest	Low-income mothers and healthy 1-to 3-year-olds	8-week community-based weight-loss intervention to improve diet and physical activity in mothers and children	<i>Peripheral Strategy</i> Colorful handouts Ethnic foods Relevant food models & measuring utensils	Modest weight loss in mothers  Diet improved in mother/child dyads
		Intervention (N=91)  Hispanic 62.6% Black 22.0% White 15.4%	Instruments: 1) Food Frequency Questionnaires (FFQ). 2) Toddler Behavior Assessment Questionnaire (TBAQ) 3) Pedometers for mothers	<i>Constituent-Involving</i> Pre-program focus group  <i>Socio-cultural</i> Modified recipes & meal plans Provided child care Classes held in community center  <i>Linguistic</i> FFQ developed and valid and reliable for low-income, tri-ethnic population of adults and 1- to 3-yr-old children  TBAQ Validated for parents of toddlers. No reported translation for Hispanics  No reported cultural translation of materials	Improved physical activity of mothers, mixed change in children, and positive change in at-risk/overweight children

CULTURAL ADAPTATION FOR ETHNIC DIVERSITY

**Table 3. Continued**

Author(s)	Design	Sample	Intervention & Measurement Tools	Cultural Adaptation Strategy and Procedures	Findings												
Clarke, Freeland-Graves, Klohe-Lehman et al (June 2007)	Comparative Cohort Study	Low-income mothers w/ 1- to 4-yr-olds  Group 1 (N=93) overweight  Group 2: (N=31) healthy weight  <table border="1"> <thead> <tr> <th></th> <th>Grp1%</th> <th>Grp2%</th> </tr> </thead> <tbody> <tr> <td>Hispanics</td> <td>60</td> <td>81</td> </tr> <tr> <td>Black</td> <td>19.4</td> <td>16.1</td> </tr> <tr> <td>White</td> <td>20.4</td> <td>41.9</td> </tr> </tbody> </table>		Grp1%	Grp2%	Hispanics	60	81	Black	19.4	16.1	White	20.4	41.9	8-week Weight Loss Intervention - Same as Klohe-Lehman et. al (2007)  To improve diet and physical activity in mothers and children    Instruments: 1) Pedometers for mothers  2) Exercise Self-Efficacy Questionnaire (ESEQ),  3) Frequency and Intent to Exercise Questionnaire (FIEQ)	<i>Peripheral:</i> Colorful handouts Ethnic foods Relevant food models & measuring utensils  <i>Constituent-Involving</i> Pre-program focus group  <i>Socio-cultural</i> 1) Classes at community center 2) Adapted meal plans and recipes 3) Children allowed in classes  <i>Linguistic</i> 1) ESEQ - valid and reliable for Hispanic men and women (unpublished data) 2) FIEQ - valid and reliable for women (avg. age 40-5-yrs)  No reported translation for Hispanics	Positive results in motivational readiness to exercise, exercise self-efficacy, pedometer steps, and expended energy  Significant decrease in body weight, percent body fat, and waist circumference  Significant correlates of exercise self-efficacy with pedometer steps, energy expended, and exercise readiness
	Grp1%	Grp2%															
Hispanics	60	81															
Black	19.4	16.1															
White	20.4	41.9															
Clarke, Freeland-Graves, Klohe-Lehman and Bohman (July 2007)	One-group pre- and post-test	Low-income mothers w/ 1- to 4-yrs-olds  Intervention (N=114)  Hispanics 64% Black 19.3% White 16.7%	8-week Weight Loss Intervention - Same as Klohe-Lehman et al (2007)  Identify predictors for weight loss at preprogram and post program  Instruments 1) Multi-dimensional Body Relation Questionnaire, 2) Nutrition Attitude Scale, 3) Decisional Balance Inventory, 4) Depression Scale, 5) ESEQ, 6) Weight effect Life-Style Questionnaire, 7) Social Support Scale, 8) Stress Scale, 9) Nutrition Knowledge Test	Same as Clarke, et al. (June 2007)  <i>Linguistic</i> 1) ESEQ - valid and reliable for Hispanic men and women 2) All other questionnaires previously validated for women of child-bearing age. No reports on validity or reliability for race/ethnicity  No reported cultural translation of program material	<u>Correlates for weight loss</u> Cohabitation with partner <u>Pre-program</u> 1) Less satisfaction w/appearance by mothers 2) More consumption of protein energy 3) Enhanced nutrition knowledge 4) Positive attitudes for benefits of weight loss <u>Post-program</u> 1) Change in healthful eating attitudes 2) Social support Physical activity had no effect on wt loss												

**CHAPTER 6**

**MANUSCRIPT 2**

**A Retrospective Analysis of Maternal and Child Outcomes**

**Following An Obesity Intervention**

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Key words: obesity intervention, preschool, high carbohydrate beverages, walking

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### **Abstract**

Obesity disproportionately affects ethnic minorities in the US, including Hispanic preschool children. Modifying obesity promoting behaviors through parental influence may help reduce young children's risks for obesity

A pre- post- single group design was used for a retrospective analysis of a subset of data from a larger intervention study. Analysis determined baseline to 9-month (post-program) differences in children's consumption of high carbohydrate beverages (HCB), milk and water; and in mothers' walking, beliefs, knowledge, self-efficacy and relationship building; as well as identified covariates for change in outcome variables. Thirty-three cases included low-income Hispanic mothers (18- to 35- years) with children (3- to 5- years).

By 9 months, children's consumption (oz/day) of HCB decreased from 18.8 oz to 8.3 oz, and water increased from 19.8 oz to 29.1 oz. Mothers' pedometer steps/day increased from 6,379 steps to 10,105 steps and maternal beliefs, knowledge, and self-efficacy for health behaviors positively increased. Gravida and visits with the promotora were correlated with walking and consumption of water and soda.

Findings suggest a culturally tailored obesity intervention program for a low-income Mexican American community was effective in improving health behaviors. Future studies should assess if these health behavior changes can be sustained.

## Introduction

Childhood obesity has become a major public health problem disproportionately affecting low-income ethnic minority children in the United States. Hispanic children are at particular risk as the largest, youngest, fastest growing, and most underinsured racial/ethnic group [1]. A higher prevalence of obesity exists among low-income Hispanic preschool children compared to their more affluent counterparts [2, 3]. For example, Mexican American 2- to 5- year-old preschool children have the highest rates for childhood obesity compared to non-Hispanic Black and Non-Hispanic Whites [4]. Obesity begins early in life, suggesting interventions should begin prior to school entry.

One concern is that obesity tracks into adulthood, placing overweight and obese children at high risk for obesity related chronic illness, such as type 2 diabetes, cardiovascular disease, and metabolic syndrome, and premature death [5-7]. Healthcare costs for obesity related illnesses have also risen in parallel with obesity rates. Regarding health disparities, children on Medicaid were six times more likely to be treated for obesity, more likely to be hospitalized, and their overall health care costs twice that of obese children on private insurance [8].

Recent systematic reviews found limited obesity intervention studies focused on ethnic minority children [9, 10]. Current U.S. national health care directives highlight the need for studies identifying effective interventions to help reduce the prevalence of childhood obesity, especially among high-risk ethnic groups. Among the recommended directives are three important strategies.

First, one directive is to provide culturally appropriate interventions targeting low-income ethnic minorities at high risk for obesity [11, 12]. Culturally appropriate

health promotion programs are more likely to succeed in producing healthy behavior changes among at-risk groups. Evidence suggests having trained promotora / health educators (PHE) (from Hispanic communities) to facilitate health promotion programs can be effective in promoting healthy behavior changes in Hispanic populations [13].

Second, the Whitehouse Task Force On Childhood Obesity recommends empowering parents as primary change agents to teach healthy behaviors to their young children[14]. Parents play an important role in teaching young children healthy behaviors while their lifestyle behaviors are still developing [7, 15]. Studies suggest focusing on the parent as the primary change agent to promote healthy behaviors in their children can help reduce risks for obesity [16, 17]. If children learn healthy behaviors at an early age, they are likely to continue these behaviors as they grow into adulthood.

Third, interventions should focus on potentially modifiable obesity promoting behaviors to effect sustained healthy behavior changes [18]. Multiple factors contribute to obesity. Two potentially modifiable behaviors are increased consumption of high carbohydrate beverages (HCB) [19] and increased sedentary lifestyles [20] observed in children of all ages. Studies have linked both behaviors with obesity, especially among ethnic minority children [21, 22]. Modifying these obesity-promoting behaviors may help reduce the incidence of childhood obesity.

In response to these directives, this was a retrospective data analysis study of a subset of data from a larger childhood obesity intervention study. The objectives were to:

- 1) determine pre- to post- program differences in low-income Hispanic preschool children's consumption of HCB and healthy drinks; the mother's walking, beliefs, knowledge, and self-efficacy regarding nutrition and physical activity; and the mother's



supportive relationships and 2) identify significant covariates for predicting changes in children's beverage consumption and maternal walking, beliefs, knowledge, and self-efficacy.

### **Background of the Larger Intervention Study**

The larger study was a dynamic culturally adapted 9-month childhood obesity intervention program (*Vida Saludable*) using a promotora/ health educator (PHE) to facilitate the program for low-income Hispanic preschool children (3-to5-years old) with mothers (18- to 35- years). The program focused on mothers as the primary change agents to promote healthy behaviors in their children. It incorporated four interactive group lessons to reduce children's consumption of HCB and increase consumption of healthy drinks (e.g., water and 1% low-fat milk). Mothers role modeled daily walking to promote their children's physical activity. Following the four lessons, 6-monthly community group activities were conducted to reinforce the healthy behaviors.

The study was conducted at a Southern California community health center. Institutional review board (IRB) approval was obtained from the appropriate institutions and facility. A purposive sample of 44 Hispanic mothers/child dyads was recruited from a community health center, with a final sample of 33 mother/child dyads. Attrition was due to work commitments. Sample size was budget constrained.

Using a community participatory approach, stakeholder's input helped to culturally adapt and tailor the intervention for the study population. The National Heart Lung and Blood Institute's health promotion project, *WE CAN!* [23], a community-based program for 6-to 12- year- old children, was modified for the intervention program. Modifications included culturally adapting and linguistically tailoring the

intervention for a group-based program appropriate for low-income Hispanic mothers and their preschool children. The original *WE CAN!* measurement instruments were based on valid and reliable surveys tools in a different population [24, 25]. Research experts (in childhood obesity and diverse ethnic populations) along with community stakeholders deemed the *WE CAN!* surveys unsuitable for the Vida Saludable study population. Four research experts, therefore, developed three surveys to measure children's consumption of HCB, milk, and water; and maternal walking, beliefs, knowledge, self-efficacy, and relationship building. The surveys were translated into Spanish following published translation guidelines [26] with input from stakeholders. The surveys were also pilot-tested with a homogenous population, thus providing preliminary survey validity. The feedback helped to linguistically tailor the surveys for the study population.

Mothers were asked to walk at least 30 minutes/day. Validated and reliable Omron HJ-13 pedometers were provided to measure the mother's walking steps [27, 28].

Data from PHE facilitated surveys were collected at baseline and 9-months (post program). Maternal pedometer steps were recorded for Tuesday and Saturday at baseline, 1-month, 4-months, and 9-months. Participant demographic data were collected at enrollment and anthropometric data (height, weight, and blood pressures) were recorded at baseline and 9-months.

### **Survey Instruments**

The first two surveys was maternal self-reported and the third survey was PHE self-reported. First, The Health Behaviors Survey (17 items) was used to measure the children's consumption of HCB (soda, sugary drinks, and 100% juice) and healthy drinks

(milk and water). Beverages consumed for each type of drink were measured in servings/day and ounces/day (oz/day). Maternal walking was measure in number of days walked /week, total minutes walked the previous 24 hours, and pedometer steps/day (Tuesday and Saturday). Second, The Program Evaluation Questionnaire (17 item) included a five- option Likert scale ranging from strongly agree to strongly disagree measuring maternal beliefs, knowledge, and self-efficacy regarding nutrition and physical activity. Third, The Promotora Survey (2 items) included a five-option Likert scale ranging from strongly agrees to strongly disagree measuring the PHE's perception of the mother's ability to build relationships with other mothers and the PHE.

### **Conceptual Framework**

The social cognitive learning (SCL) [29] and the theory of reasoned action and planned behavior [30] were integrated to form the conceptual framework used to guide this study (see Figure 1). The SCL postulates learning occurs in a social environment when a person observes a significant role model's behavior, conceptualizes and imitates the behavior. Continued reproduction of behaviors is based on feedback and reinforcement from the social environment, and one's self-efficacy (the belief one can successfully perform the behavior). The theory of reasoned action and planned behavior postulates an individual's predictive behavior is motivated by one's intention to perform the behavior. Behavioral intention is based on several constructs, such as a person's beliefs, knowledge, and control-beliefs i.e., self-efficacy.

## Methods

### Design

A retrospective data analysis, pre post single group design study was used to analyze the subset of data from a larger obesity intervention study. In a case sample of low-income Hispanic mothers and preschool children, the aims were to: 1) determine pre- to post- program differences in the outcome variables: and 2) identify covariates significantly associated with change in the outcome variables.

Outcome variables were: (a) children's consumption of HCB and healthy beverages; (b) the mother's pedometer steps; (c) mother's beliefs, knowledge, and self-efficacy regarding nutrition and physical activity; and (d) mother's ability to build relationships with other mothers and the PHE.

### Case Data

Case data (N = 33) were obtained from the larger intervention study's database of 33 mother/child dyads consisting of low-income Hispanic mothers (18- to 35- years old) and their preschool children (3-to 5- years old), regardless of BMI, recruited from a Southern California health center. Permission to access case data was obtained from the larger study's principle investigator (PI).

Data was analyzed retrospectively. The only human contact occurred during data collection in the larger intervention study. All participant information was de-identified and strict standard precautions were maintained to protect the participant's privacy. IRB approval for this study was obtained from the appropriate institutions.

## **Operational definitions**

*Body mass index (BMI)*: used as a reliable indicator of adiposity and calculated as weight (kg) / height (m<sup>2</sup>) [31]. For adult BMI, normal weight = 18.5 to 24.9, overweight = 25.0 to 29.9, and obese = 30.0 and above. For children, body fatness is calculated as BMI-for-age in percentiles using 2000 CDC age- and sex-specific growth charts [32]. Healthy weight = 5<sup>th</sup> percentile to below the 85<sup>th</sup> percentile, overweight = 85<sup>th</sup> percentile to below the 95<sup>th</sup> percentile, and obese = at or above the 95<sup>th</sup> percentile.

*High carbohydrate beverages (HCB)*: soda (sugar sweetened), 100% fruit juice, and sugary drinks (e.g., gatorade, kool-aid, and all other sugary juice drinks).

*Healthy drinks*: water and 1% low-fat milk.

*Servings/day*: number of times beverage consumed per day.

*Ounces/day*: total ounces consumed per day.

*Walking*: moving across a surface by taking steps, i.e., placing one foot in front of the other at a pace slower than a run.

*Relationship building*: PHE's perception of each mother's ability to make connections with other mothers and the PHE.

*Attitude*: person's beliefs and knowledge regarding a subject

*Self-efficacy*: one's perception of being able to successfully perform a behavior

*Role modeling*: mothers demonstrating healthy behaviors to influence and teach these behaviors to their children

### Statistical Analysis

Data were analyzed using Statistical Package for the Social Sciences, 18.0 [33]. Preliminary data-management steps included descriptive statistics to test variables for normality of distribution and identify outliers. Differences in the outcome variables for related samples between baseline and 9-months were examined using: a matched-pairs *t*-test for continuous parametric data, the Wilcoxon signed-ranks test for continuous non-parametric data and the McNemar chi-square test for categorical data. All *t*-tests were two-tailed.

Pearson and Spearman correlations were performed to assess the relationships between co-variables and outcome variables, and determine if assumptions for regression analyses were met. The most parsimonious models were selected using a backward step-wise linear regression, starting with all candidate variables and testing them one by one for statistical significance within the model, and deleting those that were not significant.

The small sample size of 33 cases limited statistical power, allowing analysis of only three co-variables as possible predictors for change in the outcome variables. In addition, some co-variables were homogenous in the sample. Therefore, co-variables with adequate statistical variation were selected. Those included: gravida (number pregnancies), number of adults in the household and the number of maternal visits with the PHE.

### Results

Table 1 displays the socio-demographic profile of the mother/child dyads. All participants were of Mexican origin. A majority spoke primarily Spanish (97%), lived at

or below the poverty level (88%), and had four or less years of education (76%). At least two or more adults lived in the households (67%). At enrollment, none of the children were attending school. Most mothers were medically uninsured (97%), whereas all the children had medical insurance.

Table 2 presents the mothers' BMI and children's BMI percentile at baseline and at 9 months. Over 85% of the mothers were either overweight or obese, whereas only 24% of the children were overweight or obese. There was a significant decrease in the mothers' BMI by 1.5 points by 9 months post-program ( $p < .05$ ). There was a non-significant - 5.3% decrease in children's BMI percentile by post-program ( $p > .05$ ).

### **Beverage Consumption**

There were significant decreases in HCB consumption and increases in healthy drink consumption between baseline and the 9-month post-program assessment (Table 3).

#### *Mean oz/day*

By 9 months, decreased consumption of soda by 2.6 oz/day, 100% fruit juice by 2.7 oz/day, and sugary drinks by 4.7 oz/day were all statistically significant ( $p < .05$ ). There was also a significant increase in water consumption of 9.3 oz/day ( $p < .05$ ). Milk consumption showed a non-significant increase of 2.5 oz/day ( $p > .05$ ).

#### *Mean servings/day*

Decreased consumptions in servings/day of soda (-0.5;  $p < .05$ ) and sugary drink (-0.7;  $p < .05$ ) by 9 months were statistically significant. The intervention did not result in a significant change in 100% fruit juice consumption.

Water consumption increased by 1.4 serving/day by 9 months ( $p < .01$ ). A significant change in milk consumption was not found by post-program.

### *Milk and water type*

By post-program, children's consumption of 1% milk increased by 52% and consumption of 2% milk decreased by 52 % ( $p < .05$ ). No significant change in consumption of water type (tap versus bottled) was found by post program.

### **Maternal Walking**

Several significant changes in maternal pedometer steps from baseline and 9 months are displayed in Table 3. By post-program, maternal walking, number of steps increased on the weekday (Tuesday) by 69% (4302 steps) and on the weekend day (Saturday) by 49% (3151 steps) ( $p < .05$ ). While steps increased, there was no significant increase in maternal self-reported minutes walked /day or days walked /week.

### **Maternal Beliefs, Knowledge, Self-Efficacy, and Relationship Building**

Pre- to post- program differences were found for maternal beliefs about walking, knowledge gained about healthy drinks, and self- efficacy for role modeling healthy behaviors. By post-program, maternal beliefs were more positive about walking (SE .24;  $p < .05$ ); maternal knowledge increased regarding healthy drinks and physical activity (SE .48;  $p < .05$ ); and self-efficacy improved, i.e., mothers' perceived their modeling of healthy behaviors positively influenced their children health behaviors (SE .21;  $p < .05$ ).

Differences from baseline to 9 months in the promotora's perception of the mother's connection to other mothers and the promotora are displayed in Table 4.

### **Significant Predictors For Change In Outcome Variables**

Table 5 presents the covariate correlations for change in the outcome variables. Backward step-wise multiple linear regression analysis was run including covariates that were significantly correlated with outcome variables. Of the three covariates (gravida,



number of adults in the household, and maternal visits with the PHE), only gravida and maternal visits with PHE were significantly associated with change in several outcome variables.

From baseline to 9 months, the number of pregnancies was significantly correlated with change in water consumption and change in maternal Saturday steps. For every additional pregnancy, children's water consumption was 7.50 oz/day lower ( $p < .05$ ) and maternal Saturday steps were 3553 steps/day higher ( $p < .05$ ). For every additional maternal visit with the PHE, children's soda consumption was 0.29 oz/day lower ( $p < .05$ ), and number of adults living in the household was not significantly correlated with change in beverages or pedometer steps ( $p > .05$ ).

### **Discussion**

Analysis of pre- and post- program outcome variables demonstrated multiple significant differences. Improvements in maternal beliefs about walking, knowledge about healthy drinks, and self-efficacy for role modeling may have influenced changes in the participants' health behaviors. Significant changes by 9 months were evident in the children's decreased consumption of all HCB and increased consumption of water. Increased physical activity with maternal walking may have influenced the reduction in maternal BMI by post-program.

Many of the improved health behaviors in this study were consistent with other studies reporting improved health behaviors in parents and their children [34, 35]. They posited low-income mothers (including Hispanics) receiving health promotion education on healthy nutrition and physical activity were more likely to offer their children healthy drinks in place of HCB, and participate in physical activities with their children. This

growing evidence of parental influence on young children's health behaviors supports the importance of parents as primary change agents for healthy behaviors in young children, while their lifestyle behaviors are developing. Children are more likely to continue these behaviors as they grow, thus reducing their risk for obesity.

By 9 months, water and milk had mostly replaced children's HCB consumption. Previous studies reported replacing HCB with water and milk was associated with lower energy intake, reduced weight gain, and improved nutrition status in preschool children [36-38]. Water consumption increased by 47% and the combined HCB consumption decreased by almost 56% in 9-months. Soda consumption decreased the most by 84%, followed by sugary drinks at 73%, and 100% juice by 31%. Children were drinking 6.1 oz/day of 100% juice by post-program, close to the recommended 4 to 6 oz/day of 100% juice for preschool children [39]. By post-program two-thirds of the mothers were offering their children 1% low fat milk. Mothers were more likely to serve their children 1% low fat milk by 9 months, after learning the recommendation and benefits of 1% low-fat milk [40].

Results showed a majority of mothers continued to serve their children bottled water versus tap water by post program, regardless of the information given on the safety of U.S. tap water. This may be due to continued mistrust in the safety of tap water as demonstrated in the Hobson and colleagues' study [38], where Latino families avoided drinking U.S. tap water for fear it causes illness.

The combined pedometer steps for Tuesday and Saturday increased by 59%. Mothers were walking more by 9 months. This gain was similar to the Clark and colleagues' study findings [41] where low-income mothers (including Hispanics)

pedometer steps increased by 64%. Increased walking may be credited to several motivating factors including: acquired knowledge regarding the benefits of physical activity; the program social support and reinforcement; and the pedometer. Although the pedometer motivation was not a key focus for this study, results confirmed the positive findings of other studies using pedometers to promote physical activities; suggesting pedometers may be a motivating factor for increased maternal walking [42, 43].

Mothers' average pedometer steps increased more for the weekday (Tuesday, 69%) than for the weekend day (Saturday, 49%). Mothers stated they walked their children to and from school each school day and may have accounted for more steps walked on weekdays than on weekend days.

A majority of the children in this study were at healthy weights (76%), in contrast to the majority of the mothers who were overweight or obese (88%). The Whitaker and colleagues' study found parental obesity was a strong predictor of obesity in children [44], suggesting it is important for children to develop healthy behaviors while they are still young to help reduce their risk for obesity.

An expected 9-month change in the mother's BMI or the children's BMI% may have been unrealistic. There was a significant reduction, albeit small, in maternal BMI. By post-program, the average maternal weight shifted from the adult obese classification ( $BMI \geq 30$ ) to the overweight classification ( $BMI 25.0 \leq 29.9$ ) [45]. This was consistent with the longitudinal Special Turku Coronary Risk Factor Intervention Program (STRIP) baby study [46] suggesting nutritional interventions for preschool children and their parents can ameliorate nutritional knowledge and behaviors, resulting in maternal weight reduction. For this study, the children's rapid growth at preschool age may have

accounted for the lack of significant change in the BMI %. During growth periods, children's weight gained may be offset by growth in height, resulting in no BMI % change.

Findings from this study showed improvements in maternal belief regarding walking, knowledge regarding healthy drinks, and self-efficacy for role modeling healthy behaviors. These improvements may be largely responsible for the positive change in health behaviors demonstrated by the increased consumption of healthy drinks and maternal walking, and maternal weight control. More visits with the PHE may have resulted in more support and reinforcement, also influencing the participant's healthy behavior changes. This supports the Klohe-Lehman study finding of improved nutritional knowledge effectively promoting weight loss in overweight and obese low-income mothers [47].

There were several significant correlations between co-variables and some outcomes variables, but they appear questionable due to lack of consistency in correlations among other similar outcome variables in the study. For example, gravida correlated with a 49% increase in Saturday steps by 9 months, but did not correlate with the larger 69% increase in Tuesday steps. Gravida also correlated with change in water consumption (47%) by 9 months, but did not correlate with large changes beverage consumption, such as soda (82%) and sugary drinks (73%). Visits with the PHE were correlated with decreased soda consumption by 9 months, but was not correlated with large changes in water and sugary drinks consumption. These inconsistencies may be due to the small sample size resulting in limited statistical power.

The purposive study sample may have introduced selection bias resulting in no significant change in maternal relationship building. A majority of the mothers may have been those who easily connected with others and enjoyed the socialization. The PHE's perception of the mothers' connections was also subjective and could have influenced the results, introducing measurement error. Future studies should consider different methods for measuring how social support influences participant engagement, retention, and behavior changes.

A threat to internal validity may have been the larger study's dynamic adaptive nature resulting in additional confounding factors influencing study results. Modifications made to the measurement instruments from pre-test to post-test may have introduced measurement error. Although the three customized survey instruments met rigorous face validity, they did not undergo formal psychometric testing for validity and reliability. Psychometric testing of the Vida Saludable surveys should be considered. This would provide more valid and reliable culturally adapted surveys for Hispanic populations.

Employing a PHE to facilitate the intervention may have strengthened the internal validity of the study outcomes. The cultural adaptation strategies used to design the program, facilitate the curriculum, and collect survey data served to minimize study bias and measurement errors.

Objective pre- to post- program maternal pedometer steps (59% increase) refuted the subjective maternal self-reported minutes walked/day and days walked/week (no change). There was no guarantee, however, that recorded pedometer steps were only those of the mother versus other users.

Although physical activity levels increased for the mothers, there was no data to measure activity levels of the children. This measure could provide important data on how maternal role modeling influences children's physical activity. This additional measure should be considered for future studies.

The small sample size limited sample power for statistical analysis and the ability to generalize results beyond the study population. Purposive sampling in the larger study may have led to selection bias, another threat to internal validity, and a potential for biased results. A follow-on study in a similar high-risk population with a larger sample size is needed to further test the feasibility of this intervention program, its effectiveness to improve health behaviors, and its impact on participant's weight.

### **Conclusions**

Findings suggest, a culturally adapted 9-month intervention program was effective in decreasing children's HCB consumption and increasing maternal walking in a low-income Mexican American community. Results suggest parental role modeling can be effective in engaging young children to practice healthy nutrition and to be physical active. The results lend support for a future larger randomized control trial to further test the feasibility of the Vida Saludable intervention program. Future research should also assess the long-term adherence to these important health behavior changes and their ongoing impact on maternal and child BMI.

## References

1. Johnson, K.M. and D.T. Lichter, *Natural Increase: A New Source of Population Growth in emerging Hispanic Destinations in the United States*. Population and Development Review, 2008. **34**(2): p. 327-346.
2. Singh, G.K., M. Siahpush, and M.D. Kogan, *Rising social inequalities in US childhood obesity, 2003-2007*. Ann Epidemiol, 2010. **20**(1): p. 40-52.
3. Sharma, A., et al., *Obesity Prevalence Among Low-Income, Preschool-Aged Children - United States, 1998-2008*. JAMA, 2010. **303**(1): p. 28-30.
4. Ogden, C.L., et al., *Prevalence of overweight and obesity in the United States, 1999-2004*. JAMA, 2006. **295**(13): p. 1549-55.
5. Franks, P.W., et al., *Childhood obesity, other cardiovascular risk factors, and premature death*. N Engl J Med, 2010. **362**(6): p. 485-93.
6. Goran, M.I., et al., *Persistence of pre-diabetes in overweight and obese Hispanic children: association with progressive insulin resistance, poor beta-cell function, and increasing visceral fat*. Diabetes, 2008. **57**(11): p. 3007-12.
7. Nader, P.R., et al., *Identifying risk for obesity in early childhood*. Pediatrics, 2006. **118**(3): p. e594-601.
8. Marder, W.D. and S. Chang, *Childhood Obesity: Costs, Treatment Patterns, Disparities in Care, and prevalent Medical Conditions*, T. Medstat, Editor 2006, Thomson Corporation and Medstat: Stamford.
9. Wilson, D.K., *New Perspective on Health Disparities and Obesity Interventions in Youth*. journal of Pediatric Psychology, 2009. **34**(3): p. 231-244.

10. Summerbell, C.D., et al., *The association between diet and physical activity and subsequent excess weight gain and obesity assessed at 5 years of age or older: a systematic review of the epidemiological evidence*. *Int J Obes (Lond)*, 2009. **33 Suppl 3**: p. S1-92.
11. *The Surgeon General's Vision for a Healthy and Fit Nation*, 2010, U.S. Department of Health and Human Services, Office of the Surgeon General: Rockville, MD.
12. *Progress In Prevention Childhood Obesity, How Do We Measure Up?2007*, Washington, D.C.: The National Academies Press. 475.
13. Ayala, G.X., et al., *Outcome effectiveness of the lay health advisor model among Latinos in the United States: an examination by role*. *Health education research*, 2010. **25**(5): p. 815-40.
14. *Solving The Problem Of Childhood Obesity Within A Generation*, W.H.T.F.O.C. Obesity, Editor 2010, Executive Office Of The President Of The United States: Washington D.C. p. 120.
15. Kimbro, R.T., J. Brooks-Gunn, and S. McLanahan, *Racial and ethnic differentials in overweight and obesity among 3-year-old children*. *Am J Public Health*, 2007. **97**(2): p. 298-305.
16. Golan, M., V. Kaufman, and D.R. Shahar, *Childhood obesity treatment: targeting parents exclusively v. parents and children*. *Br J Nutr*, 2006. **95**(5): p. 1008-15.
17. Skouteris, H., et al., *Healthy eating and obesity prevention for preschoolers: a randomised controlled trial*. *BMC Public Health*, 2010. **10**: p. 220.



18. *Working Group Report on Future Research Directions in Childhood Obesity Prevention and Treatment*. 2007 May 2008 Oct 10, 2008]; Available from: <http://www.nhlbi.nih.gov/meetings/workshops/child-obesity/index.htm>.
19. Gortmaker, S.L., M. Long, and Y. Wang, *The Negative Impact of Sugar-Sweetened Beverages on Children's Health*, in *Healthy Eating Research 2009*, University of Minneapolis School of Public Health: Minneapolis.
20. Anderson, S.E., C.D. Economos, and A. Must, *Active play and screen time in US children aged 4 to 11 years in relation to sociodemographic and weight status characteristics: a nationally representative cross-sectional analysis*. *BMC Public Health*, 2008. **8**: p. 366.
21. Butte, N.F., et al., *Physical activity in nonoverweight and overweight Hispanic children and adolescents*. *Med Sci Sports Exerc*, 2007. **39**(8): p. 1257-66.
22. Warner, M.L., et al., *Soda consumption and overweight status of 2-year-old mexican-american children in california*. *Obesity (Silver Spring)*, 2006. **14**(11): p. 1966-74.
23. *We Can! Ways to Enhance Children's Activity & Nutrition*, 2007, US Dept. of Health and Human Services, National Heart Lung and Blood Institute: Washington D.C.
24. Cullen, K.W., K. Watson, and I. Zakeri, *Relative reliability and validity of the Block Kids Questionnaire among youth aged 10 to 17 years*. *J Am Diet Assoc*, 2008. **108**(5): p. 862-6.

25. Fred Hutchinson Cancer Research Center. *Food Frequency Questionnaires*. 2009; Available from:  
[http://www.fhcrc.org/science/shared\\_resources/nutrition/ffq/index.html](http://www.fhcrc.org/science/shared_resources/nutrition/ffq/index.html).
26. Eremenco, S.L., D. Cella, and B.J. Arnold, *A comprehensive method for the translation and cross-cultural validation of health status questionnaires*. Eval Health Prof, 2005. **28**(2): p. 212-32.
27. Wilson, N., *Pilot Study Report for survey of Physical Activity and Sport in Malaysian Children (KAFS08)*, 2008, Sport, Health and Activity Research in Malaysia (SHARM) Institut Sukan Negara: Kuala Lumpur, Malaysia.
28. Sugden, J.A., et al., *The feasibility of using pedometers and brief advice to increase activity in sedentary older women--a pilot study*. BMC health services research, 2008. **8**: p. 169.
29. Bandura, A., *Social Cognitive Theory*. Annals of Child Development, 1989. **6**: p. 1-60.
30. Ajzen, I., Fishbein, M, *Understanding attitudes and predicting social behavior*1980, Englewood Cliffs, NJ: Prentice-Hall.
31. *Clinical Guideline on the Identification, Evaluation, and Treatment of Overweight and Obesity In Adults*, 1998, NIH/NHLBI: Washington DC. p. 228.
32. Kuczmariski, R.J., et al., *CDC growth charts: United States*. Adv Data, 2000(314): p. 1-27.
33. *Statistical Package for the Social Sciences*, 2009, Microsoft Chicago, Illinois.
34. McGarvey, E., et al., *Feasibility and benefits of a parent-focused preschool child obesity intervention*. Am J Public Health, 2004. **94**(9): p. 1490-5.

35. Olstad, D.L. and L. McCargar, *Prevention of overweight and obesity in children under the age of 6 years*. Appl Physiol Nutr Metab, 2009. **34**(4): p. 551-70.
36. Stookey, J.D., et al., *Replacing sweetened caloric beverages with drinking water is associated with lower energy intake*. Obesity, 2007. **15**(12): p. 3013-22.
37. Marshall, T.A., et al., *Diet quality in young children is influenced by beverage consumption*. J Am Coll Nutr, 2005. **24**(1): p. 65-75.
38. Hobson, W.L., et al., *Bottled, filtered, and tap water use in Latino and non-Latino children*. Archives of pediatrics & adolescent medicine, 2007. **161**(5): p. 457-61.
39. *American Academy of Pediatrics: The use and misuse of fruit juice in pediatrics*. Pediatrics, 2001. **107**(5): p. 1210-3.
40. *MyPyramid.gov Steps to a Healthier You*. 2011 February, 22, 2011 [cited 2011; Available from: <http://www.mypyramid.gov/>].
41. Clarke, K.K., et al., *Promotion of physical activity in low-income mothers using pedometers*. J Am Diet Assoc, 2007. **107**(6): p. 962-7.
42. Sidman, C.L., C.B. Corbin, and G. Le Masurier, *Promoting physical activity among sedentary women using pedometers*. Research quarterly for exercise and sport, 2004. **75**(2): p. 122-9.
43. Klohe-Lehman, D.M., et al., *Low-income, overweight and obese mothers as agents of change to improve food choices, fat habits, and physical activity in their 1-to-3-year-old children*. J Am Coll Nutr, 2007. **26**(3): p. 196-208.

44. Whitaker, R.C., et al., *Predicting obesity in young adulthood from childhood and parental obesity*. The New England journal of medicine, 1997. **337**(13): p. 869-73.
45. Center for Disease Control and Prevention. *Healthy Weight, Body Mass Index: About BMI for Adults*. 2009 July 27, 2009 [cited 2010 May 2010].
46. Niinikoski, H., et al., *Prospective randomized trial of low-saturated-fat, low-cholesterol diet during the first 3 years of life. The STRIP baby project*. Circulation, 1996. **94**(6): p. 1386-93.
47. Klohe-Lehman, D.M., et al., *Nutrition knowledge is associated with greater weight loss in obese and overweight low-income mothers*. J Am Diet Assoc, 2006. **106**(1): p. 65-75; quiz 76-9.

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**Table 1. Demographic Descriptors of Cases**

<u>Variable</u>	<u>%</u>	<u>or Mean(SD)</u>
<b>Maternal Age</b>		27.0 (3.7)
<b>Country (Mexico)</b>	100	
<b>Gravida</b>		
2 to 3	73	
<b>Parity (same as gravida)</b>	73	
<b>Medical Insurance</b>		
None	97	
<b>Household Income</b>		
Below Poverty Level (PL)	88	
<b>Language in Home</b>		
Spanish	97	
<b>Years of Education</b>		
1 - 4	76	
<b>Years Lived in U.S.</b>		7.2 (5.2)
<b>Marital Status</b>		
Cohabiting	76	
<b># Adults in Home</b>		
2 to 4	88	
<b># Children in Home</b>		
2 to 4	73	
<b>Children's Age</b>		3.6 (0.7)
<b>Gender</b>		
Female	52	
<b>Type of School</b>		
Not in School	100	
<b>Medical Insurance</b>		
MediCal	94	

**Table 2. BMI of Study Population at enrollment**

<b><u>Variable</u></b>		<b>Baseline mean BMI (SD)</b>	<b>9-mo mean BMI (SD)</b>
<b>Mother's BMI</b>	<b><u>%</u></b>		
Healthy Wt (18.5 to 24.9)	12	30.7 (6.4)*	29.2 (5.2)*
Overweight (25.0 to 29.9)	36		
Obese ( $\geq 30\%$ )	52		
		<b>mean BMI% (SD)</b>	<b>mean BMI% (SD)</b>
<b>Child's BMI%</b>	<b><u>%</u></b>		
Healthy Wt (5% < 85%)	76	67.6 (23.3)	62.2 (26.0)
Overweight (85 $\leq$ 94.9%)	15		
Obese (equal or > 95%)	9		

\* =  $p < .05$

**Table 3: Baseline and 9-month Variable Outcomes measures**

<b>(N = 33)</b> <b><u>Variable</u></b>	<b><u>Baseline</u></b> <b><u>Mean(SD)</u></b>	<b><u>9-Month</u></b> <b><u>Mean(SD)</u></b>
<b>Pedometer Steps (per day)</b>		
Tuesday*	6278 (4605)	10580 (5438)
Saturday*	6479 (4999)	9630 (5420)
<b>Self Reported Walking</b>		
Minutes walked (per day)	2.2 (0.9)	2.6 (1.2)
Times walked 30 min (per 7 days)	4.6 (1.5)	4.4 (2.0)
<b>Beverage Consumption (oz/day)</b>		
Soda*	3.1 (3.6)	0.6 (1.5)
100% Juice*	8.8 (5.2)	6.1 (4.4)
Sugary Drinks*	6.4 (5.3)	1.7 (3.2)
Water*	19.8 (11.8)	29.1 (15.1)
Milk	14.3 (5.5)	16.8 (12.3)
<b>Beverage Consumption (servings/day)</b>		
Soda*	0.6 (0.7)	0.1 (0.3)
100% Juice	1.5 (0.9)	1.3 (1.0)
Sugary Drinks*	1.1 (0.8)	0.4 (0.8)
Water*	2.9 (1.2)	4.3 (1.3)
Milk	2.2 (0.7)	2.7 (1.3)
<b>Milk Type Change (Ratio)</b>		
	<b><u>Percent</u></b>	<b><u>Percent</u></b>
2% Milk*	84.8	33.3
1% Milk*	15.2	66.7
<b>Water Type Change</b>		
Tap Water	6.1	9.1
Other water types §	93.9	90.9
	<b><u>Mean (SD)</u></b>	<b><u>Mean (SD)</u></b>
<b>Beliefs</b> ¥ (Agrees w/positive statements about walking)*	1.3 (1.1)	0.4 (1.3)
<b>Knowledge</b> ¥ (Agrees w/statements promoting healthy beverages)*	5.8 (2.2)	1.4 (1.4)
<b>Role Modeling</b> ¥ (Agrees w/association between mother's role modeling & child's behavior)*	2.0 (1.4)	0.8 (1.6)

\* =  $p < .05$ 

§ = water types (bottled, sweetened, filtered)

¥ = Likert scale (0 = strong agreement, &gt; 8 = strong disagreement)



**Table 4. Promotora's Perception of Mother's Connections**

<b>(N = 33)</b> <b><u>Variable</u></b>	<b>Baseline</b> <b><u>%</u></b>	<b>9-Month</b> <b><u>%</u></b>	<b><u>p-value</u></b>
<b>Mother's Connection to Group</b>			0.85
Strongly Connected	6.1	12.1	
Connected	63.6	66.7	
Somewhat Connected	21.2	0	
Not Connected	6.1	21.2	
<b>Mother's Connection to Promotora</b>			0.24
Strongly Connected	45.5	57.6	
Connected	39.4	39.4	
Somewhat Connected	12.1	0	
Not Connected	3.0	3.0	
<b>* = <math>p &lt; .05</math></b>			

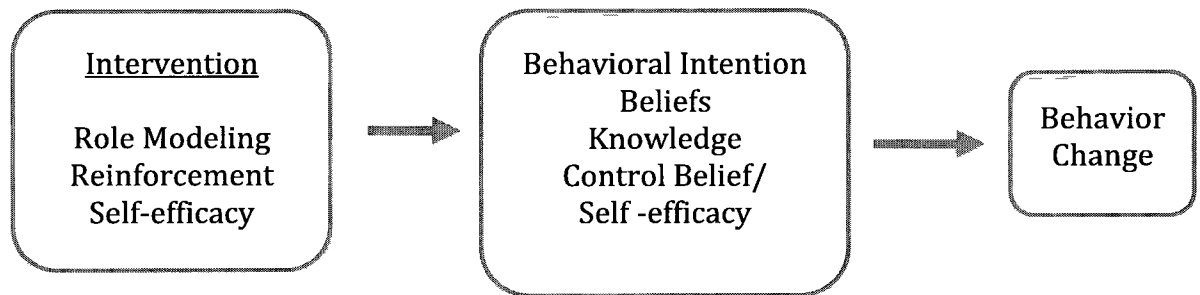
**Table 5. Correlation of Covariate With Pre- to Post- Program Change In Outcome Variables**

**(N = 33)**

<b>Covariate</b>		Change in 100% Juice	Change in Soda	Change in Sugary Drinks	Change in Water	Change in Milk	Change in Tuesday Steps	Change in Saturday Steps
<b>Gravida</b>	Correlation	-0.21	0.09	0.1	0.43	0.03	0.21	0.42
	Significance	0.28	0.68	0.61	0.02*	0.87	0.24	0.02*
<b>#Adults in Household</b>	Correlation	0.27	-0.1	0.15	-0.07	-0.09	0.17	-0.34
	Significance	0.16	0.68	0.44	0.71	0.62	0.35	0.05
<b>Visits w/ PH</b>	Correlation	0.12	-0.45	0.16	0.19	0.01	-0.05	-0.03
	Significance	0.54	0.03 *	0.42	0.33	0.96	0.81	0.85

**\* = p < .05**

**Figure 1. Social Cognitive Learning Theory + Theory of Reasoned Action  
and Planned Behavior**



**APPENDIX A****Chapter 2 - Literature Review Matrix**

**Table 1. Summary Literature Review Matrix**

Auth	Title	Year	Purpose	Design	Sample	Setting	Tools
Anderson S, Whitaker R	Prevalence of Obesity Among US Preschool Children in Different Racial and Ethnic Groups	2009	Estimate the prevalence of obesity in 5 major racial ethnic groups in 4 year old US children	Quantitative - Cross sectional secondary analysis	9550 children participated in the Early childhood longitudinal Study Birth cohort designed to provide information about the learning environments health and development of young US children The ECLS-B contains a nationally representative sample of children born in the US in 2001 while excluding children born to mothers less than 15 years or children who were adopted at 9 months or died		Prevalence of obesity defined as body mass index at or above the 95% for age of the sex specific CDC and prevention growth charts
Balcazar H, Alvarado M, Frank, C, Pedregon V, Fulwood R	A Promotora de Salud Model for Addressing Cardiovascular Disease Risk Factors in the US-Mexico Border Region	2009	1) Describe the strategies used by the NHLBI HRSA partnership with 4 HRSA-funded CHCs to implement cardiovascular health promotion and disease prevention activities in their respective communities 2) to describe the effects of Salud para su Corazon interventions on behavioral and clinical outcomes, and 3) describe the lessons learned during implementation and evaluation of Salud para su Corazon interventions in all 4 health care settings	Exploratory descriptive study utilizing a promotora model	4 Community Health Centers (CHC) providing primary health care and intervention services to predominantly Hispanic patient populations located in Texas California and Arizona		Saluda para su Corazon intervention program

**Table 1 Summary Literature Review Matrix (continued)**

Auth Title Intl	Results Conclusions Recommendations	Limitations Strengths Weaknesses	Level of Evidence
Anderson S Whitaker R  Prevalence of Obesity Among US Preschool Children in Different Racial and Ethnic Groups  Archives of Pediatric and Adolescent Medicine 163(4)	Obesity prevalence among 4 year old US children (mean age 52.3 months) was 18.4% Obesity prevalence differed by racial/ethnic group (P < .001): American Indian/Native Alaskan 31.2%, Hispanic 22.0%, non-Hispanic black 20.8%, non-Hispanic white 15.9%, and Asian 12.5%. All pair-wise differences in obesity prevalence between racial/ethnic groups were statistically significant after a Bonferroni adjustment (P < .005) except for those between Hispanic and non-Hispanic black children and between non-Hispanic white and Asian children. CONCLUSIONS Racial/ethnic disparities in obesity are apparent in 4 year old US children. The highest prevalences in American Indian/Native Alaskan children, in whom obesity is twice as common as in non-Hispanic white or Asian children. Second highest prevalence was in Hispanics followed by non-Hispanic blacks and non-Hispanic whites with Asians last.	First comparison of obesity prevalence in US preschool children across all 7 major racial/ethnic groups using a nationally representative data and comparable to the NHANES 2003-2006 data. The ECLS-B results were higher than those from NHANES for 2-5 year old children in 7 racial/ethnic groups: non-Hispanic Blacks and non-Hispanic Whites, which could be explained by the different methods used to measure weights. NHANES weighed children in paper gowns and beam-clipper, while ECLS-B weighed the children in light clothing without shoes. Also the difference could be in the ages of the children studied. Large sample size of ECLS-B provided important findings in the prevalence of high BMI observed between racial/ethnic groups especially for American Indian/Native Alaskan and Asian children on whom there are no other available prevalence estimates based on nationally representative data.	3 non-controlled descriptive  Public Health Epidemiology
Bakazar H Alvarado M Frank C Pedregon V Tulwood R  A Promotora de Salud Model for Addressing Cardiovascular Disease Risk Factors in the US Mexico Border Region  Preventing Chronic Disease 6(1)	Results: statistically significant decreases for 3 clinical outcomes: diastolic BP, LDL cholesterol levels, and HbA1c. Only LDL cholesterol level and triglyceride levels showed significant decreases from baseline to 12 months after the interventions. Mean BMI did not change and remained in the obese category at 12 months. Noted improvements in heart healthy behaviors. Significant changes in waist circumference. CONCLUSIONS Results suggest that integrating promotoras de salud into clinical practices is a promising strategy for culturally competent and effective service delivery. Promotoras de salud builds coalitions and partnerships in the community. The Salud para su Corazon HRS initiative was successful in helping to develop an infrastructure to support a promotoras de salud workforce in the US Mexico border region.	Design of data collection and method differed between the 4 sites limiting comparison of the result between sites. Unable to implement a more rigorous standardized research protocols. Several sites did not collect socio-demographic information that may confound intervention effects because of resource limitations (not having personnel at the sites to support data collection). Incomplete data constrains data analysis and interpretation of results. Strength pilot testing several integrated clinic type models of care that link promotoras to the medical system at the clinical level.	3 non-controlled clinical series  Public Health  descriptive study

**Table 1. Summary Literature Review Matrix (continued)**

Auth / Title / Jml	Year	Purpose	Design	Sample	Setting	Tools
Barlow S and The Expert Committee Expert Committee Recommendations Regarding the Prevention, Assessment and Treatment of Child and Adolescent Overweight and Obesity Summary report Pediatrics 120	2007	Provide revised recommendations on the evaluation and treatment of child and youth obesity using current evidence-based data as well as clinical experience when evidence does not exist, to provide updated practical guidance to practitioners.	To review the 1998 recommendations for providers dealing with childhood obesity in a clinic setting for prevention, for assessment, and for treatment.			Summary Report
Bluford, D, Sherry, B, Scanlon, K Interventions to Prevent or Treat Obesity in Preschool Children: a Review of Evaluated Programs Obesity 15(6)	2007	Identify effective programs to prevent or treat overweight among 2-to-6 year-old children.	Systematic review of six data bases to identify evaluated interventions, program assessing changes in wt status or body fat and systematically summarize study attributes and outcomes.			Review of literature systematic database search for interventions to prevent or treat overweight among preschool-age children. Publications from 1966- March 2005.

**Table 1 Summary Literature Review Matrix (continued)**

Auth Title /Jrnl	Results Conclusions Recommendations	Limitations Strengths/Weaknesses	Level of Evidence
Barlow S and The Expert Committee  Expert Committee Recommendations Regarding the Prevention Assessment and Treatment of Child and Adolescent Overweight and Obesity Summary report  Pediatrics 120	Overview of childhood obesity problem in the US chronic care model office exam process Provides standard definitions and terminology Recommendations and guidelines for practice are provided for thorough assessment counseling target behaviors treatment of overweight and obesity in children		Summary Report  Pediatric Medical expert committee
Pluфорд, D Sherrin P Scanlon, K  Interventions to Prevent or Treat Obesity in Preschool Children a Review of Evaluated Programs  Obesity 15(6)	5 studies reported new interventions developed by researchers and 2 were adapted from previously implemented interventions Two of the 5 prevention studies and both treatment studies reported statistically significant reduction in weight status or body fat and one approached significance Two based their studies on frameworks or theories three used some form of nutrition education all four included either guidance for or directed PA programs Heterogeneity of frameworks theories strategies and outcomes measures used made it difficult to identify any single strategy of interventions that was more effective than others Literature cites similar challenges in identifying effective interventions to prevent or treat overweight among school age children and adol Of the 5 multi-component studies three resulted in reductions in BMI The Summerbell review found that interventions that included both nutrition and PA components may have changed behaviors related to those but did not significantly improve BMI whereas interventions that focused on only one of these strategies did show a positive impact on BMI There is evidence that basing interventions on a framework or theory is likely to enhance program outcome Recommend using a framework or theory to develop interventions 1w treatment studies actively involved parents in the program 2 of the 4 programs that successfully reduced wt or fat status included parents Lack of evidence to what was the most effective component duration and intensity of the programs (Note see next column for recommendations)	Limitations Heterogeneous nature of the settings methodologies intervention strategies definitions of obesity and outcome measures makes comparisons among these studies difficult Lack of framework or theory as the basis of the interventions in 3 studies was noted None of the interventions included a cost-effectiveness component  Recommendations more interventions need to be implemented and evaluated First step would be to evaluate the effectiveness of the preceding interventions among other racial ethnic groups and in other settings Longer follow up periods of at least 1-2 years to assess change in wt status may increase the likelihood of adequately evaluating program impact and sustainability of the program Prudent to include parents rather than children alone	Review of literature  Medicine (Chronic Disease Prevention & Health Promotion)



**Table 1. Summary Literature Review Matrix (continued)**

Auth	Title	Jrnl	Year	Purpose	Design	Sample	Setting	Tools
Branner, C I, Iensen, G	Racial and ethnic differences in Pediatric obesity-prevention counseling National Prevalence of Clinician Practices Obesity 16(3)		2008	Asses the frequency of clinician-reported delivery of obesity-prevention counseling (OPC) at well-child visits evaluating for racial/ethnic discrepancies	Retrospective descriptive study (secondary analysis) of results from national surveys of well-child ambulatory clinic visits datasets 2001-2004	55 673,574 weighted well-child visits for patients 4-18 years from 2001 -2004 Pts with private Ins Medicaid or self pay at ambulatory clinics and F/R and hospital-based clinics in the US	Excluded underweight, overweight and obese pts	National Ambulatory Medical Care Survey and National Hospital Ambulatory Medical Care Survey by clinician proxy
Brown T, Kelly S Summerbell, C	Prevention of obesity a review of interventions Obesity reviews		2007	Conduct 5 reviews of 1) interventions for the prevention of overweight and obesity in school children 2) interventions for the prevention of overweight and obesity in children 2-5 years and family-based intervention 3) interventions for the prevention and overweight and obesity in vulnerable groups 4) strategies around raising awareness of obesity and 5) determinants of overweight and obesity	Review Evidence reviewed within two pieces of work Cochrane review Interventions for the prevention of Obesity and Childhood	Inclusion criteria For reviews of interventions -randomized controlled trials, for review of determinants - taken from observational studies with a follow-up of more than a year		

**Table 1. Summary Literature Review Matrix (continued)**

Auth. Title / Jml	Results / Conclusions Recommendations	Limitations Strengths Weaknesses	Level of Evidence /
Branner C, Koyama, I, Jensen, G Racial and Ethnic differences in Pediatric obesity-prevention counseling National Prevalence of Clinician Practices Obesity 16(3)	OPC counseling for diet nutrition = 42.1% exercise = 26.1% both = 24.4% 94% received at least exercise counseling Hispanics received less counseling than non-Hispanics Pt with private insurance received OPC more frequently than Medicaid and self-pay pts. Geographic discrepancies where pts in the West received less counseling, less than half likely to receive OPC. Proportion of Hispanic pts was higher in the West than in other regions. Higher rates of OPC for non-Hispanics in other regions. Inadequate OPC provided in Hosp-based practices where more Black and Hispanic patients are seen with higher percentages of Medicaid ins. No identified racial differences in counseling provided. Cultural competence training for providers is inadequate. CONCLUSIONS National provider statistics indicates a decreased delivery of OPC to Hispanic pts while not identifying racial differences in counseling.	Information bias from clinician administered survey Provider may have made OPC without making a note Quality of counseling not assessed Racial identity based on physician and to by pt, identity may not be accurate BNI not calculated = no guarantee that exclusion criteria was followed. Reported OPC for well-child exams only did not include acute visits and may have under reported true OPC Strengths: Large sample size representing regional sample Adequate statistics descriptive univariate using weighted percentages to adjust for the differences in the sample numbers of ethnic groups, race, ages and regions. Multiple logistic regression to identify predictor for the covariates	6= non randomized controlled retrospective study Epidemiology
Brown, T, Kelly, S, Summerbell C Prevention of obesity a review of interventions Obesity reviews	4 tables showing results of 5 reviews: 1) components of diet and PA deemed to be important determinants of overweight and obesity 2) Interventions for the prevention of overweight and obesity in school children 3) Interventions for the prevention of overweight and obesity in children aged 2-5 years and family-based interventions 4) Interventions for the prevention of overweight and obesity in vulnerable groups Discussion on limited and inconclusive results and the need for more research Report on the paucity of intervention for prevention in vulnerable populations		Review of literature Public Health

**Table 1. Summary Literature Review Matrix (continued)**

Auth Title (ml)	Year	Purpose	Design	Sample Setting	Tools
Brown, W., Pfeiffer, K, McIver, K, Dowda, M, Addy, C, Pate R  Social and environmental factors associated with Preschoolers Non-sedentary Physical Activity  Child Development 80(1) 45-58	2009	1) Describe with direct observation data the physical activity behaviors and accompanying social and environmental events of those behaviors for preschool children 2) Determine which contextual conditions were predictors of moderate-to-vigorous physical activity (MVPA)	Randomized cohort study	539 children 3-4-5-year olds from 24 schools 9 private child care centers church preschools and Head Start programs in a metropolitan area of South Carolina Each school had 14-33 children 51% male 55% African American, A total of 476 children were directly observed for 30 min across 5-6 hours	Developed observation protocol Observational System for Recording Physical Activity in Children-Preschool Version
Butte N, Puyau M, Adolph, A, Vohra R, Zakeri, I  Physical Activity in Non-overweight and overweight Hispanic children and adolescents  Journal of the American College of sports Medicine	2007	To describe qualitatively the types of physical activities in which non overweight and overweight Hispanic children participate, 2) to use accelerometer to quantitatively describe the duration intensity and frequency of physical activity 3) to examine the influence of age, gender and BMI status on physical activity levels and 4) to determine the relationships between physical activity and adiposity, fitness and risk for metabolic syndrome	Mixed method Qualitative & Quantitative descriptive cross sectional design	897 Hispanic children 4-to19-years old 424 convert And 473 overweight children recruited from the ITVA I A FAMII IA study between Nov 2000 and Aug 2004 in Houston Texas	Accelerometers 28 item contemporary children's activity questionnaire, 7 sedentary activities were surveyed

**Table 1 Summary Literature Review Matrix (continued)**

Auth Title Jnl	Results / Conclusions Recommendations	Limitations Strengths Weaknesses	Level of Evidence
Brown W Pfeiffer K Melver K Dowda M Addy C Patel R  Social and environmental factors associated with Preschoolers Non sedentary Physical Activity  Child Development 80(1) 45-58	MVPA was observed during only 5.4% of the observations throughout the preschool day. Results indicated that 4 and 5 year old children had more sedentary activity and engaged in less frequent light and MVPA physical activity than 3 year old children. 5 year old males were more active than 4 and 5 year old children but there was no activity difference between females. Even during outdoor play observations indicated that most often children's activities were sedentary and that teachers rarely used intentional encouragement to increase PA. Findings were similar to previous studies for preschool children. RECOMMENDS that future investigation should evolve from small scale studies to develop effective acceptable and feasible practices followed by large scale investigations with manuals and materials for dissemination of information.	Limitations: Observations of 30 min across 5-6 hours does not represent real time of children's PA. Difficult to extrapolate the amount of time related to true PA. Real time observations are prohibitive and difficult for investigators. Limited generalizability especially to children public schools. Sample bias due to sample restricted to consenting school administrators and parental permission prior to randomization. Limited to South Eastern regions of the US. No demographic information given would have been helpful to see the difference in PA based on race and ethnicity and SES. Strengths: Results replicated the finding of other studies reporting low levels of PA among preschoolers even during outdoor play. Large sample size (did not mention sample power) ethnically and economically diverse pop. cross sectional data with two waves of collection in 24 community based preschools and reliable direct observation information systematically collected across children, preschool circumstances and days. Identified some factors that may be helpful to enhance PA in preschool children.	3 cohort study  Education
Butte N Puyau M Adolph, A, Vohra F Zakeri I  Physical Activity in Non overweight and overweight Hispanic children and adolescents  Journal of the American College of Sports Medicine	Types and levels of PA were influenced by age, gender and BMI status. Total PA counts declined markedly with increasing age and were consistently higher in boys than in girls. Total activity counts were lower and sedentary counts were higher in overweight than in non overweight children. PA levels were significantly associated with percent FM, VO2, fasting serum insulin, and waist circumference though the association were weak. CONCLUSION: Efforts should be made to shift the time in sedentary activity to light activity and to increase the time spent in moderate to vigorous activity in the U.S. Hispanic children and adolescents with special attention given to the overweight girls and adolescents.	Strengths: accelerometers allowed for objectively measuring sleep time and awake time sedentary and active movements. Limitation: self reported surveys tend bias to results.	3 non controlled descriptive study  Pediatric Nutrition

**Table 1. Summary Literature Review Matrix (continued)**

Auth	Title	Yr	Purpose	Design	Sample	Setting	Tools
Clark HR, Govder E Bischoff P, Blank I Peters J	How do parents' child feeding behaviors influence child weight? Implications for childhood obesity policy	2007	Evaluates research on child feeding behaviors and considers the implications for childhood obesity policy in the United Kingdom	Review of Literature	26 studies: 11 cross-sectional, 6 longitudinal, 4 experimental, 2 observational, 2 qualitative and 1 retrospective	Most conducted in US on parents with preschool and primary age children; some with older children	Good cross-section of infant, preschool and school ages represented
Journal of Public Health 29(2)							
Connolly JP, Duaso MJ, Butler G	A systematic review of controlled trials of interventions to prevent childhood obesity and overweight: A realistic synthesis of the evidence	2007	Present practice relevant guidance on interventions to reduce at least one measure of adiposity in child populations that do or do not contain overweight or obese children	Systematic review of eligible randomized controlled trials or controlled trials using a novel approach to synthesizing the trial results through application of descriptive epidemiological and realistic evaluation concepts	Multiple databases were used to identify the trials. Eligible trials involved at least 30 participants, lasted at least 12 weeks and involved non-clinical child populations. 2 trials included preschool children		
Public Health Journal of The Royal Institute of Public Health							

**Table 1 Summary Literature Review Matrix (continued)**

Auth Title Jml	Results Conclusions Recommendations	Limitations Strengths Weaknesses	Level of Evidence / Review of Literature
<p>Clark HR Govder E Russell P Blum I Feters J</p> <p>How do parents child feeding behaviors influence child weight? Implications for childhood obesity policy</p> <p>Journal of Public Health 29(2)</p>	<p>The studies provide evidence for a relationship between parents' child feeding behaviors, children's dietary intake, and child weight. Evidence is inconsistent for some behaviors, and bidirectionality is likely for all behaviors. Parents who restrict dietary intake to manage child's wt may be counter-productive and may interfere with child's ability to self-regulate their weight, especially in girls. 9 studies found positive association between parental restriction and dietary intake, child's weight, or both. 4 found a causal relationship.</p> <p>RECOMMENDATIONS: 1) Alternative instruments may be needed for minority populations where concern about child weight may not determine parents' child feeding behaviors. 2) Find ways to communicate messages about child feeding behaviors to parents. 3) Intervention studies needed to test approaches that are effective across socio-economic and ethnic groups. Current interventions may be more effective with well-educated parents but less effective in less well-educated groups. 4) Parents be given info on how and what to feed their children with practical support.</p>	<p>Limited by nature of the studies included and those excluded. Limited generalizability secondary to: Majority conducted in the US in predominantly white, two-parent affluent family population; majority of the studies focused only on girls, excluding gender differences. Differences between SES and education not considered and may be a major predictor of feeding behaviors. Self-reporting by parents introduce result bias.</p>	<p>Review of Literature Public Health</p>
<p>Connolly JR Duaso MJ Butler G</p> <p>A systematic review of controlled trials of interventions to prevent childhood obesity and overweight: A realistic synthesis of the evidence</p> <p>Public Health Journal of The Royal Institute of Public Health</p>	<p>28 eligible trials identified up to April 2006. 11 trials effective and 17 were ineffective in reducing adiposity. Main factor distinguishing effective from ineffective trials was the provision of moderate to vigorous aerobic physical activity in the former on a relatively compulsory rather than voluntary basis.</p> <p>CONCLUSION: Nutritional education, nutritional skills training, and physical education do NOT distinguish effective from ineffective interventions regarding reducing childhood obesity. A decisive role for the compulsory provision of aerobic activity has been demonstrated.</p> <p>RECOMMENDATIONS: Further research is req'd to identify how such activity can be sustained and transformed into a personally chosen behavior by children and over the life course.</p>	<p>Synthesis of study trials used both descriptive, epidemiological, and realistic evaluation concepts and procedures to cross-classify and synthesize the controlled trials we identified. Believe this approach offers more analytic power in identifying and explaining heterogeneity of trial results than a more traditional trial-by-trial narrative description. Most existing review fail to draw practice-relevant conclusions. Finally, realistic evaluation specifies the particular importance of thoroughly describing the accepted mechanisms that are expected to underlie the changes brought about by the intervention. Aerobic physical activity has been demonstrated to reduce adiposity. Recommendation: further research needed to identify how activity can be sustained and transformed into lifestyle behaviors by children.</p>	<p>Review of Literature Public Health &amp; Psychology</p>

**Table 1. Summary Literature Review Matrix (continued)**

Auth	Title (ref)	Year	Purpose	Design	Sample	Setting	Tools
Crawford P, Gosliner W, Anderson C, Strode P, Becerra-Jones Y, Samuels S, Carroll A, Ritchie I	Counseling Latina Mothers of Preschool Children about Weight Issues: Suggestions for a New Framework  Journal of the American Dietetic Association	2004	Assess Latina mothers' health beliefs and attitudes regarding early childhood weight issues and to use the information to update current nutrition education methods	Qualitative English (n=16) Spanish (n=27) Grounded Theory	8 focus groups	43 Latina mothers (and grandmothers) with children aged 2 to 5 years recruited at five different Special Supplemental Nutrition Programs for Women, Infants, and children sites in California	Focus groups guide developed by the research team to obtain topical information on parental attitudes and beliefs about child weight and health Ranking Life Priorities tool from the CDC Photographs of overweight children from the Berkeley Longitudinal Nutrition Study to represent BMI ranging from underweight to overweight
Dabelea, D, Bell, R.A, D'Agostino, R.B, Imperatore, G, Johansen, T.M, Linder, B, Liu, J.L, Loots, B, Marcovina, S, Mayer-Davis, E.J, Pettitt, D.J, Wauzler, B	Incidence of Diabetes in Youth in the United States  JAMA 297(24)	2007	Identify incident cases of DM among individuals younger than 20 years to estimate the population incidence of type1, type2, and other types of DM overall and by age and race/ethnicity	Quantitative Multi-ethnic population-based cohort study (The SEARCH for Diabetes in Youth Study)		2435 youth (non-institutionalized non-military) 6.2% of pop. <20yrs with newly diagnosed no secondary DM in 2002 and 2003 from 10 study locations covering all regions in the US	

**Table 1 Summary Literature Review Matrix (continued)**

Auth Title / Jml	Results / Conclusions Recommendations	Limitations Strengths Weaknesses	Level of Evidence
Crawford, P, Goshier W, Anderson C, Strode, E, Becerra, Jones Y, Samuels S, Carroll A, Ritchie I  Counseling Latin Mothers of Preschool Children about Weight Issues Suggestions for a New Framework  Journal of the American Dietetic Association	1) emergent themes were identified and organized into four functional domains relevant to nutrition education 1) health beliefs surrounding weight 2) impact and cause of overweight 3) life values and concerns and 4) strategies for making changes in children's eating and activity patterns Information from this qualitative study demonstrates that the traditional nutrition counseling paradigm may not be effective with Latina mothers. In addition, cultural beliefs can be barriers to successful prevention and treatment of overweight. To ensure that culturally competent services are provided, educators must be prepared to adjust education approaches according to the cultural background of the clients. Key among the issues was mothers' difficulty acknowledging overweight among their children and their perception that health and weight were poorly associated. Certain cultural values were identified as barriers to adopting healthful behaviors. Mothers were able to identify specific ways in which nutrition education could be improved. Findings suggest that nutrition education efforts can be reframed to better address the belief system and cultural framework of the population like identifying positive eating behaviors rather than focusing on a child's weight	Strengths identified key components for designing intervention programs for obesity prevention for the Latino populations Limitations Not generalizable to the greater population due to small sample size and demographics of participants	Qualitative study  Nutrition (registered dietitians)
Dabelea, D, Bell, R.A., D'Agostino, R.B., Imperatore, G, Johansen, M, Under B, Liu, L.J, Loois, B, Marcovina, S, Mayer Davis, E.T, Pettitt, D.I, Whitfield, B  Incidence of Diabetes in Youth in the United States  JAMA 207(24)	The incidence of DM (per 100,000 person yrs) was 24.3. Among children younger than 10 years, most had type 1 DM, regardless of race/ethnicity. The highest rates of type 1 DM were observed in non-Hispanic White youth. Even among older youth (>10 yrs), type 1 DM was frequent among non-Hispanic white, Hispanic, and African American adolescents. CONCLUSION Overall, type 2 DM was still relatively infrequent, but the highest rates were documented among 15- to 19-yr-old minority groups.	Although some of the SEARCH study centers are membership-based, their basic populations are very representative of the geographic areas in which they are located. Incomplete matching across sources due to restrictions on access to names in some sites and design of the case ascertainment system for efficiency leads to an underestimate of completeness as assessed by the capture-recapture method used to estimate completeness. Therefore, estimates may represent the lower bound on the completeness of ascertainment in the SEARCH study. Different collection methods and case definitions were used in other studies, making comparisons across studies difficult.	5 - cohort study  Medicine Epidemiology



**Table 1. Summary Literature Review Matrix (continued)**

Auth / Title Jml	Year	Purpose	Design	Sample Setting	Tools
Daniels, S, Jacobson, M, McCrindle, B, Eckel, R, Sanner, B  American Heart Association Childhood Obesity Research Summit Report  Circulation Journal of the American Heart Association	2009	Present an overview of current childhood obesity problems including pathophysiology and morbidity, current healthcare practices, prevention and treatment, barriers to optimum care, challenges of behavior change, practice-based resources for prevention, research challenges research policy knowledge translation	Report AMA Childhood Obesity Research Summit - Executive Summary		
Deitrick, I, Paxton, H, Rivera, A, Gertner, e, Buery, N Letcher, A, Lahoz, L, Maldonado E, Salas-Lopez D  Understanding the Role of the Promotora in a Latino Diabetes Education Program  Qualitative Health Research 20(3)	2010	Examine the promotora role in a diabetes self-management education program for Latino patients from the perspective of both the promotora and the patients in order to understand the essential components of the promotora role that made the education program successful This was part of an overall strategy to implement the chronic care model to improve quality and accessibility of care for the Latino patient population	Qualitative study using participant focus groups, promotora interview Grounded Theory	35 Latino patients with type 2 diabetes - 14 men and 21 women Ages 40-to-82-years recruited by mail and by telephone from among the 73 people who had completed the promotora-led-program Those who were home bound or infirm were excluded Setting was at the hospital where out-patient clinic was located for the participants who had diabetes	Program developed focus group guide

**Table 1. Summary Literature Review Matrix (continued)**

Auth Title / Jrnal	Results / Conclusions / Recommendations	Limitations Strengths Weaknesses	Level of Evidence /
<p>Daniels, S, Jacobson, M, McCindle B, Eckel R, Sanner B</p> <p>American Heart Association Childhood Obesity Research Summit Report</p> <p>Circulation Journal of the American Heart Association</p>	<p>SUMMARY More research needed in areas of clinical and psychosocial/behavioral assessment Dietary factors that promote obesity include HCBs, energy-dense foods, excess refined carbohydrates, excess dietary fat and large portion sizes Studies promoting PA have demonstrated significant reduction in adiposity independent of other factors Obesity is associated with low-levels of physical fitness, reduced speed and agility Parents need educ in what activities are appropriate on the basis of child's age, development, and emotional makeup More research needed on the benefits of reducing sedentary behaviors for wt loss and maintenance Importance of parental or family involvement in childhood overwt prevention programs are needed Relatively low inclusion of family components in programs Long term success among 8-12 year-old-children Limited data on the use of behavioral management in minorities, low-income children or significantly overwt children Methods and strategies that are effective with these groups must be developed Culturally and economically appropriate behavior-based interventions are also necessary to meet unique need of various populations More low-income children are uninsured Health professions slow in implementing guidelines to assess overwt and obese children Few monitor BMIs Most have pessimistic attitude for programs to decrease obesity</p>		<p>Report</p> <p>Cardiology</p>
<p>Deitrick I, Paxton, H, Rivera, A, Gertner, e, Biery, N, Letcher, A, Lahoz L, Maldonado, E, Salas-Lopez, D</p> <p>Understanding the Role of the Promotora in a Latino Diabetes Education Program</p> <p>Qualitative Health Research 20(3)</p>	<p>SUMMARY (Promotora related only see article for diabetes intervention results) Perceived role of Promotora varies among patients, literature, and promotores themselves Important promotora functions include role model and personal connections with patients, educator and support person Functions also include providing cultural mediation, informal counseling and social support culturally appropriate health education, advocating for individual and community needs ensuring that people get the services they need, building individual and community capacity, and providing direct services corroborated by general consensus in the literature 3 universal functions health educator, cultural mediator providing cultural understanding and provider of language concordance between the patient and the promotora Patients indicated 3 important components 1) enabling connections with other Latino diabetics and promotora support, 2) Promotora-led classes that brought a sense of hope among the patients, 3) development of partnerships with health care providers through the promotora introductions Support provided by the promotora and the presence of their diabetic peers in the self-management education classes are important components of this integration of diabetes into patients personal lives</p>	<p>Limitations Results no necessarily generalizable beyond program b/c of lack of a comparison group Community-based aspect of program made a randomized controlled trial design impractical Also, there were no consistently collected health status markers such as cholesterol or blood pressure to determine whether health status markers changed as a result of program participation</p>	<p>Qualitative study</p> <p>Latino Health</p>

**Table 1. Summary Literature Review Matrix (continued)**

Auth, Title, Jml	Year	Purpose	Design	Sample Setting	Tools
Dugas, L, Fbersole K Schoeller, D Yanovski, J Barquera S, Rivera, J Durazo- Arziva, R, Luke. A	2008	Perform preliminary investigation of energy expenditure (EE) in healthy Mexican-American (MA) and European-American (EA) children with the future goal of investigating whether or not differences in EE contribute to differences in overwt among MA children	Quantitative - Comparative Study	N=47 (6-to 10- years- old children) 20 MA (10 boys, 10 girls) from western suburbs of Chicago Illinois. 27 EA (11 girls, 16 boys) from Bethesda, Maryland All were compatible for age, weight, BMI, Fat free mass(FFM), and % body fat	Delta Trac II used to measure energy expenditure at rest and after physical activity
Very low levels of energy expenditure among pre-adolescent Mexican-American girls					
International Journal of Pediatric Obesity					

**Table 1. Summary Literature Review Matrix (continued)**

Auth / Title / Jnl	Results / Conclusions / Recommendations	Limitations Strengths/Weaknesses	Level of Evidence /
<p>Dugas J, Fliersole K, Schoeller, D, Yanovski J, Barquera S, Rivera I, Durazo-Azavedo, R, Luke, A</p> <p>Very low levels of energy expenditure among pre-adolescent Mexican-American girls</p> <p>International Journal of Pediatric Obesity</p>	<p>Resting energy expenditures (REE) were not significantly different between the groups. MA had a significantly lower total energy expenditure than EA children mainly in the MA girls</p> <p>Age, wt, % body fat and FFM were all significant contributors to the final TEE. Activity energy expenditures was significantly lower in MA girls than EA girls and EA boys. No ethnic or gender differences in REE</p> <p>CONCLUSION: Results concur with previous studies showing lower physical activity participation in MA girls independent of age. Results suggests MA girls expend less energy than EA girls of comparable body size due to reduced Physical activity and may be an important determinant of body weight later during adolescence and adulthood</p>	<p>Data collected at two research sites. The sociodemographic variables may impact the physical activity patterns</p>	<p>3 – non-controlled descriptive</p> <p>Preventive Medicine &amp; Epidemiology</p>

**Table 1. Summary Literature Review Matrix (continued)**

Auth / Title / Jml	Year	Purpose	Design	Sample Setting	Tools
Elder, J, Ayala, G, Parra-Medina, D, Palavera, G Health Communication in the Latino Community Issues and Approaches Annual Review of Public Health	2009	Describe various research issues and challenges when considering the health of Latinos and implications for designing and evaluating health communication and behavior change efforts in this population	Report of the current Latino culture in the US Part I- Socioeconomic Realities, Regional Issues, Generation Status, Identity and Lang , Addressing Health Disparities, Part II- Comm and hlth behavior change A Framework for Latino health Promotion thru Comm, hlth Behavior Theories Comm - Persuasion Model Channels of comm , Sources of Comm by Setting, The Message, the Audience A Family Focus, Part III - Discussion	All sections in report supported by past studies on Latinos	Analysis performed within context of Communication-Persuasion framework model

**Table 1. Summary Literature Review Matrix (continued)**

Auth / Title / Jnl	Results / Conclusions / Recommendations	Limitations / Strengths / Weaknesses	Level of Evidence
Elder, J. Ayala, G. Parra-Medina, D. Jalavera, G. Health Communication in the Latino Community: Issues and Approaches Annual Review of Public Health	<p>CONCLUSION: Health communication efforts with Latinos need to focus on family, cultural tradition, and collectivism while attending to acculturation, language, generation, and national origin. The most extensive intervention topic in Latino health promotion has been the application of the lay health advisor model. This and other fundamental communication approaches, as well as audience and population characteristics, need to be considered within the context of dynamic and complex societal changes. The lack of empirical documentation of effective community health promotion efforts will continue to challenge researchers and policy makers alike in the coming years and decades.</p>		Report  Public & Latino Health

**Table 1. Summary Literature Review Matrix (continued)**

Auth / Title / Jnl	Year	Purpose	Design	Sample / Setting	Tools
<p>Uldes T Ayala, G, Slymen, D Arredondo E Campbell, N</p> <p>Evaluating Psychosocial and Behavioral Mechanisms of Change in a Tailored Communication Intervention</p> <p>Health Education &amp; Behavior</p>	2009	<p>Compare a short term nutrition 3 mos. Immediate post intervention and longer term 6 mos. Post intervention impact of two tailored interventions to a control condition on psychosocial factors and dietary behavioral strategies related to fat and fiber intake</p>	<p>Comparative study 1) one groups received only 12 weekly mailed Tailored print material on nutrition design for study and homework 2) Control group received 12 weekly printed materials on nutrition readily available in the community 3) Promotora group - received weekly home visits, by promotores over a 3-mo period plus the tailored print materials for the study and homework assignments</p>	<p>Random sample of 357 predominantly Mexican Mexican American women 18- 65 years old not pregnant, no family members on strict medical diet and not planning to leave the study during study period Separated into 3 intervention groups Promotora n 120 Tailored n=118 Control n 119 Setting San Diego County</p>	<p>Customized Intervention Tailored printed material related to healthy nutrition / Customized Dietary behavior scale Acculturation Rating Scale For Mexican Americans (ARSMA-II)</p>
<p>Finkelstein E Frogdon J Cohen, J, Dietz, W</p> <p>Annual Medical Spending Attributable to Obesity Payer and Service-specific Estimates</p> <p>Health Affairs - Web Exclusive</p>	2009	<p>Analyze and present updated estimates of the costs of obesity for the US across payers (Medicare, Medicaid, and private insurers)</p>	<p>Quantitative - Retrospective secondary data analysis</p>	<p>Data from the 1998 and 2006 Medical Expenditure Panel Surveys (MEPS), a nationally representative survey of the civilian non-institutionalized population that quantifies a person's total annual medical spending by type of service and source of payment, including BMI based on self reported height and weight Adults 18 years and older 1998 - 10597 adults, 2006 21 877 adults</p>	

**Table 1 Summary Literature Review Matrix (continued)**

Auth Title Jml	Results Conclusions Recommendations	Limitations Strengths Weaknesses	Level of Evidence
Elder J, Avala G, Slymen D, Arradondo J, Campbell N Evaluating Psychosocial and Behavioral Mechanisms of Change in a Tailored Communication Intervention Health Education & Behavior	Promotora group had the largest impact on behavioral strategies and psychosocial factors at immediate post interventions compared to the tailored and control conditions. Participants in the promotora group engaged in more behavioral strategies for eating low fat and high fiber diets compared to the tailored and control groups. However at the 6 month post intervention assessment the differences in these dietary behavioral strategies were no longer significant because of behaviors reverting back which was similar to the tailored and control group behaviors. This may be due to the SES of the participants who could not afford the healthy foods. Also due to family and work demands participants may have limited time to engage in behavioral strategies to eating healthy. The promotora group reported encountering fewer barriers to eating diet high in fruits and vegetables and promoting healthy diet practices with family than other two groups. CONCLUSION: The promotora model is an effective method for changing important dietary behavior and psychosocial determinants. Group norm effects suggested that the promotora condition was superior at reducing barriers and improving family interaction supporting healthy behaviors. Future studies should focus on clinic or community based promotora models.	Recruiting location not mentioned. Most participants were less acculturated and by volunteering may already have been interested in nutritional health. Women were less acculturated and may not be generalizable to women who are more acculturated or with less interest in nutrition. Data was self reported biasing results. Control and tailored groups participated by telephone so study is not generalizable to those without telephones or cell phones. Also recruitment was done by telephone which could introduce selection bias toward people who were home during the week. Strength: participants were recruited by random digit dial. Reasonable sample size.	8 - small sample randomized controlled trial Behavioral & Community Health
Linkelstein, E, Trogdon J, Cohen, J, Dietz, W Annual Medical Spending Attributable to Obesity: Payer and Service-specific Estimates Health Affairs Web Exclusive	Increased prevalence of obesity is responsible for almost \$40 billion of increased medical spending through 2006 including \$7 billion in Medicare prescription drug costs. Estimate that the medical costs of obesity could have risen to \$147 billion per year by 2008. Obesity continues to impose an economic burden on public and private payers. Per capita medical spending for the obese is \$1420 higher per year or roughly 42% higher than for normal weight person. CONCLUSIONS: Private payers bear the majority of costs associated with obesity but public sectors spending is substantial and is a major cause of concern. The extent to which obesity treatments and prevention would reduce spending in either the short or long run is unknown.	Limitations: Self reported wt and ht biases the results. Lack of statistical significance in some regressions may be attributed to the small sample size. There may be some questions about statistical analysis used. 329 Medicaid enrollees had an inpatient visit compared with 767 underweight individuals in the private payer regression. Strength: regression based stats allow for quantifying the spending attributed to obesity by payer and point of service but does not directly allow for apportioning spending across specific diseases or the underlying behavior that causes excess weight.	7 - non controlled descriptive Public Health Economics



**Table 1. Summary Literature Review Matrix (continued)**

Auth	Title	Jrnl	Year	Purpose	Design	Sample	Setting	Tools
Franks P, Hanson R, Knowler W, Sievers M, Bennett P, Looker H	Obesity, Other Cardiovascular Risk Factors, and Premature Death	The New England Journal of Medicine	2010	Assess the extent to which obesity, glucose intolerance, hypertension and hypercholesterolemia in children without diabetes predicted death (defined as death before 55 years of age) in American Indians from Arizona	Quantitative - descriptive longitudinal cohort study  Secondary analysis of data from baseline exam until the person's death, the person's 55th birthday, or end of 2003, whichever came first	N = 4857 children without diabetes (5- to 20 years) born between 1945-1984 Pima or Tohono Oodham Indians in reservations in Arizona		International Classification of Diseases - 9th Revision (ICD-9) used to classify causes of death / Alcohol dependence estimated via use of CAGE questionnaire / Glucose tests interpreted according to WHO diagnostic criteria
Freedman D, Khan, J, Dietz, W, Srinivasan S, Berenson G	Cardiovascular Risk Factors and Excess Adiposity Among Overweight Children and Adolescents: The Bogalusa Heart Study	Pediatrics	2007	Explore the accuracy of various BMI cutpoints in identifying children who have excess adiposity (based on skinfold thicknesses), adverse levels of lipids, insulin, and blood pressures, and high risk for severe adult obesity	Quantitative - descriptive longitudinal cohort study  Secondary analysis on data of subjects who participated in the Bogalusa Heart Study	Cross sections (n=10,099) 5 to 17 years -old and longitudinal (n = 2392) 5 to 14 years old who were reexamined as adults. Recruited from a Louisiana community		CDC Growth Charts used to determine BMI percentiles. Large Skinfold Calipers recordings used as input to index of adiposity
Fuentes Aflick, E, Hessol, N	Overweight in Young Latino Children	Archives of Medical Research	2008	Assess the role of maternal acculturation, child health and dietary factors, and maternal perceptions of the child's body mass on risk of overweight among young Latino children	quantitative descriptive secondary analysis of 3 - year follow up data from the Latino Health Project done 1997-1999	185 Latina mother and children (3 y o) recruited from San Francisco General Hospital / Mission District predominantly Latino community) who completed the Latino Health Project study		Acculturation status based on 4 measurements: 1) acculturation index, 2) number of years residing in the US, 3) education attainment, 4) Americanization score

**Table 1. Summary Literature Review Matrix (continued)**

Auth Title Jnl	Results Conclusions Recommendations	Limitations Strengths Weaknesses	Level of Evidence
Franks F Hanson R, Knowler W, Sievers M Bennett P, Croker H Obesity Other Cardiovascular Risk Factors and Premature Death The New England Journal of Medicine	559 of 4857 participants (11.5%) died before they reached 55 years of age. PMI was positively associated with the risk of premature death from endogenous causes. BMI was positively but not significantly associated with death from external causes. Rates of death from endogenous causes among children in the highest quartile of BMI were more than double those among children in the lowest BMI quartile. Rates of death from endogenous causes among children in the highest quartile of glucose intolerance were 73% higher than those among children in the lowest quartile. Childhood hypertension was significantly associated with premature death from endogenous causes. No significant associations were seen between rates of death from endogenous or external causes of childhood cholesterol levels or systolic or diastolic blood pressure levels on a continuous scale. Obesity is causally related to other death or other related factors. <b>CONCLUSIONS</b> Obesity, glucose intolerance, and hypertension in childhood were strongly associated with increased rates of premature death from endogenous causes in this population.	Limitation: generalizability related to this group of American Indians in the southwest. Strength: multiple parameters evaluated. ID: major factors contributing to premature death related to BMI.	5 - cohort study Diabetes Epidemiology
Freedman, D, Khan L, Dietz W, Srinivasan S, Berenson C Cardiovascular Risk Factors and Excess Adiposity Among Overweight Children and Adolescents: The Bogalusa Heart Study Pediatrics	39% of the children with a BMI ≥95% had at least two risk factors for heart disease. 65% had excess adiposity and 65% had an adult BMI of ≥35 kg/m <sup>2</sup> . Of those with a BMI ≥99%, 59% had at least two risk factors, 94% had excess adiposity, and 88% had an adult BMI ≥35 kg/m <sup>2</sup> . About 4% of children in the US now have a PMI ≥99%. <b>CONCLUSION:</b> the 99% of BMI for age may be appropriate for identifying children who are at very high risk for biochemical abnormalities and severe adult obesity. More aggressive weight control strategies may be warranted for this subgroup.	Limitations: There are limitations of BMI which does not distinguish between fat mass and fat free mass as an indicator of obesity. Some misclassification is likely because of measurement errors and although these errors may be largest for skinfold thickness, all characteristics are subject to these errors. Geographic selection of population. Strength: Large sample size with longitudinal design supporting conclusive results.	5 - cohort study Nutrition & Physical Activity Cardiovascular Health
Fuentes-Afflick E, Hessol N Overweight in Young Latino Children Archives of Medical Research	At age 3 yrs, 43% of children were overweight. Childhood overweight was associated with maternal acculturation status and maternal obesity. Childhood overweight is also more likely among children who were reported to eat well or very well and among children whose weight was perceived as too high. <b>CONCLUSIONS:</b> Latino children have very high rates of overweight by 3 years of age. 3 important risk factors for overweight are: maternal acculturation, maternal perception, and body weight. Clinical and policy efforts to reduce the prevalence of overweight among Latino children should address the role of acculturation and body mass within the context of family.	Sample bias: small sample from one hospital based clinic and women who remained enrolled 3 years post partum. Relied on self-report biasing results. Limited data to demographic and nutrition factors, although obesity is multi-factor.	3 - non controlled descriptive Pediatric Epidemiology Medicine

**Table 1. Summary Literature Review Matrix (continued)**

Auth	Title	Year	Purpose	Design	Sample / Setting	Tools
Giger J, Davidhizar R, Purnell L, Harden, H, Phillips J, Strickland, O, American Academy of Nursing Expert Panel	Report: Developing Cultural Competence to Eliminate Health Disparities in Ethnic Minorities and Other Vulnerable Populations	2007	1) Assess current issues related to closing the gap in health disparities and achieving cultural competence 2) Discuss a beginning plan of action from the Expert Panel often Cultural Competence for future endeavors 3) Provide clearly delineated recommendation to assist the Academy to plan strategies and to step forward in taking the lead in reshaping health care policies to eliminate health care and health disparities evidenced in today's society	Report - Outlined definitions for healthcare disparities, health disparities and current evidence for each of these in the US today. Defined cultural competence for health care professional and need for improvements among the professional disciplines. 12 recommendations were outlined (see Results / Conclusions Recommendations)		
Golan M, Crow S	Targeting Parents Exclusively in the Treatment of childhood Obesity: Long-Term Results	2004	Report long term change in children's overweight following a family-based health-centered approach where only parents were targeted compared with a control intervention where only children were targeted	Comparative randomized control trial. Longitudinal test-retest	50 of 60 children recruited in Tel Aviv, Israel randomly assigned to 1 of 2 groups: parent only or child only interventions  14-to 19 years 7 years post intervention	2 Interventions: 1) Only parents participated in group sessions, consisting of diet guidelines for entire family 2) Only children participated in group sessions and prescribed a 1500 kcal/d diet. Overwt calculated using formula comparing actual wt vs desirable wt (based upon 90th percentile of age, sex, and ht according to US NHCS growth charts)

**Table 1. Summary Literature Review Matrix (continued)**

Auth	Title / Jml	Results / Conclusions / Recommendations	Limitations Strengths Weaknesses	Level of Evidence /
Giger J, Davidhtzar R, Purnell L, Harden, JI Phillips, I Strickland O, American Academy of Nursing Expert Panel Report Developing cultural Competence to Eliminate Health Disparities in Ethnic Minorities and Other vulnerable Populations  Journal of Transcultural Nursing 18(2)		RECOMMENDATIONS for reducing or eliminating disparities: 1) Education: develop knowledge, skills, basic competencies and abilities among health care professionals. 2) Practice setting must be culturally sensitive and must assure culturally competent care is rendered. 3) Research: on diversity, disparities, and cultural competence is needed, including women and ethnic minorities. 4) Policy: take proactive lead in proposing policies that can focus funds and care in areas that will change health outcomes, education of policy makers is essential, and 5) Advocacy: promote efforts that advocate for diverse groups and vulnerable populations who cannot advocate for themselves.		Report  Nursing
Golan, M, Crow, S  Targeting Parents Exclusively in the Treatment of childhood Obesity: Long-Term Results  Obesity research 12(2)		Children in the parent-only group achieved significantly higher reduction in percent overweight compared with children in the child-only group at 1 yr, 2 year and 7 year follow-up: no significant difference in the increase between the 2 groups over the 1 year study. At end of intervention 35% children reached non-obese status but only 14% in child-only group reached non-obese status. No significant difference between gender was seen. At 7 years the mean reduction for parent-only group was 29% and only 20.2% in the child-only group. At 7 yrs 60% of the children in the parent-only group were in the non-obese status and only 31% in the child-only group. In both groups boys overweight was greater than girls in all follow-up points.  CONCLUSION: Over the long term, treatment of childhood obesity with parents as the exclusive agents of change was superior to the conventional approach.	Small sample size limiting sample power to preserve adequate statistical power. Only two conditions could be studied. Choose child-only approach for control because it was the most common approach used in Israel. Reasonable statistical analysis was used.	8 - small sample randomized control trial  Nutrition Psychiatry

**Table 1. Summary Literature Review Matrix (continued)**

Auth	Title / Jml	Year	Purpose	Design	Sample / Setting	Tools
Golan, M, Kaufman V, Shahar, D	Childhood obesity treatment targeting parents exclusively vs parents and children	2006	Evaluate the relative efficacy of treating childhood obesity via a family based health centered intervention, targeting parents alone vs parents and obese children together	Quantitative comparative longitudinal study	32 families with obese children of 6-to 11-years of age randomized into groups: 1) parent only, 2) parent and obese child	6 month of a comprehensive educational and behavioral program for healthy lifestyle Family Eating and Activity Habits Questionnaire (Golan) The Parental Authority Questionnaire (Bun) Overwt calculated using formula comparing actual wt vs desirable wt (based upon 50th percentile of age, sex and ht according to US NHCS growth charts)
Goran, M, Lane, C, Toledo-Corral, C, Weigensberg, M	Persistence of pre-Diabetes in Overweight and Obese Hispanic children	2008	Examine changes in risk factors of overwt and obese Hispanic children at high risk of developing type 2 diabetes through secondary analysis of longitudinal data from the USD California Study of Latinos At Risk (SOLAR) Diabetes Project	Quantitative Retrospective secondary analysis of longitudinal data on test retest for pre-diabetes markers	N= 128 overwt obese Hispanic children with a family history of type 2 diabetes primarily from clinics in East Los Angeles 68 boys, 58 girls, 11-2 + 1-8 years from the USC California Study of Latinos At Risk (SOLAR) Diabetes Project	BMI determined per CDC normative curves Diabetes determined per standard ADA criteria

**Table 1. Summary Literature Review Matrix (continued)**

Auth Title / Jml	Results Conclusions Recommendations	Limitations Strengths Weaknesses	Level of Evidence
Golan M Kaufman V Shaha, D  Childhood obesity treatment targeting parents exclusively vs parents and children  British Journal of Nutrition	Only intervention aimed at the parents-only group resulted in a significant reduction in the percentage overweight at the end of the program (p = 0.02) as well as the 1-year follow-up meeting. The difference between groups at both times were significant (P = 0.05). A greater reduction in food stimuli in the home was noted in the parents-only group. In both groups the parent's weight status did not change. Regression analysis shows that the level of attendance in sessions explained 28% of the variability in the children's weight status change; the treatment group explained another 10% and the improvement in the obesogenic load explained 11% of the variability.  CONCLUSION: These results suggest that omitting the obese child from active participation in the health-centered programmed may be beneficial for weight loss and for the promotion of a healthy lifestyle among obese children.	Strength: first study to demonstrate that omitting the child from attendance in interventions session has the advantage of more weight loss compared with sessions where both parent and child attend.  Limitation: small sample size without statistical power. Study in focused geographical region limited generalizability.  I lacked a third condition where parents and children are targeted separately. In the parent only group two parents refused to participate whereas in the parent child groups only one family refused to participate indicating it may be difficult to recruit participants for the parent only group.	5 cohort study  Nutritional Science
Goran M Lane, C, Toledo-Corral C Weigensberg M  Persistence of pre-Diabetes in Overweight and Obese Hispanic children  Diabetes 57	3 Cohorts: Group 1) never defined by a neg test for pre-diabetes at all 4 visits. Group 2) intermittent, defined by one or two positive test for pre-diabetes in 4 annual visits. Group 3) persistent, defined by 3 or 4 positive test for pre-diabetes at the 4 annual visits. 51 (40%) never had pre-diabetes at any visit, 61 (47%) had intermittent pre-diabetes, 16 (13%) had persistent pre-diabetes over 4 annual visits (4 years). No subjects developed type 2 diabetes in the 4 years study. 40% never had predicaments, 47% had intermittent pre-diabetes with no clear pattern over time and 13% had persistent predicaments. At baseline those with persistent pre-diabetes had lower B cell function (BCF) and higher intra-abdominal and subcutaneous and adipose tissue (VAT= visceral fat). In repeated measure, SI (insulin sensitivity) deteriorated regardless of pre-diabetes and there was a significant effect of pre-diabetes on AIR (acute insulin response) and disposition index (34% lower in pre-diabetes) and a significant interaction of pre-diabetes and time on IAAI (a greater increase over time with pre-diabetes).  CONCLUSION: In this groups of Hispanic children at high risk of type 2 diabetes 1) pre-diabetes is highly variable from year to year. 2) the prevalence of persistent pre-diabetes over 3 years is 13% and 3) children with persistent pre-diabetes have lower BCF due to a lower AIR and increasing visceral fat over time.	Cohort was not representative of the population at large. Very limited characteristics in study population, not generalizable to larger population. Outcomes were pre-diabetic not type 2 diabetes - the pattern for pre-diabetes over time is highly variable from year to year.	3 = cohort study  Preventive Medicine / Pediatrics Physiology Biophysics

**Table 1. Summary Literature Review Matrix (continued)**

Auth	Title	Jrnl	Year	Purpose	Design	Sample	Setting	Tools
Hinkley, F D Salmon, J A, Hesketh K	Preschool Children and Physical Activity A Review of Correlates	American Journal of Preventive Medicine	2008	Review articles investigating correlates of preschool children's physical activity behaviors published in peer-reviewed journals between 1980 - 2007	Review of Literature	24 articles were identified that met the inclusion criteria. Multiple database used to identify studies that investigated correlates of preschool children's physical activity. Due to the very limited amount of published literature about the preschool population, all variables from identified studies were included in this review.		
Johnson, K, Lichter, D	Natural Increase a New Source of Population growth in Emerging Hispanic Destinations in the United States  Population and Development Review		2008	Provide new demographic portrait of urban, rural and small-town America. Current trends - especially high rates of Hispanic natural increase- continuing population growth that will reshape the social and cultural fabric of our communities in the US.	Quantitative - cohort study secondary analysis of longitudinal data	Data from 1990 - 2007 was obtained from the 1) National Center for Health Statistics, 2) Federal Statistical Program for Population Estimates		

**Table 1 Summary Literature Review Matrix (continued)**

Auth Title Jml	Results Conclusions Recommendations	Limitations Strengths Weaknesses	Level of Evidence
Hindley I Crawford D Salmon J Okely J Hesketh K Preschool Children and Physical Activity A Review of Correlates American Journal of Preventive Medicine	From the identified articles 39 variables were identified across five domains. Results showed that boys were more active than girls that children with active parents tended to be more active and that children who spent more time outdoors were more active than children who spent less time outdoors. Age and BMI were consistently shown to have no association with preschool children's physical activity. Research into correlates of preschool children's physical activities is sparse and relatively few studies have been conducted to date with the majority undertaken in the US. Recommendation: 1) simultaneously investigate multiple variables across multiple domains may assist in the identification of potential mediating, moderating or confounding influences on preschool children's physical activity. Larger samples will allow for the detection of small yet significant associations previously concealed.	Many of the studies utilized relatively small potentially non-representative samples. The level of variability in physically active time relatively small in preschool children compounding the effect of small sample sizes. Measurement and analysis tools may not be sensitive enough to detect significant associations in small samples when there is little difference across the sample in the level of the dependent variable. Some studies lacked detailed sample characteristics which prevented attempts to make meaningful comparisons across studies. There was a limited numbers of investigations. Lack of consistent or conclusive findings in this review may result from a number of additional issues including study design and measurement which should be address in future research.	Review of literature Exercise & Nutritional Science Childhood Obesity
Johnson E Richter D Natural Increase a New Source of Population Growth in Emerging Hispanic Destinations in the United States Population and Development Review	Hispanics represent a significant proportion of the immigrant stream which has accelerated rapidly over the past 2 decades. US grew by 32.7 million and Hispanics accounted for 13.3 million or 41% of the population's growth in the 1990s. Hispanics grew by 58% in the 1990s while the overall US population grew by only 13%. For 2000-2006 the US pop grew by 18 million. Hispanics accounted for 50% of this growth even though they represent only 12.5% of the pop in 2000. Hispanics are spatially concentrated in metropolitan areas or 14% of all metro residents. Hispanic pop gains more than offset population decline of non-Hispanics. Growth been fueled by both natural increase and net migration. Metro areas accounted for 57% of the overall Hispanic gain and 67% gain in the non-metro areas. Hispanics represent 47.1% of all natural increase in the US. (CONCLUSIONS) A growing number of areas are being transformed demographically and culturally by new Hispanic arrivals. Significant minority pop growth in the rural areas specifically natural increase and high fertility greater than in migration. Half of the non-metro Hispanic pop now resides outside traditional areas of Hispanic settlement in the rural Southwest.		Cohort study Sociology Economics



**Table 1 Summary Literature Review Matrix (continued)**

Author	Title/Jrnl	Year	Purpose	Design	Sample/Setting	Tools
Johnson, S. Clark, L. Goree, K. O'Connor, M. Zimmer, I.	Healthcare Providers' Perceptions of the Factors Contributing to Infant Obesity in a Low Income Mexican American Community	2008	Examine healthcare professionals' perception of Mexican American infant feeding practices and cultural variables thought to contribute to infant obesity. Focus on health care provider perceptions will assist in development of culturally appropriate prevention strategies.	Qualitative grounded theory focus groups	Five focus groups of Health care providers: N = 38 (3 WIC educators, 9 RNs, 8 medical assistants, 5 dietitians, 3 pediatricians, 2 physician assistants, 16 non-Hispanic white, 15 Hispanics, 3 black African American, 4 other) recruited from a public health clinic and WIC program in two separate counties of the Denver Metro area serving Mexican American communities and newer Mexican immigrant communities in the Denver metropolitan areas.	Timed focus group agenda w/ 10 question interview guide.
Kaufman, L. Karpati, A.	Understanding the Sociocultural Roots of Childhood Obesity: Food Practices among Latino Families of Bushwick, Brooklyn	2007	Explore how adults and children participate in and perceive food acquisition, exchange, and eating amidst fluctuating and often scarce resources among Latinos.	Qualitative ethnographic approach  Engaged participants in their own environment to examine their everyday lives.	60 Bushwick residents, 12 families and their extended kin and friends, 6 Puerto Rican, 2 Ecuadorian, 1 Columbian, 1 Cuban, 1 Dominican, 1 Mexican (17 mothers, 3 fathers, boyfriends, 3 grandmas, 1 great grandma, 2 grandfathers, 3 extended kin, 5 friends, 31 children). Study done in a low income neighborhood in New York City.	Interviews. Examines how families generate meaning about food, well-being and obesity and parental identity and how these beliefs figure in practices that can ultimately affect weight and overall health which constitute the sociocultural roots of obesity among Latinos. (7 interviews, 1 unstructured, 1 semi-structured)

**Table 1 Summary Literature Review Matrix (continued)**

Auth Title Jnl	Results Conclusions Recommendations	Limitations Strengths Weaknesses	Level of Evidence
Johnson, S Clark I Corea K Connor M Zimmer I Healthcare Providers Perceptions of the Factors Contributing to Infant Obesity in a Low Income Mexican American Community Journal of Specialists in Pediatric Nursing	6 themes 1) A chubby baby is a healthy baby 2) Complementary foods are introduced earlier than recommended 3) extended family influences feeding practices 4) mother off high-calorie low nutrient dense food choices 5) Mothers delay weaning from the bottle 6) What's a provider to do Role confusion The providers in the study (40%) Mexican Americans perceived that Mexican American mothers share child feeding practices that are similar to those of mothers in other high risk groups the themes from this study and the larger parent study with Mexican American mothers fathers and grandmothers were similar This suggest that Mexican American communities are aware and concerned about the issue of childhood obesity but lacks culturally appropriate strategies to prevent and address the issue IMPLICATIONS Healthcare providers working with Mex Am families should deliver consistent culturally specified messages re infant feeding and activity practices They must develop appropriate language and practice message delivery	Limitations small sample and focused on one sub ethnic group in specific geographic region limiting generalizability Third person perspective obtained leading to result bias Strengths third person perspectives corroborated with target population's perspectives lending credibility to results Identified specific cultural beliefs attitudes perspective and behaviors that are valuable in guiding development of intervention programs that are culturally and contextually relevant to target population	Qualitative Medicine Pediatrics Nursing
Kaufman L Kaipati A Understanding the social/cultural roots of childhood obesity Food Practices among Latino families of Bushwick Brooklyn Social Science and Medicine	The study underscored how poor Latino families fluctuating economic resources and their strategies to cope with resultant instability (taking credit and food buying) create a monthly food cycle that shapes their pattern of food acquisition and consumption Patterns reveal unstable purchase and eating habit that have potentially negative effects on children including eating less overeating and excessive expectations around unhealthy foods Practices are deeply connected to shared sociocultural values histories of poverty and available economic resources CONCLUSIONS Neighborhood food environment should be assessed for food type availability quality price and proximity to home relative to families actual shopping patterns These practices embedded in neighborhood food environment drive food choice and related activities of families often leading to overweight and obesity in their children	Limitations qualitative study based on opinions expressed by participants generalizable only to the study population	Qualitative Health & Mental Hygiene

**Table 1 Summary Literature Review Matrix (continued)**

Auth	Title	Year	Purpose	Design	Sample	Setting	Tools
Kimbro R Brooks Gunn J McLanahan S	Racial and Ethnic Differentials in Overweight and Obesity Among 3 year old children	2007	Estimate race ethnic differences in overweight and obesity in a national sample of 3 year olds from urban, low income families and assess possible determinants of differences	Quantitative descriptive longitudinal cohort  Data derived from 1) waves of 1 2 and 3 of the Fragile Families and Child Wellbeing national survey (1998-2000) 1 year follow up interview (199) 2001) and 3 years (2001-2003) 2) 79% wave 3 respondents completed in Home survey	Wave 1 survey (1998-2000) 5712 births among unmarried parents and 1188 births among married parents in 20 large US cities Oversampling of unmarried mothers included a large sample of minority and immigrant women 2271 participants for in home survey non Hispanic whites (20%) non Hispanic Black (75%) Hispanic (25%) mothers and children	1) Fragile Families and Child Wellbeing Survey and 2) In Home Longitudinal Study of Pre- School Aged Children Study survey	
Klohe Lehman, D Freeland Graves T Clarke K, Craig G Voruguntla S Milani T, Nuss H Proffitt M, Bohman T	Low Income overweight and obese Mothers as Agents of Change to Improve Food Choices Fat Habits and Physical Activity in their 1 to 3 year old children	2007	Examine the effects of a weight loss program for mothers on the diet and activity of mothers and their 1 to 3 year-old children Focused on low income Hispanic African American and White mothers as agents of change for their children	Quantitative Exploratory One Group Pre test, post test design Weight loss program was 8 weeks	235 purposeful sample of low income mother child dyads recruited from WIC and public health clinics 100 completed program with a final sample size n=91 62.6% Hispanic 22% African American 15.4% white obese 73.8% and overweight 24.2% mothers	Food frequency questionnaires developed and validated for tri- ethnic population of adults and 1 to 3 year old children Both FFQ were derived from the Health habits and History Questionnaire but were modified to include ethnic foods low fat food restaurant fast foods and supplements and less appropriate foods and portions	
	Journal of the American college of Nutrition 26(3)						

**Table 1 Summary Literature Review Matrix (continued)**

Auth Title / Jml	Results Conclusions Recommendations	Limitations Strengths Weaknesses	Level of Evidence
Kumbro R Brooks Gunn J McLanahan S Racial and Ethnic Differential in Overweight and Obesity Among 3 year old children American Journal of Public Health	35% of the study children were overweight or obese Hispanic children were twice as likely as either Black or White children to be overweight or obese Although controlled for a wide variety of characteristics unable to explain eighth white Hispanic or Black Hispanic differences in overweight and obesity Birth wt taking a bottle to bed and mother's weight status were important predictors of children's overweight or obesity at age 3 years CONCLUSION Children's problems with overweight and obesity begin as early as age 3 and the heterogeneous nature of the Hispanic population in the US interventions designed to prevent childhood obesity in the Hispanic community should be culture specific	Limitations mothers weight and height were by self report so BMI results should be interpreted with caution Sample selection from the in home survey used only wave 3 participants limiting the generalizability of the results Due to sample bias Strengths large national sample size for power supporting the significance of the results	cohort study Child Health Human Development
Klohe Lehman D Freeland Graves J Clark E Craig G Voruganti S Milim T Nuss II Proffitt M Bohm J Low Income overweight and Obese Mothers as Agents of Change to Improve Food Choices Diet Habits and Physical Activity in their 1 to 3 year old children Journal of the American college of Nutrition 26(3)	Study suggests that mothers can act as positive agents of change to improve dietary behaviors in their 1 to 3 year olds Mothers who modified their food choices and fat habits made comparable changes for their child resulting in reduced calories Child's diet reduced calories fat sweetened beverages and fast food consumption and increased home cooked meals Although activity levels of both mother and child increased overall they were not related indicating mothers may not serve as agents of change for their child's activity at this young age Program was successful in curtailing intake of sweetened beverages Mean wt loss in mothers was 2.7+2.8 kg (p < .001) mean BMI was reduced from 34.9kg/m <sup>2</sup> to 33.9kg/m <sup>2</sup> Wt loss was sustained at week 24 Children remained at the same growth channel (50-70%) The mothers with the least education lost the most wt vs mothers with more education Activity score improved particularly among overweight children even after controlling for age related developmental increases but overall PA was not related between mother-child pairs One problem was mothers focused on eliminating those thought to be unhealthy foods rather than increasing nutritious foods Emphasis should be placed on positive messages that stress inclusion of all foods in moderation w/o labels of good or bad CONCLUSIONS Offering wt loss classes to low income population increased participation in edu intervention benefiting children Overwt & Obese mothers who modified food choices made similar changes for their child	Limitations short intervention and short follow up Re evaluation of eating habits and anthropometrics is needed to examine the sustainability of the behavioral changes Self reporting surveys may have biased the results Strength novel approach by using mothers as agents of change for their 1-3 year old children with multiple measures of food intake and activity	3- Non controlled descriptive study Nutritional Science

**Table 1. Summary Literature Review Matrix (continued)**

Auth	Title / Jnl	Year	Purpose	Design	Sample / Setting	Tools
Lim S /ocliner J Lee J Burt, B Sindretto A, Sohn W Ismail A, Iepkowski J	Obesity and Sugar sweetened Beverages in African American Preschool Children a Longitudinal Study	2009	Determine the association between sugar sweetened beverage consumption (soda, fruit drinks and both combined) and overweight and obesity	Quantitative correlation longitudinal	365 low income African American preschool children aged 3-5 years. Children examined at a dental clinic in 2002, 2003 and again after 2 years	Block Kid Food Frequency Questionnaire
	Obesity 17 (6)					
Iuttyva M, Garcia R, Dankwa C Young T Iipsky M	Overweight and Obese Prevalence Rates in African American and Hispanic children: An analysis of Data from the 2003-2004 National Survey of Children's Health	2008	Determine what factors included in the NSCH survey might be associated with overweight and obesity in AA and Hispanic school aged (5-18 years old) children. Identifying the presence of unique factors contributing to overweight and obesity would likely be useful for developing targeted prevention and intervention strategies.	Quantitative Quasi- experimental Correlation secondary data analysis of the NSCH collected in 2003 and 2004	School age children ages 5 to 18 years N= 62,976. 21,715 of this sample were overweight or obese	NSCH Survey questionnaire
	The Journal of the American Board of Family Medicine					

**Table 1. Summary Literature Review Matrix (continued)**

Auth / Title / Jml	Results / Conclusions	Recommendations	Limitations Strengths Weaknesses	Level of Evidence
Lim, S, Zoellner, J, Lee J, Burt B, Sandretto, A, Sohn, W, Ismail, A, Lepkowski J  Obesity and Sugar-sweetened Beverages in African American Preschool Children a Longitudinal Study  Obesity 17 (6)	The prevalence of overweight was 12.9% at baseline and increased to 18.7% after 2 years. The prevalence of obesity increased from 10.3% to 20.4% during the same period. Baseline intake of soda and all sugar sweetened beverages were positively associated with baseline BMI z-scores. CONCLUSION: After adjusting for covariates, addition intake of fruit drinks and all sugar-sweetened beverages at baseline showed significantly higher odds of incidence of overweight over 2 years. Among a longitudinal cohort of African American preschool children, high consumption of sugar sweetened beverages was significantly associated with an increase risk for obesity.		Limitations: study accounted for energy intake but other dietary covariates were not considered that may have a compounding influence on weight. Lack of physical activity data in the study which can effect weight also limits result. Self report may also bias results. The 5-7 year old children at follow-up 2 years spent more time out of the home leading to self-reporting inaccuracies by parent. Not generalizable to greater population. Strengths: study supports the hypothesis that baseline consumption of sugar-sweetened beverages is positively associated with baseline BMI and the incidence of overweight over 2 years.	5 cohort study  Epidemiology / Pediatric Endocrinology / Public Health / Environmental Health / Dentistry
Iutfivya M, Garcia R, Dankwa C, Young T, Lipsky M  Overweight and Obese Prevalence Rates in African American and Hispanic children: An analysis of Data from the 2003-2004 National Survey of Children's Health  The Journal of the American Board of Family Medicine	Overwt children were more likely to be AA and Hispanic than white. The male live in households with incomes below 150% of Federal poverty level watch TV 3 or more hours daily and not have received preventive care in the past 12 months. Overwt children were less likely to get minimum levels of moderate physical activity or have participated on a sports team. CONCLUSION: Poverty impacts childhood BMI in at least 2 specific ways: unsafe neighborhoods and the cost and accessibility of healthy foods in low income communities. Addressing these issues requires the concerted efforts of policy makers, as does resolving the issues of children not receiving preventive care.		Strengths: Large sample size covering all geographic areas of the US with entire range of school age children. Sample weighted to be representative of the child population in the US. Provided insight into the issues surrounding overwt and obesity in AA and Hispanic children in the US. Limitations: Difficult to parse out race/ethnicity from SES because limited by data collected. Data are self-reported ~ bias results. But bias would more likely be under reporting overwt or obesity suggesting prevalence is higher than reported. May have missed other confounding variables associated with obesity i.e., parental BMI or neighborhood assessment was not asked. No way from data to assess what barriers AA and Hispanic children face related to PA and participation in team sports. Although there was increased TV watching did not assess if TV was in the room. Further study needed to fully understand how various aspects of social, cultural and economic factor place these children at risk for overwt and obesity.	6= non-randomized controlled retrospective study  Family & Community Medicine

**Table 1 Summary Literature Review Matrix (continued)**

Auth	Title (ref)	Year	Purpose	Design	Sample	Setting	Tools
Morales-Cervantes M, Malacalza T, Garay Sevilla M, Diaz Cisneros F	Effect of Recreational Physical Activity on Insulin Levels in Mexican Hispanic Children	2009	Analyze the effect of measurable recreational activity on the metabolic and anthropometric variables	Quantitative - experimental	Analyzed 76 children randomized sample as sedentary or with moderate activity (n = 38 experimental, n = 38 control group) 6 to 9 years of age, clinically healthy, and with stable weight for 2 months ( $\pm$ or 1 kg) over 12 week period, recruited from public schools in 4 neighborhoods from Leon Guanajuato, Mexico. Excluded children with osteomuscular alterations, chronic illness, or who received medications altering body composition or insulin secretion. 32 participants (n = 17 boys, n = 15 girls) completed the experimental program, and 30 volunteers (n = 15 boys, n = 12 girls) completed the control program.	Intervention: 12 sedentary children increased to moderate activity; 20 moderately active children increased to high activity.	
Martinez S, Ainsworth B, Elder J	A Review of Physical Activity Measures Used Among US Latinos: Guidelines for Developing Culturally Appropriate Measure	2008	Identify and evaluate measures used to quantify physical activity among US Latinos	Review of literature	13 physical activity measure identified from studies. Measure inclusion criteria: if they had been developed in English and culturally adapted to the Latino culture or if they had been translated into Spanish; use in a Latino sample or in a study where Latinos were the largest subgroup. Excluded if they had not been used to assess PA in Latino samples or if Latinos were not the majority of the sample. 9 questionnaires identified from studies, 2 referred by PA researchers and 2 questionnaires were obtained from individual researchers.	Culturally adapting physical activity measure guidelines for Latino population.	

**Table 1 Summary Literature Review Matrix (continued)**

Auth Title (ref)	Results Conclusions Recommendations	Limitations Strengths Weaknesses	Level of Evidence
Macias Cervantes M Milavara T Garav Sevilla M Diaz Cisneros T	Metabolic indices 1) At the beginning, 29.62 children had insulin resistance (IR) 18.3% in the experimental and 11.30 in the control group. After intervention, the proportion of children with IR in the experimental group decreased to 12.32, whereas the control group did not show changes in the proportion with IR. The insulin and HOMA-IR values decreased in the experimental group (p = 0.01) and did not change in the control group. 2) In order to assess the influence of body weight on insulin change, a secondary analysis in the experimental group according to subgroups of normal weight, overweight, and with obesity. All groups showed a trend to diminish insulin levels, which in the overweight group was statistically significant (153.8 pmol/L to 41.7 pmol/L, p = 0.007). A marginal change was shown in the obese group (p = 0.08). Plasma glucose, total cholesterol, HDL, LDL, and triglycerides did not change after the intervention. In the control group, fasting glucose and LDL-C had a significant decrease within the normal levels. Overweight children received the most clear effect on IR with this short-term program. CONCLUSION: Children who increased PA during the 12 weeks decreased insulin levels and insulin resistance, with no change in other metabolic and anthropometric variables.	Limitation: 1) In-study recreational activity for 3 months is not sufficient to show an improvement of BMI, waist circumference, or the lipid profile. Strengths: 1) Recreational activity has clear advantages with regards to applicability over formal exercise, i.e., it is fun, easy to do, and no special equipment or trainer is needed.	8 - small sample randomized control trial
Effect of Recreational Physical Activity on Insulin Levels in Mexican Hispanic Children European Journal of Pediatrics			Medicine Public Health
Martinez S Ainsworth, B Elder J	Children of foreign born child-parent dyads walked to school more frequently than their counterparts (T = 7.71, df = 732, < 0.01). Similarly, parents who reported living in the US for less than or equal to 12 years reported more walking to school by their children compared with parents living in the US for more than 12 years (T = 10.82, df = 4,737, < 0.01). Finally, English-speaking females walked to school more frequently than Spanish-speaking and bilingual females. Being less acculturated was associated with more walking to school among children living in South San Diego County. CONCLUSION: The current review implicates a need to extend PA measurement to ethnically diverse populations using culturally appropriate methods. Advancing the field should involve the use of qualitative methods and pilot testing during the extension of measures in Latino or other ethnic minorities. Using a mixed methods approach prior to implement PA measure in target communities will increase the validity within and across ethnic minorities. Researchers should use easy-to-remember acronyms when developing measures so as to increase the dissemination of PA measures.	Limitations: self-reporting biases, results not all the results obtained were in the positive or desired directions (e.g., smoking, or social support for physical activity). Strengths: large randomized control trial. Longitudinal study for valid behavior change. Geographic sample selection included multiple regions in the US, increases validity of intervention.	Review of Literature Public Health
A Review of Physical Activity Measures Used Among U.S. Latinos: Guidelines for Developing Culturally Appropriate Measure Annals of Behavioral Medicine			



**Table 1. Summary Literature Review Matrix (continued)**

Auth / Title / Jml	Year	Purpose	Design	Sample / Setting	Tools
Martinez, S Guadalupe, A Arredondo, E Finch, B Elder, J  Active Transportation and Acculturation Among Latino Children in San Diego County  Journal of Preventive Medicine	2008	Examine multiple measures of acculturation and their association with walking to school in a large population-based sample in San Diego, CA.	Quantitative - descriptive Secondary analysis of a cross-sectional study	Cross-sectional analysis of baseline data collected from 812 Latino parent-child dyads recruited into a randomized community intervention whose aim was to maintain the healthy weights of kindergarten aged through second-grade children. Low- and middle-income families were recruited regardless of ethnicity from a target community consisted of 13 schools in 3 San Diego school districts. Sampling eligibility was based on 1) Latino enrollment of at least 70% 2) no participation in obesity-related study in last 4 yrs 3) defined attendance boundary	Survey - parental questionnaire including demographic questions and measure of acculturation, PA, and transportation. Analysis - parent's acculturation assessed using the 30-item ARSMA-II developed by Cuellar et al
Mattocks, C Deere K, Leary, S Ness, A, Blair, S Riddoch, C  Early life determinants of physical activity in 11 and 12 year olds cohort study  British Journal Sports Medicine	2008	Examine factors in early life (up to age 5 years) that are associated with objectively measured physical activity in 11 - 12 year olds	Quantitative - Correlation longitudinal cohort study	Valid actigraph data (defined as at least 3 days of PA for at least 10 hours a day) were collected from N = 5451 children aged 11-12 years from the Avon longitudinal study of parents and children (ALSPAC) United Kingdom  (11951 children age 11 from Avon longitudinal study invited, 7159 attended, 6622 wore actigraph, 5595 had valid data)	3 Stats Models - to explore role of confounders on epm outcomes adjusted for 1) age & sex 2) age, sex, maternal edu, social class and 3) same as model 1, but restricted to children with all avail data from model 2. Actigraph Accelerometer - see bmi.com Questionnaires - starting from birth, sent to mothers, partners and children inquiring about their health and lifestyle

**Table 1 Summary Literature Review Matrix (continued)**

Auth Title Jml	Results Conclusions Recommendations	Limitations Strengths Weaknesses	Level of Evidence
Martinez S Guadalupe A Arredondo E Finch B Elder J  Active Transportation and Acculturation Among Latino Children in San Diego County  Journal of Preventive Medicine	Children of foreign born child parent dyads walked to school more frequently than their counterparts (F 7.71 df 5.732 p 0.001) Similarly parents who reported living in the U.S. for less than or equal to 12 years reported more walking to school by their children compared with parents living in the U.S. for more than 12 years (F 10.82 df 4.737 p 0.01) Finally English speaking females walked to school more frequently than Spanish speaking and bilingual females (CONCLUSION) Although studies describe Latinos as sedentary the current study found that less acculturated children were more likely to walk to school than more acculturated children Active transportation has been noted among less acculturated adults and the results of the present study support that finding Because walking is common in Mexico it would be expected that Mexican parents had children who walked more often than children of U.S. born parents Given that economic parity is not expected in less acculturated individuals limited access to an automobile or increased gas prices may have made active school commute more attractive	Limitations 1) This study was a sectional therefore causality cannot be inferred 2) The distance from school to home was not determined and may be a confounder because school neighborhoods are dense with apartment complexes 3) Given that the children were in kindergarten child's PA and acculturation were based on parent report rather than self report or an objective measure 4) The parent sample consisted of mostly females therefore conclusions are limited to mothers Strengths 1) Large sample size 2) First to report on the relationship between various measures of acculturation and walking to school by Latino children	3) non controlled descriptive  Public Health Sociology Preventive Medicine
Mitrocks C Deerc K Leary S Less A Blair S Riddoch C  Early life determinants of physical activity in 11 and 17 year olds cohort study  British Journal Sports Medicine	Parents physical activity during pregnancy and early in the child's life showed a modest association with PA of the child at age 11-12 suggesting that active parents tend to raise active children None of the birth outcomes was associated with later PA in 11-12 yr olds BMI of the mother but not the partner was weakly associated with PA Smoking in the mother and her partner were both positively associated with PA There was a prior demonstration by authors of a negative association between PA and socioeconomic status PA was positively associated with parity number of siblings) Hard to explain, but children born during summer to winter were more active than those born in spring None of PA indicators at 0 to 2 yrs was associated with later PA Parental PA at 21 mths was weakly associated with child's PA when 2 non active parents were compared with 1 or both parents being active A small association was found with motor coordination at 6 months Few characteristics in preschool aged children (2-5 yrs) was associated with later PA (small association found with TV viewing at 38 and 54 months) (CONCLUSION) Few factors in early life predicted later physical activity in 11-12 year olds and those that did showed modest associations	Limitations 1) Some of the variables are based on single questions therefore not validated questionnaires may have resulted in attenuated associations with children's PA owing to imprecision of measurement 2) Possible attrition and biased participation may have resulted in unrepresentative sample e.g. participants were more likely to be from socially advantaged backgrounds 3) several of the characteristics were based on questionnaires in which the questions were changed over time making comparisons difficult Limited geographical region limits generalizability Strengths 1) Use of an objective measure (cpm) to provide an accurate measure of PA, 2) Detailed measures available and large sample size allowed for association testing between multiple potential determinants and allowed exploration of role of confounder	3) Cohort Study  Medicine Dentistry Exercise Science

**Table 1 Summary Literature Review Matrix (continued)**

Auth Title Jnl	Year	Purpose	Design	Sample Setting	Tools
Merchant A, Dehghan, M, Bchnke Cook, D and Annand S	2007	Pilot Study compares diet, physical activity, and the built environment in two Hamilton Ontario elementary schools serving socioeconomically different communities in order to understand the determinants of obesity	Quantitative Cross sectional quantitative comparative cohort study	160 children (n = 48 School A, and n = 122 School B) and 170 parents (n = 43 School A, n = 113 School B) participated in study. School A and B were located in low and high socioeconomic areas respectively	Survey. Assessed dietary intake, physical activity, dietary restraint, and anthropometric measures in consenting children in grades 1 and higher. Assessed family characteristics and walkability of built environment from parents
Diet, Physical Activity, and Adiposity in Children in Poor and Rich Neighborhoods: A Cross-sectional Comparison					
Nutrition Journal					
Nader P, Stone F, Lytle L, Pury C, Osganian S, Kelder S, Webber L, Jilder J, Montgomery D, Felman H, Wu M, Johnson C, Parcel G, Huebner R	1999	Assess differences through grade 8 in diet, physical activity, and related health indicators of students who participated in the Child and Adolescent Trial for Cardiovascular Health (CATC II) school and family intervention from grades 3 through 5	Quantitative randomized controlled trial with 56 interventions and 40 control elementary schools	N = 3714 (73% ) of the initial CATC II cohort of 5106 students from ethnically diverse background in California, Louisiana, Minnesota, and Texas at grades 6, 7, and 8	accelerometers, self-administered surveys on daily diet and physical activity
Three Year maintenance of Improved Diet and Physical Activity					
Archives of Pediatric and Adolescent Medicine					

**Table 1. Summary Literature Review Matrix (continued)**

Auth / Title / Jml	Results / Conclusions / Recommendations	Limitation / Strengths / Weaknesses	Level of Evidence
Merchant, A, Dehghan M, Behnke-Cook, D and Anmand, S Diet, Physical Activity and Adiposity in Children in Poor and Rich Neighborhoods: a Cross-sectional Comparison Nutrition Journal	School A parents were less educated and had lower income than School B parents. School A neighborhood was perceived as less walkable than School B. School A children consumed more junk food, watched more TV, spent more time at computer than School B children. Children at both schools were overweight but there was no difference in their mean BMI z-scores (School A = 0.65 vs School B = 0.81, p-value = 0.38). CONCLUSION: The determinants of overweight in children may be more complex than imagined. In future intervention programs, researchers may consider addressing environmental factors and customizing lifestyle interventions so that they are closer to community needs.	Limitations: 1) small sample size which increased likelihood of type 2 error (power = 14% with alpha level of 0.05). 2) children were self-selected, and may have been more motivated and health conscious than the general population. explaining why fruit and vegetable intake at both schools was high. 3) Children in School A were older than those in School B and may be one reason why junk food intake was higher at School A. 4) Info on diet and activity were based on self-report and could be biased. and 5) School B children filled out the diet/PA questionnaires at home where they may have been influenced by parents while School A children filled out questionnaire at school. 6) Canadian study not generalizable to US pop.	3 = non-controlled descriptive study  Nutrition / Health Science
Nader, P, Stone, H, Lytle, L, Perry, C, Osgaman, S, Kelder, S, Webber, L, Filder, J, Montgomery, D, Felman, H, Wu, M, Johnson, C, Parcel, G, Luepker, R Three Year maintenance of Improved Diet and Physical Activity Archives of Pediatric and Adolescent Medicine	Self reported daily energy intake from fat at baseline was virtually identical in the control (32.7%) and intervention (32.6%) groups. At grade 5 intake for controls remained at 32.3% (P = 0.001). At grade 8 the between group differential was maintained (31.6% vs. 30.6%, P = 0.01). Interventions students maintained significantly higher self reported daily vigorous activity than control students (P < 0.01) although the differences declined from 13.6 min in grade 5 to 11.2, 10.8 and 8.8 min in grades 6, 7, and 8. Significant differences in favor of the intervention students also persisted at grade 8 for dietary knowledge and dietary intentions but not for social support for physical activity. No impact on smoking behavior or stages of contemplating smoking was detected at grade 8. No significant differences were noted among physiologic indicators of body mass index, blood pressure, or serum lipid and cholesterol levels. CONCLUSION: This 3 year follow up without further intervention suggest that the behavioral changes initiated during the elementary school years persisted to early adolescence for self-reported dietary and physical activity behaviors.	Limitations: reliance on self-reported data than may bias results. Strengths: national and local training with standardized measurement protocols, on-site quality control observations, and an adequate ration of field staff per student. May be difficult to provide socially desirable or correct answers on a 24 hr dietary recall interview.	9 = large randomized controlled trial  Pediatric / Adolescent Medicine / Epidemiology / Public Health

**Table 1. Summary Literature Review Matrix (continued)**

Auth / Title / Jml	Year	Purpose	Design	Sample / Setting	Tools
Nader, R, Bradly R, Houts R, McRitchie, S, O'Brien, M  Moderate-to-Vigorous Physical Activity From Ages 9 to 15 Years  JAMA	2008	Determine the patterns and determinants of moderate-to-vigorous physical activity (MVPA) of youth followed from ages 9 to 15 years	Quantitative - descriptive cohort study Secondary analysis of data from NICHD Study of Early Child Care and Youth Development birth cohort 1991 - 2007	1032 participants in the 1991-2007 NICHD Study of Early Child Care & Youth Development birth cohort from 10 study sites who had accelerometer-determined minutes of MVPA at ages 9 (year 2000), 11 (2002), 12 (2003) and 15 (2006) years. Participants included boys (517) and girls (515); white (n=791) other ethnic groups (n =241) and low-income (n=231)	Accelerometer measured activity minutes per day determined by 4 to 7 days of monitored activity
Nader R, O'Brian, M, Houts, R, Bradley, R, Belsky, J, Crusoe, R, Friedman, S, Mei Z, Sussman, E  Identifying Risk for Obesity in Early Childhood  Pediatrics	2006	Assist clinicians by estimating the predictive value of earlier levels of BMI status on later risk of overweight and obesity during the middle childhood and early adolescent years	Quantitative - descriptive cohort study Secondary analysis of data of a 13 year study from NICHD Study of Early Child Care and Youth Development birth cohort from birth to 12 years of age	N = 1042 participants born in the 1991, recruited from 10 designated hospitals across the nation, enrolled in the NICHD Study of Early Child Care & Youth Development birth cohort. Multiple births and infants who remained in the hospital > 7 day or had known medical conditions were excluded	Stat Analysis - Calculation of odds ratio (ORs) of being overweight at age 12 years based on various levels of BMI at previous ages was conducted

**Table 1. Summary Literature Review Matrix (continued)**

Author / Title / Jnl	Results / Conclusions / Recommendations	Limitations / Strengths / Weaknesses	Level of Evidence
Nader R, Bradley R, Houts R, McRitchie S, O'Brien M Moderate-to Vigorous Physical Activity From Ages 9 to 15 Years JAMA	At age 9 yrs children engage in MVPA approx 3 hrs per day on both weekends and weekdays. Weekday MVPA decreased by 38 minutes per year while weekend MVPA decreased by 41 minutes per year. By age 15 yrs adolescents were only engaging in MVPA for 49 minutes per wkday and 35 minutes per wkend day. Boys were more active than girls, spending 18 and 13 more minutes per day in MVPA on the weekdays and weekends respectively. The rate of decrease in MVPA was the same for boys and girls. The estimated age at which girls crossed below the recommended 60 minutes of MVPA per day was approx 13.1 yrs for wkday activity compared with boys at 14.7 yrs and for wkend activity girls crossed below the recommended 60 minutes of MVPA at 12.6 yrs compared with boys at 13.4 yrs. CONCLUSION In this study cohort measured PA decreased significantly between ages 9 and 15 years. Low-income children with lower BMI% had a faster linear decrease in MVPA on both weekdays and weekends. Note: When all covariates considered boys, low-income children, and low BMI percentile children were more active at 9 yrs.	Strengths: 1) longitudinal study when obesity epidemic well under way 2) Use of objective accelerometer to measure MVPA in large sample with large adherence rate (wearing monitor). Limitations: 1) Sample not fully nationally representative but recruited sample did match US population w/ income and race/ethnicity and was diverse in ethnicity, socioeconomic status and household membership 2) Unavoidable bias due to fact accelerometers tend to underestimate activity of youth involved in contact sports or swimming, 3) Separating age from secular trends in longitudinal data is difficult 4) Uncertain reliability of wkend data	5 - Cohort Study Pediatric Adolescent Health Statistics & Epidemiology Education Human Development
Nader, R O'Brian, M, Houts R, Bradley R, Belsky J, Crusoe R, Friedman S, Mei, Z, Sussman B Identifying Risk for Obesity in Early Childhood Pediatrics	The more times a child entered a BMI category over the 85th percentile the greater the likelihood that the child remained overweight. This first becomes evident during the preschool years and is reinforced and strengthened during the school-age years. Children > 75th percentile for BMI at any previous age have a detectable increase in risk of being overweight by 12 years of age. Furthermore, preschool age children who BMIs are >50th percentile are considerably more likely than those who stay below this point to become overweight by 12 yrs. CONCLUSIONS For this sample of children who are growing up during a period of increasing obesity prevalence it is clear that the longer a child remained in the lower range of normal BMI the less likelihood there was that the child would become overweight by early adolescence. Pediatricians can be confident in counseling parents to address at-risk child's eating and activity patterns immediately rather than delaying on the hope they will self-resolve in due course.	Limitations: 1) all report includes participants from many locations around US it is difficult to extrapolate to entire population of US children given relatively small sample size 2) no measurements of parental weight status thus unable to relate this variable to predicted outcomes, 3) no independent measurement of body fat 4) reasons some children continue to gain weight and become obese remains to be examined	5 - Cohort Study Pediatrics / Human Development Family Studies / Statistics & Epidemiology Education Nutrition Nutrition & Physical Activity

**Table 1. Summary Literature Review Matrix (continued)**

Auth / Title	Jrnl	Year	Purpose	Design	Sample	Setting	Tools
NAPAP NAPNAP Position Statement on the Identification and Prevention of Overweight and Obesity in the Pediatric Population Journal of Pediatric Health Care		2009	Develop recommendations for nursing practice in relation to childhood obesity.	Position Paper			
Narvan K. Boyle, J Thompson, S Sorenson, D Williamson. D Lifetime risk for diabetes Mellitus in the United States JAMA		2005	Estimate age- sex and race/ethnicity-specific lifetime risk of diabetes in the cohort born in 2000 in the US among non-Hispanic white non-Hispanic black, Hispanic and other	Quantitative comparative cohort study secondary analysis	Data from the 1) National Health Interview Surveys (NHIS) 1984-2000 US Census Bureau 3) previous study of diabetes as a cause of death were used to estimate age sex- and race ethnicity specific mortality rates for diabetic and non diabetic populations		

**Table 1. Summary Literature Review Matrix (continued)**

Auth Title Jml	Results Conclusions / Recommendations	Limitations Strengths Weaknesses	Level of Evidence
<p>NAPAP NAPAP Position Statement on the Identification and Prevention of Overweight and Obesity in the Pediatric Population Journal of Pediatric Health Care</p>	<p>Outlines recommended PNP practice guidelines for the assessment and treatment of overweight and obese Pediatric patients for identification history taking, culturally sensitivity and family focused interventions, community awareness about psychosocial consequences, motivational interviewing techniques for counseling community based partnerships to combat obesity advocate for schools and public policies that support healthy eating and activities for children and families didactic and clinical practicum experiences, continued expansion of knowledge in pediatric overwt. and obesity, participation in evidence-based practice and research focused on prevention CONCLUSION Strategies focused on bldg healthy eating habits and increasing PA provide more long-term results vs strategies focused on limiting negative behaviors</p>		<p>Position paper Nursing</p>
<p>Narayan, K, Boyle J, Thompson T, Sorensen, S, Williamson D Lifetime risk for diabetes Mellitus in the United States JAMA</p>	<p>Estimated the prevalence and incidence of diabetes in 2000-specific to age (birth through 2000) sex and race ethnicity Data from the US Census Bureau and from the previous study of diabetes as the cause of death were used to estimate mortality rates specific to age, sex and race ethnicity for the individual with and without diabetes Estimates were entered in to a Markov model to estimate remaining life-time risk of diabetes specific to sex and race/ethnicity from birth to 80 years for the US population born in 2000 Also estimated age at diagnosis, duration with diabetes and life-years lost from diabetes as well as quality of life Results estimated lifetime risk was 32.8% for males and 38.5% for females Females have higher residual lifetime risks at all ages Highest estimated lifetime risk for diabetes is among Hispanic (males 45.4% and females 52.5%) Individuals diagnosed as having diabetes have a large reduction in life expectancy CONCLUSION For individuals born in U S in 2000, lifetime probability of being diagnosed with diabetes mellitus is substantial Prevention of diabetes and its complications are important public health priorities</p>	<p>Strengths Large sample size from National Health Interview Survey for the US Estimates for lifetime risks allows more accurate inference to general population than methods based on the experience of individuals followed in previous cohort studies Very strict rigorous methods used for data analysis of estimates Limitations estimates for lifetime risks may be lower than true risks 1) Estimates only apply to the risk of diagnosed diabetes Not feasible to include rates of undiagnosed diabetes in estimates 2) Although data is based on self report but a report indicates that the accuracy on self-reporting for diabetes is reasonably high in populations surveys 3) modeled for constant diabetes incidence rates even though obesity incidence is increasing rapidly in the US Thus the incidence of diabetes is likely to increase 4) there is limited accuracy for the projection is due to the projected increase in life expectancy in the US especially for ethnic groups at greatest risk for diabetes</p>	<p>6 - non-randomized controlled retrospective study Endocrinology Preventive Health</p>



**Table 1. Summary Literature Review Matrix (continued)**

Auth (Title Jml)	Year	Purpose	Design	Sample	Setting	Tools
National Heart Lung and Blood Institute  Working Group Report on future Research Directions in Childhood Obesity Prevention and Treatment  DIIHS NIII	2007	Summarize Childhood Obesity Prevention Panel Meeting	Report			
Nelson, M, Neumark Sztainer, D, Hannan P, Story, M  Five year Longitudinal and Secular Shifts in Adolescent Beverage Intake Findings from Project EAT (Latent among Teens-II)  Journal of the American Dietetic Association	2009	Provide the opportunity to examine beverage trends over time assessing trends occurring concurrently due to age related developmental changes and time	Qualitative descriptive longitudinal cohort study  secondary analysis of the data from Project EAT I (1999) and then resurveyed the participants of Project EAT by mean 5 years later in 2004	2 different cohorts mid-adolescents of similar age one in 1999 and the other in 2004 4 746 junior and senior high school students in 31 Minnesota schools Of original sample 22 % lost to follow up Among remaining students 2 516 completed the survey 1 710 in younger cohort (440 females 366 males) and 1 710 in older cohort (946 females 764 males)		In class surveys Youth and Adolescent Food Frequency Questionnaire

**Table 1. Summary Literature Review Matrix (continued)**

Auth Title Jml	Results / Conclusions / Recommendations	Limitations / Strengths / Weaknesses	Level of Evidence
National Heart Lung and Blood Institute Working Group Report on Future Research Directions in Childhood Obesity Prevention and Treatment DHHS / NIH	Outline of current Childhood Obesity epidemic in the US. Focused on Prevention and Treatment priorities to mitigate the rise in rates of childhood obesity. Presented overview of Pediatric Obesity Prevention research from the Cochran, Flynn and Bluford reviews. There is not enough evidence from trials to prove effectiveness of interventions. Still paucity in studies that address obesity prevention in certain subgroups (preschoolers, minorities, males and immigrants). New recommendations for transdisciplinary studies that separately test efficacy, effectiveness and translation dissemination. Due to the urgency of finding solutions to the childhood obesity problem recommend that different types of research proceed simultaneously rather than following strict trajectory research protocol. Recommended different strategies using theoretical models for behavior change, environment interventions, and multilevel interventions. <b>CONCLUSION:</b> More evidence is needed. No definitive answers concerning the optimal intervention approaches or setting for obesity prevention. Many unanswered questions regarding how race, ethnicity and SES predispose children to becoming obese. More research studies needed.	No discussion of limitations or strengths.	Report Preventive Health
Nelson M, Neumark-Sztainer D, Hannan P, Story M Five year Longitudinal and Secular Shifts in Adolescent Beverage Intake: Findings from Project LAT (Latent Trends II) Journal of the American Dietetic Association	Intake of soda and sugar sweetened beverages (soda, sugar sweetened beverages and fruit drinks) increased significantly among younger males and alcohol increased across all groups (p < 0.01). Consumption of certain beverages decreased with age: fruit juice (among all males and older females, p < 0.02), milk (older adolescents, p < 0.01), other milk beverages (all females and older males, p < 0.01), diet soda (younger adolescents, p < 0.01). Significant secular decreased were observed in fruit juice and coffee/tea for males and females (p < 0.05). <b>CONCLUSION:</b> Overall findings reflect recent secular and longitudinal shifts in adolescent beverage consumption during the critical transition period from early to mid adolescence and mid to late adolescence. Health professional working with adolescents should address the importance of limiting sugar sweetened beverages with low nutrient density.	Limitations: Included 2 measurement points over a 5 year period. Addition of measurement points would have enhanced the study. May be difficult to accurately estimate serving sized and intake frequency given the options provided in the questionnaire. Questionnaire did not allow for all beverage consumed. Data did not provide information about water intake which may be replacing other beverages. One geographical region for sample limits generalizability. Strengths: used a validated and reliable survey tool for adolescents and youths. Large sample size.	5 cohort study Epidemiology Community Health

**Table 1 Summary Literature Review Matrix (continued)**

Auth	Title	Jrnl	Year	Purpose	Design	Sample	Setting	Tools
Ogden C, Carroll M, Flegal K	High Body Mass Index for Age Among US Children and Adolescents, 2003-2006	JAMA	2008	Update the prevalence overweight and obesity by estimates of 3 measures of high body mass index for age: 85 <sup>th</sup> , 95 <sup>th</sup> , and 97 <sup>th</sup> (calculated as wt in kg divided by height in meters squared) and to examine recent trends for US children and adolescents. Using national data with measured height and weights	Quantitative descriptive retrospective secondary analysis of NHANES survey results with heights and weights from 1999-2000, 2001-2002, 2003-2004, 2005-2006	4207 children and adolescents (2-19 yrs) from 2005-2006 and 3955 children and adolescents from 2003-2004		
Ogden C, Carroll M, Curtin L, Lamb M, Flegal K	Prevalence of High Body Mass Index in US Children and Adolescents, 2007-2008	JAMA	2010	Provide the most recent estimates of high BMI among children and adolescents and high weight for recumbent length among infants and toddlers and to analyze trends in prevalence between 1999-2008	Quantitative descriptive retrospective secondary analysis of NHANES survey results of heights and weights from 1999-2000 through 2007-2008 (see previous NHANES study reports)	3281 children and adolescents (2-19 year olds and 71) infants and toddlers birth-2 years (1 age 1) from 2007-2008 meeting the power for statistical significance required for trend analyses over serial time periods. Comparison done with the previous NHANES survey study reports		

**Table 1. Summary Literature Review Matrix (continued)**

Auth / Title / Intl	Results / Conclusions / Recommendations	Limitations / Strengths / Weaknesses	Level of Evidence
<p>Ogden, C, Carroll M, Flegal K, High Body Mass Index for Age Among US Children and Adolescents, 2003-2006 JAMA</p>	<p>Non-Hispanic black and Mexican American girls were more likely to have a high BMI for age than non-Hispanic white girls. Among boys, Mexican Americans were significantly more likely to have high BMI for age than non-Hispanic white boys. Non-Hispanic-black boys were only more likely than non-Hispanic white boys to have high BMI for age at the highest BMI-for-age-level. From 2003 - 2006, 11.3% of the children and adolescents were at or above the 97% and 31.9% were at or above the 85%. The increase in the prevalence of high BMI for age among US children that was previously seen between NHANES III(1988-1994) and NHANES 2003-2004 was not observed between 2003-2004 and 2005-2006 or by racial/ethnic groups. Rates of overweight and obesity have remained stable. CONCLUSION: Results showed no statistically significant trend over the 4 time periods (1999-2000, 2001 - 2002, 2003-2004, 2005-2006) for either boys or girls. It is similar for non-Hispanic white and non-Hispanic black, and Mexican American boys and girls. Trends were not statistically significant for any ethnic group.</p>	<p>Analysis using 4 data points (years) provides more precise estimates of trends and sampling error than analysis with 3 data points. The 97% cut off point provides an even higher cut point to identify the heaviest children. Using 4 years of data, these estimates were based on a larger sample size and were thus more stable than those from only 2 years of data. Large national sample size representative of the general population.</p>	<p>5 cohort study Health Statistics / Epidemiology</p>
<p>Ogden, C, Carroll M, Curtin, L, Lamb M, Flegal K, Prevalence of High body Mass Index in US Children and Adolescents 2007-2008 JAMA</p>	<p>2007-2008, 9.5% of infants and toddlers were at or above the 95% of the weight for recumbent length growth charts. Children and adolescents 2-19 years, 11.9% were at or above 97% and 31.9% at or above 95% and 31.7% were at or above 85% BMI for age. Prevalence estimates differed by age and by race/ethnicity group. Trend analysis indicates no significant trend between 1999-2000 and 2007-2008 for girls or boys except at the highest BMI cut point (&gt;97% - among 6-19 year-old boys and among non-Hispanic white boys of the same age. Among all Hispanics 2-19 years, boys were more likely to be at or above the 95% of BMI for age. Differences by sex among Hispanics were not significant using the other 2 BMI cut points. There were no significant differences among non-Hispanic white or non-Hispanic blacks. From 2007-2008, Hispanic boys had significantly higher odds of having high BMI at all 3 BMI cut points compared with non-Hispanic white boys, but no significant difference between non-Hispanic white and non-Hispanic blacks. Among girls, non-Hispanic black girls were significantly more likely than non-Hispanic white girls to have high BMI at all 3 BMI cut points, but no difference between Hispanic girls and non-Hispanic white girls. There is stabilization in the prevalence of high BMI between 1999-2000 and 2007-2008 in girls and possibly boys at lower BMI cut points with no decline. CONCLUSION: No statistically significant linear trends in high weight for recumbent length or high BMI were found (1999-2000, 01-02, 03-04, 05-06, and 07-08) among boys or girls, except among the very heaviest 6- thru 19-yr old boys.</p>	<p>Large national sample size representative of the general population with statistical power. Graphs provided clear delineation and support the resulting trends.</p>	<p>5 cohort study Health Statistics / Epidemiology</p>

**Table 1 Summary Literature Review Matrix (continued)**

Author	Title	Year	Purpose	Design	Sample	Setting	Tools
Olstad, D L McCarger	Prevention of overweight and obesity in children under the age of 6 years	2009	Describe timely and effective strategies for obesity prevention among children up to 6 years of age	Review of literature	More than 250	journal articles reviewed	
Fowler, L Slater, S Mitchell, D Bailey, Y Chaloupka, F	Food store availability and neighborhood characteristics in the United States	2007	Provide the first comprehensive multivariate national study of the availability of food stores by zip code across the US and associations with neighborhood characteristics on race, ethnicity, SES, population size, urbanization and region. Provide evidence on the extent to which different types of food stores are differentially available in low-income communities and in those neighborhoods with higher proportions of minority populations simultaneously accounting for both factors	Quantitative description secondary analysis	280,675	874 people living in 28,051 zip codes in the year 2000. examine the availability of 4 types of food stores that include 1) chain supermarkets, non-chain supermarkets, grocery stores, and convenience stores Data obtained from 1) a business list developed by Dun and Bradstreet (D&B) available through Marketplace software containing information on more than 14 million businesses in the US compiled and updated quarterly through directories, government registries, websites and interviews, 2) Census bureau (census for 2000)	multivariate analyses

**Table 1 Summary Literature Review Matrix (continued)**

Auth / Title / Jnl	Results / Conclusions / Recommendations	Limitations / Strengths / Weaknesses	Level of Evidence
Olstad D, McCarger L Prevention of overweight and obesity in children under the age of 6 year Applied Physiology Nutrition and Metabolism	CONCLUSIONS: Parental obesity is the best predictor of childhood obesity. Single strategy obesity prevention initiatives have had limited success. RECOMMENDATIONS: Strategies should be initiated in utero and continue throughout childhood and adolescence. Programs that target multiple behaviors may help reduce body weight and body fat among young children. Parental involvement is key to the success of obesity prevention programs at a young age. Parents should be encouraged to teach and role model healthy lifestyle behavior for their young children. Health care professionals are ideally placed to identify young children at risk for obesity by calculating and plotting the BMI index for all children and initiating obesity prevention strategies in utero.	Limitations: References directed toward Canadian preschool children 3-6 years. Strength: extensive review of multiple references including many older classic studies laying the foundation for interventions programs to prevent obesity in children.	Review or literature Nutrition
Powell L, Slater S, Mitchava, D, Bio Y, Chaloupka, F Food store availability and neighborhood characteristics in the United States Preventive Medicine	Median household income avg at \$45,000 across zip codes. Zip codes are on avg 75% white, 12% African American. By ethnicity on avg across zip codes 12% Hispanic population on avg by about 10,000 people 30% contain urban areas while more than 1/2 are rural. Low income neighborhoods have fewer chain supermarkets with only 75% (p < 0.01) of that available in middle income neighborhoods. Even after controlling for income and other covariates the availability of chain supermarkets in African American neighborhoods is only 52% (p < 0.01) of that in White neighborhoods with even less relative availability in urban areas. Hispanic neighborhoods have only 32% (p < 0.01) as many chain supermarkets compared to non Hispanic neighborhoods. A large disparity exists by race in the availability of chain supermarkets even after controlling for differences in neighborhood income. Non chain supermarkets and grocery stores are more prevalent in low income and minority neighborhoods. CONCLUSION: Results highlight the importance of various potential public policy measures for improving access to supermarkets that may serve to reduce systematic local area barriers that are shown to exist by race, ethnicity and income.	Limitations: 1) geographic context of analysis was limited to within zip codes and did not account for the characteristics of adjoining zip codes. 2) results may be subject to measurement error if there is non random under or over representation of food store outlets in our commercial database that varies systematically with our covariates of interest. 3) while our data allowed us to distinguish food store types and chain versus non chain supermarkets providing a greater level of specificity than in previous studies, the data may be subject to misclassification and do not include information on informal food distribution channels such as farm stands or markets which may offer a healthy selection of foods to local residents at low cost. Strength: existing evidence underscores the implications of these results for the low income and minority neighborhoods that are found to be underserved by chain supermarkets. Large sample size supports validity of results.	3 - non controlled descriptive study Economics Health Policy

**Table 1. Summary Literature Review Matrix (continued)**

Auth	Title	Jrnl	Year	Purpose	Design	Sample	Setting	Tools
Procter K	The aetiology of childhood obesity: a review	Nutrition Research Reviews	2007	Provide an overview of the understanding about the etiology of childhood obesity and those environments that are most amenable to measurable change in order to be able to develop powerful population level interventions and public health policies to prevent childhood obesity	Review of literature			
Rosas L, Hatlev K, Bernald I, Guendelman S, Mejia, F, Neufeld I, Eskenazi B	Dietary Associations of Household Food Insecurity among Children of Mexican Descent: Results of a Binational Study	Journal of the American Dietetic Association	2009	Understand the level of perceived food insecurity and its association with dietary intake among children of Mexican descent residing in the US and Mexico	Quantitative correlational secondary analysis	Data from a binational study of 5 year-old children of Mexican descent living in migrant communities in California and Mexico. Two cross sectional samples of 5-year old children and their mothers. In the US Low income Mexican born mothers and their children recruited from the Center for the Health Assessment of Mothers and Children of Salinas longitudinal cohort study recruited from 1999-2000 (N=317). Mexico convenience sample of women and children recruited through local government community health clinics from families who participate in the Proyecto Mariposa study (N=317). Sample size deemed statistically significant	In the US the Harvard Service Food Frequency Questionnaire for Hispanic children was used. In Mexico FFQ developed by the Division of Nutritional Epidemiology at the Mexican National Institute of Public Health was used	

**Table 1. Summary Literature Review Matrix (continued)**

Auth / Title / Jnl	Results / Conclusions / Recommendations	Limitations / Strengths / Weaknesses	Level of Evidence
<p>Procter K The aetiology of childhood obesity: a review Nutrition Research Reviews</p>	<p>Review outlines the concern about childhood obesity and impact on health why prevention is important for children, determinants of health behavior and the obesogenic environment are explored Considers whether genetics or the environment are leading the change and moves on to the complex, multi-factorial aetiology of childhood obesity and rationale for the increasing trends in obesity that are evident Draws conclusion about evidence base for the different causes of childhood obesity considering the importance of the obesogenic environment Focuses on the ecology model that health behavior is effected by the individual factors social and cultural factors and the physical environmental factors CONCLUSION Prevention (rather than treatment) will be more effective in children utilizing interventions that consider multiple factors together</p>	<p>No discussion of limitations or strengths</p>	<p>Review of literature Epidemiology Biostatistics</p>
<p>Rosas L, Harley K, Formid I, Guendelman S, Mejia F, Neufeld I, Eskenazi B Dietary Associations of Household Food Insecurity among Children of Mexican Descent: Results of a Binational Study Journal of the American Dietetic Association</p>	<p>39% of California mothers and 73% of Mexico mothers reported low or very low food security in the past 12 months (P = 0.01) Children in the US experiencing food insecurity consumed more fat saturated fat sweets, and fried snacks than children not experiencing food insecurity In contrast, in Mexico food insecurity was associated with lower intake of total carbohydrates dairy and vitamin B6 CONCLUSION Programs and policies addressing food insecurity in the US and Mexico may need to take steps to address dietary intake among children in household experiencing food insecurity possibly through education and programs to increase resources to obtain healthful foods</p>	<p>Limitations Diet was assessed by FFQ via self report biasing the results FFQ have limited choices for participants collecting incomplete information FFQ was limited in detail about portion size and food preparation Two different FFQ used making it difficult to directly compare energy and nutrient intake between samples Generalizability is limited due to sample selection and small sample size Strengths FFQ still the instrument of choice for epidemiologic studies because of their ability to capture long term diet as opposed to intake on a few specific dates and their usefulness for ranking participants</p>	<p>3 = non controlled descriptive study Sociology Public Health / Epidemiology</p>



**Table 1. Summary Literature Review Matrix (continued)**

Auth / Title / Jnl	Year	Purpose	Design	Sample / Setting	Tools
Runge C Economic Consequences of the Obese Diabetes	2007	Offer an economic perspective on the economic consequences of obesity	Review of literature	Review of 30 relevant references on the subject of economic consequences of obesity and diabetes	
Scaglioni S, Salvioni M, Galimberti C Influence of parental attitudes in the development of children eating behavior British Journal of Nutrition	2008	Review available data on effects of parental feeding attitudes and styles on children nutritional behavior	Review of current literature on parental attitudes in the development of children eating behaviors	22 references reviewed	

**Table 1 Summary Literature Review Matrix (continued)**

Auth Title Jml	Results Conclusions Recommendations	Limitations Strengths Weaknesses	Level of Evidence
Runge C Economic Consequences of the Obese Diabetes	There are about 1P people worldwide who are overweight or obese (vs. 850M chronically underweight). Obesity and economic costs are borne on 3 levels each related to the next: 1) At an individual level, obesity imposes costs by limiting personal opportunity in many ways only some of which can be quantified. A variety of incentives may be needed to encourage healthier behavior (some of which are economic). 2) In the workplace, costs are borne by employers due to lost productivity, absences, underperformance, and high insurance premia, which in the aggregate are quite large. There is increasing recognition by employers and their insurers that both exercise and diet should be internalized as "part of the job." 3) Finally, obesity affects expenditures by local, state, and nat'l gov'ts, where programs compensate for or cover some of the private and workforce costs of illness and unemployment (shifted to programs such as Medicare, Medicaid, unemployment insurance, etc.). Public policies are especially important in breaking the obesity-poverty link (involving poor and unemployed) not just by lecturing, but bringing them out of poverty into the active workforce. CONCLUSION: Econ consequences of obesity are serious and growing, which are affecting both wealthy as well as lower income countries. Unless significant effort undertaken to confront complex factors re obesity, valuable resources will be drawn away from productive economic activities.	Economic consequences are quantified where data are available, although lack of data in many areas suggests that the estimates reported are probably lower bound. In addition to exploring various economic issues related to obesity, emphasis is given to the relationship between poverty and the obesity epidemic. In offering perspective, Runge steers clear of causes. Yach et al summarize 5 developments that have led to rising obesity: 1) expanding labor market opps for women, 2) increased consumption of food away from home, 3) rising costs of healthy foods relative to unhealthy foods, 4) growing caloric intake with overall declining food prices, and 5) decreased occupational and environmental PA.	Review of Literature Economics, Law
Scaglioni S, Salvioni M, Galimberti C Influence of parental attitudes in the development of children eating behavior British Journal of Nutrition	Results showed significant correlations between parent and child for reported nutritional behavior like food intake, eating motivations, and body dissatisfaction. Parent create environments for children that may foster the development of healthy eating behaviors and wt or that may promote overweight and aspects of disordered eating. Positive parental role model may be a better method for improving a child's diet than attempts at dietary control. Over control, the offering of rewards, and the provision of nutrition information to children appear to have negative effects on food acceptance patterns. Parents' own food preferences on the other hand are enormously influential and eating together allows parents to model good eating habits. Guidance and education for parents regarding healthy feeding practices and portion size is important. CONCLUSION: Positive parental role model may be a better method for improving a child's diet than attempts at dietary control.		Review of Literature Pediatrics

**Table 1 Summary Literature Review Matrix (continued)**

Auth Title Jml	Year	Purpose	Design	Sample / Setting	Tools
Singh G, Shripush M, Kogan M Neighborhood socioeconomic conditions, built environments and childhood obesity Health Affairs	2010	Examine the impact of neighborhood socioeconomic conditions and "built environments" on obesity and overweight prevalence among US children and adolescents using the 2007 National Survey of Children's Health	Quantitative descriptive Secondary analysis of cross sectional data collected by 2007 NSCH survey on a variety of indicators regarding child health and well being including BMI based on parent reported ht and wt	A random digit dial sample of n=91,642 children from birth thru age 17 was selected from households from 50 states and Washington DC (1800 children per state) One child was selected in each household as subject of survey Survey questions included demographic data (age sex ht wt ethnicity etc) and neighborhood data (social conditions such as safety litter vandalism and built environment conditions such as sidewalks playgrounds rec centers library)	Survey telephone interviews with parent or guardian conducted in English Spanish and 4 Asian languages Interview completion rate was 66% BMI Obesity & Overwt Cutoffs Based on 2000 CDC age specific growth charts Interaction Models Various interaction models were developed
Sivta, C, Ostwald, S Strategies for Implementing a Promotores Led Diabetes Self management Program Into a Clinic Structure The Diabetes Educator	2008	Describe a process for integrating promotores who teach diabetes self management into a community clinic structure	Description using the Donabedian structure process and outcome methodology	Community health center located along the Texas Mexico border a geographically isolated area more than 200 miles from a major US city County was medically underserved with high poverty low educational rates and high unemployment rate of 27.2% in 2001	Donabedian structure process and outcome methodology was used to integrate promotores into a community clinic Outline of course design was given with promotora training program and diabetes self management program policies and procedures cultural and contextual adaptation of the program for the target population and outcome measures

**Table 1. Summary Literature Review Matrix (continued)**

Auth / Title / Jnl	Results / Conclusions / Recommendations	Limitations / Strengths / Weaknesses	Level of Evidence
<p>Singh G, Shahpush, M, Kogan M</p> <p>Neighborhood socioeconomic conditions, built environments, and childhood obesity</p> <p>Health Affairs</p>	<p>The odds of a child being obese or overweight were 20-60 percent higher among children in neighborhoods with the most unfavorable social conditions, such as unsafe surroundings, poor housing, and no access to sidewalks, parks, and recreation centers than among children not facing such conditions. The effects were much greater for females and younger children. e.g. girls ages 10-11 were 2 to 4 times more likely than their counterparts from more favorable neighborhoods to be overweight or obese.</p> <p>Neighborhood environment varied greatly across racial/ethnic and socioeconomic groups. Ethnic minority and socially disadvantaged children were more likely than others to live in unfavorable physical or built env. (26% black and 23% Hispanic children lived in unsafe neighborhoods vs. 8% white children). Children in least health promoting neighborhoods with fewest amenities were 61% more likely to be physically inactive, and 25% more likely to watch more than 2 hrs of TV. In 2007, 16.4% of US children 10 to 17 were obese, and 31.6% were overweight. 20% of children in least favorable neighborhoods were obese, and 37% overweight vs. 17% and 29.8%, respectively for children in more favorable neighborhoods.</p> <p>CONCLUSION: Community based approaches designed to improve social, physical, and built env. of local residents could be a strategy for tackling the growing epidemic of obesity. Reducing children's physical inactivity levels and limiting TV are promising interventions.</p>	<p>Limitations: 1) Childhood obesity was based on parental reports of ht &amp; wt, which might not be accurate, although limited research indicates parental reports are valid and reliable indicator. 2) Because of lack of NSCH survey data, unable to consider individual level covariates (parental obesity, dietary patterns), and 3) Survey lacked additional info on important neighborhood environmental aspects (access to healthy food, etc.). 4) Because of \ sectional nature of data, causal inferences about environment and obesity cannot be made. 5) alternate shopping context or children's roles were not examined to assess impact on purchases.</p> <p>Strengths: 1) Estimation of a variety of neighborhood effects on childhood obesity. 2) Large sample size and national representativeness of finding. 3) examination of whether obesity effects of neighborhood conditions varied across various socioeconomic and demographic groups.</p>	<p>3-Non-controlled descriptive</p> <p>Epidemiology</p> <p>Social &amp; Behavioral Science</p> <p>Maternal Child Health</p>
<p>Sixta C, Ostwald S</p> <p>Strategies for Implementing a Promotores Led Diabetes Self-management Program Into a Clinic Structure</p> <p>The Diabetes Educator</p>	<p>Description of the various roles: promotora, promotora supervisor, certified diabetes educator, provider, job description, and RN director job description. Article provides a formula for successful use of the CHW within a clinic setting: 1) Spanish CHWs were hired and trained by the clinic for the provision of diabetes self management education. 2) diabetes self management course was taught by the CHWs under supervision of the clinic RN, CDE, and clinic providers. 3) primary recruitment strategies for the diabetes self management course were provider referrals and phone recruitment. 4) an infrastructure of policies and procedures, culturally sensitive education tools, and coordination and communication processes supported the work of the promotores. 5) CHW were members of the provider led team, and 6) providers were actively involved in supporting self management through reinforcement of behavioral goals and the provision of disease prevention and management advice.</p> <p>CONCLUSION: Model provides systematic approach to safely address educational needs of large numbers of patients with type 2 diabetes who live in communities that suffer from a lack of health care professionals, and may be successful in management of other chronic diseases, reducing risk factors, and preventing future disease and disability.</p>	<p>Article presents a reasonable solution to the need for diabetes self management education in clinics that have limited human resources, have an ever growing number of patients with diabetes, and require a culturally sensitive program aligned with the community.</p>	<p>Descriptive article</p> <p>Nursing</p>

**Table 1. Summary Literature Review Matrix (continued)**

Auth	Title	Yr	Purpose	Design	Sample	Setting	Tools
Small Meyers	Anderson D B	2007	Identify effective early treatment or prevention interventions that could be used in pediatric primary care practices with young children who are overweight obese or at high risk for later life obesity to co morbidities that are associated with overweight and obesity	Review of literature	Reviewed 12 journal articles		Systematic search using Medline Psych Info and CINAHL databases
	Prevention and Early Treatment of Overweight and Obesity in Young children: A Critical Review and Appraisal of the Evidence						
	Pediatric Nursing						
	33(2)						
Small D Gracie	Anderson Sidora Arcoleo K, Cleveland B	2009	Investigate the changes in health care providers practice behaviors regarding the evaluation and treatment of overweight and obesity from 1999 to 2005	Quantitative (comparative) survey results of PNP physicians and KDs	1) Purposful sample of 232 PNP in the Trowbridge study (2002) 33% response rate of mailed surveys to physicians P.NPs and RDs 2) 174 PNP at 2005 NAPNAP Annual National conference (12% response rate out of 1000 mailed surveys) none participated in previous survey		Survey Assessment of Overweight in Children and Adolescents used in the Trowbridge et al 2002
	Pediatric Nurse Practitioners Assessment and Management of Childhood Overweight Obesity results from 1999 and 2005 Cohort Surveys						
	Pediatric Nursing						

**Table 1. Summary Literature Review Matrix (continued)**

Auth / Title / Jml	Results / Conclusions / Recommendations	Limitations / Strengths / Weaknesses	Level of Evidence /
<p>Small I. Anderson D, Neivyl, B. Prevention and Early Treatment of Overweight and Obesity in Young Children. A Critical Review and Appraisal of the Evidence. Pediatric Nursing 33(2)</p>	<p>There is a paucity of randomized controlled trials designed to test intervention strategies with young children so are overweight obese or at risk for later life obesity. Only three programs involved parents that is likely to be of pivotal importance when working with preschool and young school age children. There is universal reliance on self-reported nutrition and activity measure despite the questionable validity and reliability of self-reported or parent-reported data. Sample sizes are small. Very few published rigorous studies to guide the prevention or early treatment of childhood obesity. CONCLUSION: There has been no evidence generated from RCTs in primary care to guide clinical practice. Practitioners urgently need evidence from RCTs upon which to based practice decisions.</p>		<p>Review Nursing</p>
<p>Small I. Anderson, D, Sidora-Arcoleo K, Gance-Cleveland, B. Pediatric Nurse Practitioners' Assessment and Management of Childhood Overweight Obesity: results from 1999 and 2005 Cohort Surveys. Pediatric Nursing</p>	<p>Results from 2005 survey reported increased frequency in assessments and 1 lb screening for co-morbid conditions associated with obesity. No statistical significance on family hx assessment. PNPs in both cohorts reported lower levels of adherence with counseling treatment recommendations (nutrition and activity) across all age groups. Perceived parent associated barriers and health care system associated barriers were reported to increase over time. 80% in both cohorts reported parent associated barriers curtailed effective treatment efforts. There was a decrease in frequency of psychosocial evaluations for the 2005 cohort to the 1999 cohort. 45% (1999) and 47% (2005) indicated that professional practice guidelines would improve their ability to treat overweight children and adolescents even though expert recommendation and guidelines were available at both time points. CONCLUSIONS: Participants requested evidence-based guidelines. Motivation interviewing may enhance provider skills to assess and manage challenging patient behavior change.</p>	<p>Limitations: No power analysis on sample size done. Limited generalizability due to self selection from mailed surveys and only PNP responses were included in study. Self selected sample of respondents with small sample size - not generalizable to all PNPs in practice. Self reported survey - introduces biased results.</p>	<p>3 non-controlled descriptive study Nursing / Public Health</p>

**Table 1 Summary Literature Review Matrix (continued)**

Auth	Title	Jrnl	Year	Purpose	Design	Sample	Setting	Tools
Sneathen J Hewitt J Porting, D	Addressing Childhood Overweight Strategies learned from one Latino Community	Journal of Transcultural Nursing	2007	Understand one Latino community's perspectives about childhood overweight and effective weight management held by Latino family member within this high risk ethnic group	Qualitative grounded theory Focus groups	3 focus groups consisting of ~ 12 Latino mothers ~ 12 Latino father and Latino children ~ 12 (8 boys and 4 girls ages 10 to 12 years old) recruited from an urban setting at a Latino community center in Milwaukee Wisconsin		Focus group interview guide included beliefs about healthy body wt dietary intake and activities
Summerbell CD Douthwaite W Whittaker V Ellis LJ Hillier F Smith S Kelly S Edmunds IT MacDonald I	The association between diet and physical activity and subsequent weight gain and obesity assessed at > years of age or older a systematic review of the epidemiological evidence	International Journal of Obesity	2009	Update the original review done for the World Cancer Research Fund in 2005 to provide evidence of association but not causes of subsequent excess weight gain and obesity There is a degree of uncertainty inherent in epidemiological evidence given that it is impossible to determine if there are uncontrolled variables including genetic variations	Review of literature 160 publications done January 2008  Note Only the (th Chapter Discussion & Conclusions was printed in hardcopy and filed For rem under of article see electronic version	Inclusion criteria prospective cohort studies with an accurate measure of diet and physical activity exposures at baseline and outcomes in terms of body fatness at subsequent point in time (1 year) in humans at least 5 years old Exclusion criteria 1) cross sectional studies 2) Intervention studies including randomized controlled trials 3) primary studies that report growth body composition and weight in fetal life (including birth wt ) infancy and childhood Observational studies with outcome age > 5 years 4) Observational studies with a follow up period of < 1 years 5) Prospective studies that have examined change in an exposure over time with change in outcome over time (tracking) 5) studies focusing on psychological aspects of eating behaviors 6) studies that examined the determinant factors of food choices		

**Table 1. Summary Literature Review Matrix (continued)**

Author, Title, Jml	Results / Conclusions / Recommendations	Limitations / Strengths / Weaknesses	Level of Evidence
<p>Smethan, J, Hewitt T, Porting, D</p> <p>Addressing Childhood Overweight Strategies Learned from one Latino Community</p> <p>Journal of Transcultural Nursing</p>	<p>Factors that affect dietary intake: lack of time for food preparation, eating whatever was easiest (ie, fast foods, high caloric foods). Parents use sweets as reward. Factors associated with decreased PA: Too busy with homework, do not have time to do activities with children.</p> <p>Time, safety, racist, cost and physical environment were issues. Factors that promote weight management: important to provide education in how to eat traditional foods in healthy way. Physical activities: sports, dance, bicycling.</p> <p>CONCLUSION: Participants know good nutrition and exercise help prevent obesity. Parental involvement, community involvement and computation were identified as possible means for increasing engagement in healthy behaviors.</p>	<p>Limitations: small sample and focused on one sub-ethnic group in specific geographic region limiting generalizability. Qualitative deciding not generalizable to greater population.</p> <p>Strengths: Provided perspectives about childhood overweight and effective weight management held by Latino family member within this high risk ethnic group. Identified ways intervention programs can be designed to meet the expressed need of this population.</p>	<p>Qualitative Nursing</p>
<p>Summerbell CD, Douthwaite W, Whittaker V, Hills LJ, Hillier T, Smith S, Kelly S, Edmunds J, D. Maedonald I</p> <p>The association between diet and physical activity and subsequent weight gain and obesity assessed in a systematic review of the epidemiological evidence.</p> <p>International Journal of Obesity</p>	<p>CONCLUSIONS: Evidence shows that the only diet and physical activity (PA) exposures that are associated with subsequent excess weight gain and obesity are the consumption of fast foods, breastfeeding, and intake of non-caloric sweeteners. Higher levels of consumption of fast foods and non-caloric sweeteners are associated with greater (although small) subsequent gain in excess weight. Results suggest that the levels of consumption of (fast) foods, energy and nutrient intake, as well as the levels of PA are not associated with subsequent excess weight gain or obesity. This is not what would be expected. This lack of association is likely at least in part to be an artifact of the well documented under and mis-reporting of foods and drinks that is greater in participants of dietary surveys, particularly in those who are overweight and obese, who are more likely to avoid reporting foods and drinks that contribute to a high total energy intake. The interpretation of the results from all studies reviewed suffers from significant problems involved with measurement error of the exposure, analytic design, confounding, and publication bias. A reverse causality argument is a competing hypothesis that can be used to explain the results of studies, as is clearly shown by the finding that those who consumed higher levels of non-caloric sweeteners are more likely to gain excess weight over time. Association does not prove causation. There is a degree of uncertainty inherent in the evidence reviewed, given that it is impossible to determine whether there are uncontrolled variables, including genetic variations. The results of this review should be considered alongside other types of evidence (mechanistic studies and intervention studies) to formulate evidence based public health policy and guidance.</p>	<p>Limitations: Note the exclusion of intervention studies from this review. The conclusion therefore DO NOT apply to obesity intervention studies !!!</p>	<p>Review of Literature</p> <p>Medicine</p>



**Table 1. Summary Literature Review Matrix (continued)**

Auth / Title / Jml	Year	Purpose	Design	Sample / Setting	Tools
Sonneville K, La Pelle N, Taveras F, Gillman M, Prosser J  Economic and other barriers to adopting recommendations to prevent childhood obesity: results of a focus group study with parents  BMC Pediatrics	2009	Explore thru the use of qualitative methods barriers and facilitators that influence parenting behaviors and decisions that relate to child food choices activities and other behaviors that could affect a child's risk of obesity. A primary focus was economic barriers.	Qualitative 4 focus groups (2 English 2 Spanish) consisting of n=2 to n=7 participants each	n=19 parents of overweight (BMI =85th percentile) children aged 5-17 years were recruited from the Preventive Cardiology Clinic at Children's Hospital Boston or 1 of 2 weight mgmt clinics at the hospital	Survey focus groups lasting 2 hours. Facilitator focused main discussion on common obesity prevention recommendations. Parents asked to assess difficulties (barriers) and facilitators to implementation including importance of economic barriers.
Stice E, Shaw H, Marti SN  A Meta-Analytic Review of Obesity Prevention Programs for Children and Adolescents: A Skinny on Interventions that Work  Psychological Bulletin	2006	Summarize obesity prevention programs and their effects and investigates participant intervention delivery and design features associated with larger effects.	Meta-analytic Review	147 identified prevention programs seeking to produce weight gain prevention effects. Final sample of N=46 articles included in this review. Inclusion: prevention programs evaluated in controlled trials (comparison matched controls) tested whether the change in the outcomes over time was significantly greater in the intervention group vs. the control group.	Descriptive statistics. Average effect size and effect size heterogeneity moderator Analyses. Multivariate model

**Table 1 Summary Literature Review Matrix (continued)**

Auth Title Jmi	Results (Conclusions Recommendations)	Limitations Strengths Weaknesses	Level of Evidence
<p>Sonneville K, LaFelle N, Laveris F, Grillman M, Prosser J</p> <p>Economic and other barriers to adopting recommendations to prevent childhood obesity: results of a focus group study with parents</p> <p>BMC Pediatrics</p>	<p>Parents identified many barriers but few facilitators to adopting obesity prevention recommendation for their children. Members of all groups identified economic barriers (time and cost) among a variety of pertinent barriers although discussion of dollar costs often required prompting. Parents cited other barriers, including children preference, difficulty with changing habits, lack of information, lack of transportation, difficulty with monitoring child behavior, need for assistance from family members, parity with other family members, and neighborhood walking safety. Facilitators identified included access to physical activity programs, availability of alternatives to fast food and TV, which are acceptable to the child, enlisted outside support, dietary information, involving the child, setting limits, making behavior changes gradually, and parental change in shopping behaviors and own eating behaviors. CONCLUSION: Intervention program should consider the context of family priorities and how to overcome barriers and make use of relevant facilitators during program development.</p>	<p>Limitations: 1) Due to recruiting challenges, a) size of focus groups varied (2 to 7); bc) sample of Spanish speaking parents was smaller than English speaking; c) groups consisted of parents of children of all ages. 2) Small sample size and limited geographical area, which may not be representative of all parents. 3) Differences in parental response based on parental or family characteristics not assessed bc detailed demographic data was not collected. 4) Study only explored barriers/facilitators to implementing 7 specific obesity prevention recommendations.</p> <p>Strengths: 1) Considered economic factors including time and dollars costs. 2) Identified barriers related to all family members.</p>	<p>Qualitative study</p> <p>Nutrition Preventive Medicine</p>
<p>Stice E, Shaw H, Marti SN</p> <p>Analytic Review of Obesity Prevention Programs for Children and Adolescents: A Summary on Interventions That Work</p> <p>Psychological Bulletin</p>	<p>21% of the studies produced significant prevention effects that were typically pre to post effects. Larger effects emerged for programs that targeted children and adolescents (vs. preadolescents) and females (vs. males or mixed gender), programs that were relatively brief, programs that solely targeted weight control versus other health behaviors (e.g. smoking), programs evaluated in pilot trials and programs where participants must have self-selected into the intervention. Other factors including mandated improvements in diet and exercise, sedentary behavior reduction, delivery by trained interventionists and parental involvement were not associated with significantly larger effects. CONCLUSION: Results suggest that most interventions do not produce the hypothesized weight gain prevention effects and that the overall average intervention effect was small.</p>		<p>10 meta-analysis of randomized controlled trials</p> <p>Psychology Education</p>

**Table 1. Summary Literature Review Matrix (continued)**

Auth / Title / Jnl	Year	Purpose	Design	Sample / Setting	Tools
<p>Styles, J, Meier, A, Sutherland, L, Campbell, M</p> <p>Parents' and Caregivers' Concerns About Obesity in Young Children</p> <p>Family &amp; Community Health</p>	2007	Understand parents' and caregivers' concerns and beliefs regarding their children's weight problems and best practices for addressing those concerns	Qualitative - grounded theory 8 focus groups between June 2004 and January 2005	8 focus groups - 2 Hispanic, 3 Black, and 3 White 54 participants - 54% Black, 30% Hispanic, 17% White of mothers (68% grandmothers (16%)) Families with children 5 to 8 years old with at least 1 with a weight problem Recruited from general community, primary care practice in 2 urban areas in central North Carolina and a rural community in eastern North Carolina	Interview guide - 7 questions related to children's eating, and TV watching habits and how children's obesity affects family dynamics
<p>Sussner, K, Lindsay, An, Greaney M, Peterson, K</p> <p>The influence of Immigrant Status and Acculturation on the Development of Overweight in Latino Families - A Qualitative Study</p> <p>Journal of Immigrant Minority Health</p>	2008	Examine mothers' beliefs attitudes and practices related to early child feeding and weight using focus groups and in-depth interviews	Qualitative - grounded theory	6 focus groups (N=31) and 20 in-depth interviews over 6 months (Sept 2005 - Feb 2006) Latinas living in the greater Boston metropolitan area purposively recruited from women enrolled in another randomized controlled trial Setting- local community health clinic	12 item Marin Acculturation Scale

**Table 1. Summary Literature Review Matrix (continued)**

Auth / Title / Jml	Results / Conclusions / Recommendations	Limitations / Strengths / Weaknesses	Level of Evidence /
<p>Styles, J. Meier, A. Sutherland L. Campbell, M.</p> <p>Parents' and Caregivers' Concerns About Obesity in Young Children</p> <p>Family &amp; Community Health</p>	<p>In all groups, participants reported that they had trouble finding enough time to help their children develop healthy lifestyles. Conflicting family priorities and needs often made it difficult to ensure that their children had healthy diets. Children's own diet and activity preferences and their parent or caregiver's inability to adequately guide their choices also contributed to obesigenic behaviors. Many thought that physician and community support for their efforts to manage their children's eating habits was inadequate. Awareness of the knowledge of recommendations and perception about the need for more parenting oriented messages and education was seen more in white parents than Hispanic and Black parents.</p> <p>CONCLUSION: Findings from these focus groups suggest that participants would be receptive to positive, multilevel prevention approaches to help their children attain and maintain healthy weights.</p>	<p>Limitations: Sample was not large enough to determine whether differences were related to race/ethnicity or to socioeconomic status. Study may not reflect issues outside this study's geographic region. Selection bias - only included parent who had a weight concern about their child, excluded parents who did not recognize obesity in their children. Convenience sample for focus group may not represent or be generalizable to all parents.</p> <p>Strengths: Elicited perspectives and needs of different race/ethnic groups and identifying differences and similarities across groups. Implications are relevant to developing more effective and targeted interventions for children's obesity preventions.</p>	<p>Qualitative</p> <p>Nutrition / Public Health / Sociology / Pediatrics</p>
<p>Sussner, K., Lindsay, An, Greaney M., Peterson, K.</p> <p>The influence of Immigrant Status and Acculturation on the Development of Overweight in Latino Families: A Qualitative Study</p> <p>Journal of Immigrant Minority Health</p>	<p>Mean acculturation score 2.04 = participants more closely identified with the Latino culture than American culture. Proportion of years spent living in the US was significantly correlated to acculturation score as were duration of residence, SES and number of children. Several themes resulted when mothers compared lifestyles between their native countries and the US related to changes in: 1) diet, perceived food quality and availability; 2) food and eating practices; 3) breastfeeding practices; 4) beliefs about food, child feeding and weight status; 5) weight status of mothers and children; 6) social isolation and support. Mothers identified changes in dietary quality and intake, physical activity and rising sedentary behaviors, factors previously associated with acculturation and development of overweight as well as additional changes since immigrating in eating practices and routines, breastfeeding, cultural beliefs about food, child feeding and weight status, time pressures and lack of social support networks.</p>	<p>Limitations: selection bias, small sample and limited geographical area not representative of greater population.</p> <p>Strength: used validated and reliable tool. Able to identify beliefs, attitudes and practices related to child feeding and weight.</p>	<p>Qualitative</p> <p>Oncology / Nutrition</p>

**Table 1. Summary Literature Review Matrix (continued)**

Auth	Title / Jml	Year	Purpose	Design	Sample Setting	Tools
Sutherland F Beavers, D Kupper, I Bernhardt A Heatherton T Dalton, M	Like Parent Like Child	2008	Identify the food preferences young children may have implicitly learned through exposure to parental self-reported consumer practices media and other external influences	Quantitative - Mixed method 1) Qualitative - Semi structured observational study 2) Quantitative - Parent survey questionnaire	Convenience sample Parent/children (2-to 6- year old) dyads, N = 120 (66 females 54 boys) Study conducted in behavioral lab at Dept of Psychological and Brain Sciences at Dartmouth College in New Hampshire (3 excluded final sample N=117)	1) Self administered parent questionnaire on TV exposure, accompanying parent to grocery store how often purchased specific foods and beverages 2) Role playing scenarios of children in grocery store purchasing various foods
Sweetman C Wardle J, Cooke L	Soft drinks and the desire to drink in preschoolers	2008	Examine how the Child Eating Behavior Questionnaire (CEBQ) construct Desire To Drink (DD) relates to drink consumption, preferences and BMI-SDS	Quantitative correlational	Children were 9 to 12-years-old 56% of the participants were female Recruited from 346 same sex twin children drawn from Twin Early Development Study Were followed up 7 years later for to do survey for this study	Child Eating Behavior Questionnaire (CEBQ) and the Desire to Drink (DD) construct

**Table 1 Summary Literature Review Matrix (continued)**

Auth. Title / Jml	Results / Conclusions / Recommendations	Limitations / Strengths / Weaknesses	Level of Evidence
Sutherland, I. Beavers D. Kupper, L. Bamhardt, A. Hatherton, T. Dalton M. Like Parent, Like Child Archives of Pediatric and Adolescent Medicine	Most of the children (70.8%) purchased food that were categorized as least healthy choices. Only 13 children (10.5%) had shopping baskets consisting of the healthiest choices. On average, children in the group with the least healthy choices purchased the same number of healthier and less healthy products, whereas children in the group with most healthy choices purchased 5 healthier products for each less healthy product selected. The healthfulness of children's total purchases were significantly ( $P = .02$ ) predicted by their parent purchasing categorization. <b>CONCLUSION:</b> When presented with a wide array of foods, young children select a combination of healthier and less healthy foods and beverages. The data suggest that children begin to assimilate and mimic their parents' food choices at a very young age, even before they are able to fully appreciate the implication of these choices.	<b>Strength:</b> First simulation study to examine food choices of preschool aged children who were pretending to be adults. <b>Role playing advantage:</b> quantitatively examine food choices of young pediatric children. <b>Controlled environment for observations allow for more valid results.</b> <b>Limitations:</b> Questionnaire only included pantry items from the play store, therefore not representative of the true products purchased by parents. Possible of over reporting of healthy foods by parents. Collecting grocery receipts from parents would be more valid of their purchases. Only one scenario gave to children to shop done in the evening. May have had different results if done at different time and more than one scenario. Convenience sample demographics and geographical area limits generalizability.	3 non controlled descriptive study  Community Health Pediatrics Public Health Psychology
Sweetman, C. Wardle T. Cooke, J. Soft drinks and the desire to drink in preschoolers International Journal of Behavioral Nutrition and Physical Activity	Scores on the CEBCQ-DD subscale were not significantly related to child BMI SDS in this sample. Children scoring higher on DD had higher preference for sugar sweetened soft drinks ( $p = 0.016$ ), fruit squash ( $p = 0.042$ ) and milk ( $p = 0.020$ ) than children scoring lower on the scale. DD was also positively related to more frequent consumption of sugar sweetened soft drinks ( $p = 0.017$ ) and low calorie soft drinks ( $p = 0.003$ ). No relationship was observed between DD scores and liking for or intake of water or 100% fruit juice. <b>CONCLUSION:</b> Findings suggest that the construct desire to drink in children is related to a liking for consuming sweetened drinks, and does not appear to simply denote greater thirst or hunger. This may have important implications for the ongoing development of dietary patterns and weight status in the longer term through an increased preference for high caloric, low nutrient sweet things in the mouth and a failure to compensate for calories provided by drinks. Parents should be encouraged to offer their children water when they ask for something to drink.	<b>Limitation:</b> study is cross sectional and not possible to determine causal relationships and it may be that more frequent consumption of sweetened beverages increases preference and desire to drink. Factors such as availability and accessibility are also likely to play a role, although these were not assessed in this sample. <b>Strength:</b> large sample size to enhance reliability of results. Used validated and reliable tools for assessment of outcomes.	3 non controlled descriptive study  Epidemiology

**Table 1 Summary Literature Review Matrix (continued)**

Auth	Title Jml	Year	Purpose	Design	Sample	Setting	Tools
Taylor A, Ogden J	Avoiding the term obesity: An experimental study of the impact of doctors' language on patients' beliefs	2009	Explore the relative impact of using the term obese compared to GPs preferred euphemism on patients' beliefs about the problem	Quantitative comparative secondary analysis of data	Compared 2 studies 1) GPs use of euphemisms to 2) The impact of the term obese versus the flavoured euphemism on patients' beliefs about the problem	Study 1: N=20 GPs from 20 different practices and were chosen to offer a heterogeneous sample in terms of GPs demographic characteristics and location of practice Study 2: 472 recruited by consecutive patients aged over 18 visiting one practice in south West inner city district of London 485 patients returned the questionnaire	Study 2: patient questionnaire
Javrus F, Gillman M, Kleinman K, Rich Edwards, J, Rifis Shiman S	Racial Ethnic differences in Early Life Risk Factors for Childhood Obesity	2010	Examine racial/ethnic difference in early life risk factors for childhood obesity	Quantitative comparative longitudinal cohort study	N=1343 white, 355 black, 128 Hispanic	mother-child pairs recruited from participants of the Project Viva study	mailed questionnaires at 1, 2, and 4 yrs after birth of child
	Pediatrics						

**Table 1 Summary Literature Review Matrix (continued)**

Auth Title JmI	Results / Conclusions Recommendations	Limitations Strengths Weaknesses	Level of Evidence
Taylor A Ogden T Avoiding the term obesity: An experimental study of the impact of doctors language on patients beliefs Patient Education and Counseling 76	The first stage of the study showed that GPs avoided using the term "obese" and preferred to use euphemism. The most commonly used euphemism was "your weight may be damaging your health." The second stage showed that the term "obese" made patients believe that the problem had more serious consequences and made them feel more anxious and upset than when the same symptoms were labeled using the euphemism. When analyzed according to the patient's own BMI, however, the results showed that the term "obese" had a greater emotional impact than the euphemism only on patients who were not obese. Obese patients found the euphemism more upsetting. (CONCLUSION) Results conflict with suggestions that the term "obese" may be too emotive because it has negative connotations. Results however are consistent with Taylor and Ogden et al study that reported that patients found medical terms more beneficial in terms of feeling that they deserved sympathy and had not brought the problem upon themselves.	Limitations: 1) Design was based on hypothetical vignette rather than a real interaction between the doctor and patient and the answers may be different given the different scenarios. 2) During a real exam it may be possible for the GP to use both the obese term and euphemisms to explain the weight issue with the pt. 3) many other factors could influence the impact of the words used i.e. the patients concern about their weight rather than the weight status. 4) Selection bias: the study was based only in one GP practice and responses are generalizable. Strength: design enabled an experimental and quantitative investigation of an area often only studied through observation. Experimental approach enabled all other aspects of the consultation to be kept constant so that the impact of each phrase could be examined individually.	3 non controlled descriptive study Psychology
Liveris F Griffin M Kleinman K Rich Edwards L Kiefer Shiman S Racial Ethnic differences in Early Life Risk Factors for Childhood Obesity Pediatrics	Blacks and Hispanic children exhibited a range of risk factors related to child obesity compared to their white counterparts. In pregnancy, higher rates of maternal depression (1.85 for black, 1.89 for Hispanic) in infancy, more rapid weight gain (2.01 blacks, 1.75 Hispanic) more likely to introduce solid foods before 4 months of age (1.9 blacks, 2.04 Hispanic) and higher rates of maternal restrictive feeding practices (2.59 black, 3.35 Hispanic) and after 2 years old more TV in the bedrooms (7.65 black, 7.99 Hispanic) higher intake of sugar sweetened beverages (4.11 blacks, 2.48 Hispanic) and higher intake of fast food (1.65 black, 3.14 Hispanic). Blacks and Hispanics had lower rates of exclusive breastfeeding and were less likely to sleep at least 12 hours/day in infancy. (CONCLUSION) Racial ethnic differences in risk factors for obesity exist prenatally and in early childhood. Racial ethnic disparities in childhood obesity may be determined by factors that operate at the earliest stages of life.	Limitations: 1) Responses were self selected and most of the measures were self report introducing bias. 2) educational and income levels of the population were relatively high and may not be generalizable to more disadvantaged populations. 3) Did not measure lifestyle or cultural determinants of dietary and sedentary practices. 4) did not have enough power to examine potentially important interactions between race ethnicity and SES. Strengths: having prospectively collected data on a wide range of risk factors that extend from pregnancy to early childhood and the ability to adjust for several important confounding factors including parental obesity.	5 cohort study Medicine / Public Health



**Table 1 Summary Literature Review Matrix (continued)**

Author	Title (url)	Year	Purpose	Design	Sample	Setting	Tools
Trasande E Chatterjee S	The Impact of Obesity on Health Service Utilization and Costs in Childhood Obesity	2009	Quantify the magnitude of increased health care utilization and expenditures among overweight and obese children (higher prescription drug, ER, inpatient and outpatient expenditures than children with normal BMI)	Quantitative comparative secondary analysis data from 2002-2005 Medical Expenditure Panel Survey (MEPS) a national probability survey of the non-institutionalized civilian population in the United States	N = 19,613 children of 6-19 years of age for whom anthropometric data were available in both 2002 and 2005 MEPS		
Trasande E, Liu Y, Frerker G, Weitzman M	Effects of Childhood Obesity On Hospital Care and Costs, 1999-2005 Health Affairs	2009	Evaluate trends in obesity associated hospitalizations, charges, and costs using 1999-2005 data from a nationally representative sample of admissions to US hospitals	Quantitative descriptive retrospective secondary analysis	Analyzed a multi-year data file from the 1999-2005 Nationwide Inpatient Sample, the largest all-payer database for US hospitalizations of children and youths ages 2 to 19 years of age		

**Table 1 Summary Literature Review Matrix (continued)**

Auth Title Jnl	Results Conclusions Recommendations	Limitations Strengths Weaknesses	Level of Evidence
Trisande L Chatterjee S The Impact of Obesity on Health Service Utilization and Costs in Childhood Obesity	20.4% and 20.3% participants were obese and overweight respectively both years. Most of the sample lived in the South and 1/3 of the sample were Hispanic or non-Hispanic black. 1/3 of the sample families lived <200% of the federal poverty line. Significant increases in utilization and expenditures for the children who were overweight in one year and were obese in the second year, those who were obese in both years, and those who were overweight both years, as compared to normal weight children. CONCLUSION: Extrapolated to the nation, elevated BMI in childhood was associated with \$14.1 billion in additional prescription drug, emergency room, and outpatient visit costs annually.	Limitations: MIPs does not report BMI for children <6 years so unable to examine the impact of elevated BMI on health care utilization and costs among 2 to 5 year olds or children in the 6 to 23 months of age. Sample size considerations limited the capacity to examine the impact of the shift from normal BMI to overweight and overweight to obese or incremental increases/decreases of z scores over time. Efforts to control for insurance status, age, SES, gender, and race/ethnicity limited the power to detect differences within age subgroup or to control for other confounders such as health status. A larger data set would permit more detailed comparisons of frequency of specific utilizations and expenditures. Strength: large nationally representative sample.	3 cohort study  Community & Preventive Medicine / Health Policy
Trisande L, Liu Y, Triver G, Watzman M Effects of Childhood Obesity On Hospital Care and Costs, 1999-2005 Health Affairs	Detected near doubling in hospitalization with a diagnosis of obesity between 1999-2005 of children and youth ages 2 to 17 years for which obesity was listed as a diagnosis, and an increase in costs from 125.9 million to 237.6 million (in 2005 dollars) between 2001-2005. Charges for hospitalizations with a primary diagnosis of obesity increased by 66.3% annually while charges for hospitalizations with obesity as a secondary diagnosis increased 48.0% annually by private insurance. Obesity remains under coded. Analysis identified continued increases in obesity associated hospitalization for asthma, diabetes, and gallbladder disease as well as broader array of disease categories. Secondary diagnosis of obesity was associated with significant increases in lengths of stay, charges, and costs. CONCLUSION: Medicaid appears to bear a large burden of hospitalization costs with a secondary diagnosis of obesity while private payers pay a greater cost for hospitalizations with obesity as a primary diagnosis.	Limitations: unlike other studies this study only included those hospitalizations with a primary and secondary diagnosis of obesity. Therefore may have underestimated the true rate. This also makes it difficult to compare results with other studies. Strengths: analysis provides data that can be used to estimate the economic benefits of interventions to prevent obesity.	5 descriptive cohort study  Community & Preventive Medicine / Pediatrics

**Table 1. Summary Literature Review Matrix (continued)**

Auth., Title, Jml	Year	Purpose	Design	Sample / Setting	Tools
Two Feathers, I Keiffer, T, Palmisano G. Anderson, M, Janz, N. Spencer, M Gusman, R, Jamers, S  The Development Implementation, and Process Evaluation of the REACH Detroit Partnership's Diabetes Lifestyle Intervention  The Diabetes Educator	2007	Describe the development, implementation and process evaluation findings of a culturally tailored diabetes lifestyle intervention for African Americans and Latinos	Mixed method descriptive study. Qualitative -focus groups, observation. Quantitative - pre- post- test survey  Intervention program to improve diabetes self- management in disadvantaged African Americans and Latino using family health advocates (FHA)	Detroit - socioeconomic disadvantaged population with barriers to diabetes self- management, health care and other resources African Americans and Latino residents with a physician diagnosis of type 2 diabetes Focus groups used to help adapt the program to be culturally and contextual relevant for the target population	Pre and post surveys to assess sociodemographic characteristics diabetes and health related beliefs and self reported behaviors

**Table 1. Summary Literature Review Matrix (continued)**

Auth	Title	Intl	Results	Conclusions	Recommendations	Limitations	Strengths	Weaknesses	Level of Evidence
Two Feathers, J Keiffer, E, Palmisano G, Anderson, M, Lanz, N, Spencer, M, Gusman, R, Jimers, S	The Development Implementation and Process Evaluation of the REACH Detroit Partnership's Diabetes Lifestyle Intervention		Process Evaluation: from direct observations, focus groups and brief questionnaires. The culturally tailored diabetes lifestyle intervention combined education, behaviors and social learning strategies and social support in ways that resulted in a high degree of participant satisfaction, overall program retention and moderate to high meeting attendance. Significant improvements in dietary and physical activity behaviors among AA and Latino participants in this intervention were reported. Both AA and Latino participants reported that the curriculum information and activities were applicable to their daily lives. Thus evaluation suggest that when culture and context are appropriately integrated, the main diabetes education messages of the curricula could be generalized across most REACH Detroit participants. Health education interventions involving community health workers are emerging as a important approach to health promotion. CONCLUSION: A community based, culturally tailored diabetes lifestyle intervention delivered by trained community residents was associated with high participant satisfaction and retention.			Limitation: High proportion of positive Responses among participants who completed the program are likely to be those who enjoyed the meetings vs. those who did not complete the program or dropped out. Also participants have better experience because the interest is focused on them = Hawthorne effect. Participation by Latina women was lower than expected. Biased results due to self reported surveys. Reasons need to be examined to develop programs that may be more accessible.	Strengths: Process evaluation findings contribute to the understanding of methods for developing and implementing a culturally tailored, community based intervention delivered by community health workers.		3 non-controlled study and Qualitative study  Epidemiology Sociology Public Policy / Community Medicine
	The Diabetes Educator								

**Table 1. Summary Literature Review Matrix (continued)**

Auth	Title Jml	Year	Purpose	Design	Sample Setting	Goals
Van Duyn M McCrack I Wingrove B Henderson K Boyd J Kagawa Singer M Ramirez, A. Scunci Searles, I Penalosa, I Maibach F		2007	Study how best to adapt proven, evidence-based strategies to increase physical activity for use with underserved racial or ethnic groups	Qualitative - focus groups grounded theory	N = 22, individuals participated in the study (conducted focus groups with low-income Hispanic women in Texas, among parents and their children in California, low-income African American women and men in the Mississippi Delta and Native Hawaiian college students in Hawaii. Also interviewed key leaders of these communities	Interview guide topics: 1) the benefits of engaging in physical activity 2) proposed evidence-based strategies for increasing each community's level of PA, and 3) benefits and barriers to following the proposed interventions for increasing physical activity
	Adapting Evidence-Based Strategies to Increase Physical Activity Among African Americans, Hispanics, Hmong, and Native Hawaiians: A Social Marketing Approach					
	Preventing Chronic Disease 4(4)					
Veerman H, Van Breeck, L Barendregt JJ Mackenbach JP		2009	Explore the potential effects of a total ban on TV food advertising on 6-to-12-year-old children in the USA	Quantitative descriptive	Model based on body measurements for NHANES 2003-04, the CDC's 2000 cut offs for weight categories and literature that relates advertising to consumption levels and consumption to body mass	1) Constructed a mathematical simulation model to estimate the potential effects of reducing the exposure of 6 to 12 year old children to TV ads for food on the prevalence of overweight and obesity 2) Depth study to obtain experts estimates of the effect of advertising on consumption
	By how much would limiting TV food advertising reduce childhood obesity?					
	European Journal of Public Health 19(4)					

**Table 1 Summary Literature Review Matrix (continued)**

Auth Title Jml	Results (Conclusions Recommendations)	Limitations Strengths/Weaknesses	Level of Evidence
Van Duyn M McCrae J Wingrove B Henderson K Boyd J Kagawa Singer M Ramirez A Srinici Searles I Penalosa T Maibach E	All groups considered that being physically active was part of their culture and participants found culturally relevant suggestions for physical activities appealing. Overwhelmingly strategies that aimed to create or improve social support and increase access to physical activity venues received the most positive feedback from all groups. Barriers to PA were not culturally specific they are common to all underserved people (lack of time transportation access neighborhood safety or economic resources). CONCLUSION Results indicate that evidence based strategies to increase PA need to be adapted for cultural relevance for each racial or ethnic group. Our research shows that members of four underserved populations are likely to respond to strategies that increase social support for PA and improve access to venues where they can be PA. Further research is needed to test how to implement such strategies in ways that are embraced by community members.	Limitations Results are not statistically representative of a larger population because of non-random recruiting technique, quest, small sample sizes and use of qualitative rather than quantitative research methods. Limited discussion about point of place prompts (i.e. signs to encourage activities such as taking the stairs rather than the elevator). Study focused on perceived benefits and barriers associated with proven PA strategies which may have precluded generation of new ideas for other PA increasing strategies.	Qualitative  Public Health Nutrition
Adapting Evidence Based Strategies to Increase Physical Activity Among African Americans Hispanics, Hmong, and Native Hawaiians A Social Marketing Approach  Preventing Chronic Disease 4(4)			
Vocorn JJ Van Bieck L Barendregt JJ Mackenbach JP	Based on literature findings the model predicts that reducing the exposure to zero would decrease the average BMI by 0.38kg/m2 and lower the prevalence of obesity from 17.8% to 15.2% for boys and from 15.9% to 13.5% for girls. When estimates are based on expert opinion, these values are 11.0% and 9.9% respectively. CONCLUSION This study suggests that from one in seven up to one in three obese children in the US might not have been obese in the absence of advertising for unhealthy food on TV. Limiting the exposure of children to marketing of energy dense food could be part of a broader effort to make children's diets healthier.	Limitations hypothetical statistical model not necessarily realistic. The modeled prevalence of obesity is about 1.4% lower than that reported by the CDC though values are within 95% confidence range. Assumes the relationship between advertising exposure and consumption is linear. This may not be accurate. The uncertainty in the size of these effects is considerable and reflects the paucity of quantified data in this field of inquiry. Another uncertainty is the dose response relation between advertising and total energy intake. Estimates were based on the Bolton study which is old and possibly out dated to current estimates.	non controlled descriptive  Public Health
European Journal of Public Health 19(4)			

Table 1. Summary Literature Review Matrix (continued)

Auth. Title (ml)	Year	Purpose	Design	Sample / Setting	Tools
Wang, YC Gortmaker, S, Iaveras E  Trends and racial/ethnic disparities in sever obesity among children and adolescent, 1976 - 2006  International Journal of Pediatric Obesity	2010	Describe secular trends of severe obesity in childhood from 1976-2006, with a particular focus on racial/ethnic differences and to provide estimates of the weight (in kg) above the 95% for obese and severely obese children	Quantitative - comparative Longitudinal  Compared estimates between non-Hispanic white non-Hispanic blacks and Hispanic children	N= 33,781 2-to-9-year-old from 3 NAHANES Surveys (NHANES II 1976 - 1980 N=7,201 NHANES III 1988-1994 N= 10,600, NHANES 1999-2006 N= 15,980) Non-Hispanic whites non-Hispanic blacks Mexican Americans, and other Hispanic youths Civilian, non-institutionalized US population	Stats - multivariate logistic regression to estimate odds ratios of being severely obese associated with survey year, sex, age, race/ethnicity and income
Wang, YC Ludwig D, Sonneville K, Gortmaker, S  Impact of Change in Sweetened Caloric Beverage consumption on Energy Intake Among Children and Adolescents  Archives of Pediatrics and Adolescents	2009	Estimate the net caloric impact from replacing sugar-sweetened beverages (SSBs) with alternatives in children and adolescents in naturalistic settings	Quantitative - descriptive	Children and adolescents 2-to 9- years of age (N=3098)	NHANES 2003-2004 survey data

**Table 1 Summary Literature Review Matrix (continued)**

Auth Title Jnl	Results (conclusions Recommendations)	Limitations Strengths Weaknesses	Level of Evidence
Wang Y Cortmaker S Lavras E  Trends and racial ethnic disparities in severe obesity among children and adolescents 1976-2006  International Journal of Pediatric Obesity	Age standardized prevalence of severe obesity increased from 1.1% (1.5% (boys girls) in NHANES II, to 2.9% (3.1% in NHANES III and 3.1% (4.7% in NHANES (p < 0.001). Some prevalence between race ethnicity Hispanic boys (11 yrs and non Hispanic black girls (2.1 yrs had the highest prevalence of severe obesity in the most recent NHANES data. On avg obese youths were 2.7kg above the obesity standard and severely obese youth were 21.3kg above. CONCLUSION The prevalence of severe obesity among the US youth is increasing, especially among Hispanic boys and non Hispanic black girls. The degree of pediatric obesity is substantial and will likely have profound impact on adult morbid obesity and other morbidities	Limitations results were constrained by sample size in some demographic and income groups can be too small to accurately estimate the prevalence of severe obesity resulting in wide confidence intervals and vulnerability to sampling variability Strength lies in the validity of measured BMI from NHANES data. First study to report the degree of obesity by number of kg above 5% cut off which puts the epidemiological concept of prevalence into clinical perspective	cohort study  Health Policy Public Health Medicine
Vang Y Ludwig D Sonnevilk K Cortmaker S  Impact of change in Sweetened Caloric Beverage consumption on Energy Intake Among Children and Adolescents  Archives of Pediatrics and Adolescents	Each additional serving (8oz) of SSB corresponded to a net increase of 106 kcal do (p < 0.01 95% CI 112 121 kcal/do holding other beverages constant. Increases were also seen for each additional serving of whole milk (169kcal/d 95%CI 118 171 kcal do) and 100% juice. No net increase in total energy intake (EI) were seen for water or diet drinks. Substituting SSBs with water was associated with a significant decrease in EI controlling for intake of other beverages total beverages and fast food and weekend effect for all groups studied. Each 1% of beverage replacement was associated with 6.6 kcal lower TFI a reduction not negated by compensatory increases in other food or beverages. CONCLUSION We estimate that replacing all SSBs with water could result in an average reduction 235 kcal do. More experimental work examining the impact of reducing SSB consumption in children and adolescents is warranted. Reducing SSB intake can be an important strategy to eliminate excess caloric intake however the choice of replacement beverage is crucial. Water can be recommended as a clear replacement choice	Limitations 1) the recall method is subject to inaccuracy and bias in enlisting all food ingested in quantifying portion size 2) underreporting may be considerably greater among those who consume more than average 3) individual's diet may vary greatly from one day to another 3) inferences on net caloric impact from beverage choices may remain constrained by residual confounding effect from other unavailable variables such as P.A.	3 non controlled descriptive  Medicine Nutrition Public Health Health Policy



**Table 1 Summary Literature Review Matrix (continued)**

Auth	Title (ml)	Year	Purpose	Design	Sample	Setting	Tools
Warner M, Harley K, Bradman A, Vargas G, Fskunazi B	Soda consumption and Overweight Status of 2 year old Mexican American Children in California	2006	Investigate the cross sectional relationship of soda consumption and other dietary and physical activity factors with overweight status in 2 year old children from low income Mexican American families who are participants in a birth cohort Salinas Valley CA	Quantitative cross sectional longitudinal cohort study	N= 354 2 year old children recruited from a previous longitudinal study The Center for the Health Assessment of Children of Salinas (CHAMACOS) Study done between 2001-2002		Interview of mothers on demographics and a 20 item modified food frequency questionnaire Medical records 24 month follow up of height and weight were measured
Wilfley D, Stein R, Saelens B, Mockus D, Matt G, Hyden Wade H, Welch R, Schechtman K, Thompson P, Epstein D	Efficacy of Maintenance Treatment Approaches for Childhood Overweight	2007	Determine the short term and long term efficacy of 2 distinct weight maintenance approaches vs no continued overweight and to examine children's social functioning as a moderator of outcome	Quantitative comparative parallel groups randomized controlled trial conducted between Oct 199 and July 2004  (groups 1) control 2) Behaviors skills maintenance (BSM) 3) social facilitation maintenance (SFM) treatment	Study done at a university based weight control clinic Sample 204 healthy 7 to 12 year olds 20% to 100% above median BMI for age and sex with a least 1 overweight parent Enrolled in a 5 mo weight loss treatment program N=150 were randomized to 1 of 3 maintenance conditions Follow up assessment occurred immediately following maintenance treatments and 1 and 2 years following randomization Exclusions child or parent involved in psych or wt loss treatment using appetite or wt affecting meds or hid psych condition		Therapist Training and Treatment Fidelity program prior to leading group and family sessions Family Based weight loss intervention focused on dietary modification PA increases and behavior change skills Weight Maintenance intervention included two approaches 1) BSM Behavioral skills maintenance program and 2) SFM Social facilitation maintenance program
	JAMA						

**Table 1 Summary Literature Review Matrix (continued)**

Auth Title (ref)	Results / Conclusions Recommendations	Limitations Strengths Weaknesses	Level of Evidence
Warner M, Harley K, Bradman A, Vargas G, Eskenazi P. Soda consumption and Overweight Status of 2 Year Old Mexican American Children in California. Obesity 14(11)	75 (15%) of the children were overweight which is higher than the 11.1% reported for the NCHS 1999-2000 report. Over half (56%) reported consuming any soda in the last week. After covariate adjustment compared with no soda consumption, 1 soda/day was not related to overweight (adjusted odds ratio 0.97, 95% confidence interval 0.47-1.99) but 1 soda/day was significantly associated with overweight and test for trend was significant (p=0.02). Children who drank soda were of higher birth weight, older, consumed more fast food and more sweets, and watched more TV per day. They also consumed less 100% juice, but no difference in consumption of other foods including milk, fruits, or vegetables. Mothers of children who reported drinking soda had a higher BMI both at pre-preg and at the 24 month interview. CONCLUSION: The findings of increased risk for overweight with higher soda consumption is consistent with previous studies of sweetened beverages including soda in school aged and preschool aged children. Intervention to reduce consumption of soda in young Mex Am children should be considered.	Limitations: Mexican American sample limits generalizability to other Latino subgroups. Self report survey can bias results. Did not ask about consumption of fruit drinks which may be significant in this age group. Did not exclude diet soda from Food Frequency Questionnaire. If consumers of diet soda were misclassified as soda consumer may have underestimated the risk for overweight from soda consumption in this population. Cross sectional design of data limits interpretation of whether soda consumption preceded overweight status which could be biologically possible.	Cohort study Public Health
Wilfley D, Stein R, Saelens P, Mockus D, Matt G, Hyden Wade II, Welch R, Schuchman K, Thompson P, Epstein D. Efficacy of Maintenance Treatment Approaches for Childhood Overweight. JAMA	Intervention: Maintenance conditions included the control group or 4 months of behavioral skills maintenance (BSM) or social facilitation maintenance (SFM) treatment. Children receiving either BSM or SFM maintained relative weight significantly better than children assigned to the control group from randomization to post weight maintenance. Active maintenance treatment efficacy relative to the control group declined during follow up, but the effects of SFM alone and when analyzed together with BSM were significantly better than the control group when examining BMI z score outcomes from baseline to 2 year follow up. Baseline child social problem scores moderated child relative weight change from baseline to 2 year follow up, with low social problem children in SFM vs the control group having the best outcomes. CONCLUSION: The addition of maintenance targeted treatment improves short term efficacy of weight loss treatment for children relative to no maintenance treatment. However, the waning of effects over follow up, although moderated by child initial social problems, suggests the need for the bolstering of future maintenance treatments to sustain effects.	Limitation: Did not measure the impact of wt loss maintenance on health related outcomes. Although adjusted for age, wt, and ht using BMI derived outcome variables, did not adjust for Tanner stage that could effect results. Did not include a placebo control intervention. Strengths: First large scale study to test the efficacy of maintenance approaches for childhood overweight.	9 Large randomized controlled trial Psychiatry Internal Medicine Biostatistics Pediatrics Epidemiology Clinical Psychology

**Table 1. Summary Literature Review Matrix (continued)**

Auth. Title / Jnl	Year	Purpose	Design	Sample / Setting	Tools
Witfley D, Ibbs L, Van Buren D, Reach K, Walker M, Epstein L. Lifestyle Interventions in the Treatment of Childhood Overweight: A Meta-Analytic Review of Randomized controlled Trials Health Psychology	2007	Primary aim: use meta-analytic techniques to quantitatively evaluate the efficacy of lifestyle interventions in the treatment of pediatric overweight by comparing lifestyle intervention to wait-list / no treatment control groups or information / education-only control groups. Secondary aim: examine variables that potentially moderated treatment outcomes (age, sex, duration of treatment and number of interventions components)	Quantitative Experimental comparative	Studies selected through Cochrane Controlled Trials Register, MEDLINE and Psych INFO from the first available year to Aug 2005. RCT of lifestyle interventions focused on weight loss or weight-control for youth age 19 or younger. Tx for at least 4 weeks and participants overweight at baseline with reports in English. Total of 1456 journal articles were identified. Of these 14 studies were used in the present study. Avg. age of participants was 11.5 years (range 2-19 yrs)	Literature search strategy included variations on the words "overweight" and "treatment" and related terms. Articles were restricted to pediatric and adolescent populations. Also, references from recent major reviews on childhood overweight were used to identify articles. A coding document was developed for data extraction and analysis purposes.
Wilson D. New Perspectives on Health Disparities and Obesity Interventions in Youth Journal of Pediatric Psychology 34(3)	2009	Review intervention studies that address health disparities and the increasing rate of obesity in minority youth. The review focuses on interventions that target obesity-related behaviors (diet, PA, sedentary behaviors) and adiposity outcomes (BMI) in minority children and adolescents.	Review of literature		

**Table 1. Summary Literature Review Matrix (continued)**

Auth Title Jml	Results Conclusions Recommendations	Limitations Strengths Weaknesses	Level of Evidence
Willfey, D, Fibbs, T, Van Buren, D, Reach, K, Walker, M, Epstein, L Lifestyle Interventions in the Treatment of Childhood Overweight: A Meta-Analytic Review of Randomized Controlled Trials Health Psychology	Meta-analysis found lifestyle interventions produced significant treatment effects when compared to no-treatment wait-list groups. Studies comparing lifestyle interventions to info-education only also showed significant immediate and long-term effects. The average participant receiving no treatment or info edu only can be expected to continued to gain weight. CONCLUSION: Lifestyle intervention for the treatment of pediatric overweight are efficacious in the short-term with some evidence for persistence of effects. Results provide clinicians encouragement to offer lifestyle interventions to overweight youth even if only modest wt changes or maintenance results from their efforts. Future research is required to identify moderators and mediators of outcome and to determine the optimal length and intensity of treatment required to produce enduring changes in weight status.	Limitation: Since focus of review was limited to impact of lifestyle interventions on wt outcomes, may have underestimated breadth of effectiveness. In addition, despite restricting meta-analysis to RCTs, insufficiencies in reporting of design, implementation, and analysis of studies were present. Examples: in most studies, both confidence intervals and effect sizes not reported, making clinical significance difficult to determine. Also, all studies conducted completer analysis rather than intent-to-treat analysis that can result in larger effect sizes. Moreover, patient study demographic features were infrequently reported, making it difficult to generalize results to other treatment settings or populations. Adverse effects and treatment preferences were not routinely reported, making it difficult to empirically compare safety and acceptability of the interventions. Also, limitations to English language articles may have led to publication bias.	10= meta-analysis of randomized controlled trials Psychiatry Pediatrics Preventive Medicine Internal Medicine
Wilson, D New Perspectives on Health Disparities and Obesity Interventions in Youth Journal of Pediatric Psychology 34(3)	A limited number of studies have been conducted that target obesity-related behaviors and adiposity outcome in minority youth. The most successful interventions for minority youth have incorporated culturally targeted and culturally tailored intervention components using multi-systemic approaches. Many studies have focused on randomized controlled trials for intervention strategies but few randomized controlled trial studies have targeted minority groups. CONCLUSION: Further research is needed that focuses on testing the efficacy of theoretically based approaches that integrate culturally appropriate program elements for improving obesity-related behaviors and adiposity outcomes in minority youth.		Review of literature Psychology

**Table 1. Summary Literature Review Matrix (continued)**

Author / Title / Jnl	Year	Purpose	Design	Sample / Setting	Tools
Wolff, B. Dansinger, M. Soft Drinks and Weight Gain: How Strong is the Link? The medical Journal of Medicine 10 (8)	2008	To evaluate the extent to which current scientific evidence supports a causal link between sugar sweetened soft drink consumption and weight gain	Review of observational studies, intervention studies, mechanisms by which soft drinks may promote obesity and related diseases and recommendations that were done on adults, youths and adolescents	46 studies were reviewed	
Zhu, X. Lee, C. Walkability and Safety Around Elementary Schools: Economic and Ethnic Disparities American Journal of Preventive Medicine	2008	To examine different aspects of environmental support for walking around elementary schools, including neighborhood-level safety related to traffic and crime. It also explores disparities based on the students' economic status and ethnicity	Quantitative -comparative descriptive  used field audits subjective values via Likert Scale and objective variables captured by either absolute values or dichotomous measures	(N = 73) public elementary schools in the Austin Independent School District in the city of Austin Texas. High percentage of Hispanic students (54.7%) non Hispanic white (29.0%) and other (16.3%) during the 2004-2005 school year. Poverty rate ranged from 2%-98.9%	1) Pedestrian Environment Data Scan Tool (validated environmental audit instrument) revised for this study's design and setting. 2) High resolution aerial photographs. 3) GIS maps were developed to visually examine spatial disparities of environmental variables

**Table 1 Summary Literature Review Matrix (continued)**

Auth Title Jrnl	Results Conclusions Recommendations	Limitations Strengths Weaknesses	Level of Evidence
Wolff J Daninger M Soft Drinks and Weight Gain How Strong is the Link? The medical Journal of Medicine 10 (8)	Sugar sweetened soft drink intake has increased dramatically during the past few decades yet the magnitude of the weight gain and adverse health effects caused by soft drinks are poorly understood due to paucity of clinical trial data. Despite preliminary data from observational studies that support an association between soft drink consumption and weight gain the weaknesses of this type of study design raise uncertainty in regard to the magnitude of weight change and other clinical effects expected as a result of drinking more or less of these beverages. These small intervention trials in adults with treatment periods of 10 weeks or less have observed weight gain associated with sugar sweetened beverages. CONCLUSION: More comprehensive intervention trials designed to evaluate the effect of soft drink consumption on body weight and cardiovascular risk factors could potentially fill the data gaps to better inform patients clinicians and policy makers.	Limitations: These studies have not reported the effects on lipid levels and other cardiovascular risk factors. Second causality has not been established (between soft drink consumption and wt gain) which would require large multicenter long term randomized trials with controls. However limited resources and logistical barriers confine the design and implementation of clinical trials designed to answer the question of causality.	Review of literature Medicine
Zhu X Lee C Walkability and Safety Around Elementary Schools Economic and Ethnic Disparities American Journal of Preventive Medicine	Schools with higher poverty rates were located closer to their students homes but showed much worse street environments. Schools with higher percentages of Hispanic students were exposed to more dangers from traffic and crime although their neighborhood conditions were considered more walkable based on the aggregated measures. Disparities became aggravated when considering the limited access by low income and minority populations to private automobiles and formal or paid PA facilities such as parks and gyms. Neighborhood level and street level walkability showed contrasting variations across the neighborhoods and had reversed associations with the students ethnic and economic conditions. Similarly neighborhood level safety and walkability appeared to have contrasting variations and thereby different impacts on walking behaviors. CONCLUSIONS: Economic and ethnic disparities exist in the environmental support for walking and suggesting the need for tailored interventions in promoting active living. Low income Hispanic children are more likely to live in unsafe areas with poor street environments but with some favorable neighborhood level conditions.	Limitations: 1) GIS data were collected at different times from 2000 to 2007 and had different levels of accuracy from precise point to census blocks. 2) different units of analyses were used for the neighborhood level and the street level measures thus opening up inaccuracies in the results. 3) this field audits by researchers ensured higher internal validity their assessment of the built environment may be different from the residents assessment, especially for perceptual variables. 4) this study examined only urban and suburban setting decreasing generalizability to rural or less populated areas. Strengths: study added to the walkability literature and has several implications for research practice and policy. 1) new aspects of economic and ethnic disparities were explored in terms of walkability and safety around public elementary schools in Austin Texas.	3 – non controlled descriptive Architecture Urban Planning

## APPENDIX B

## Permission for Access to Case Data

UNIVERSITY OF CALIFORNIA, SAN DIEGO

UCSD

OFFICE OF THE CHIEF OF POLICY AND COMPLIANCE SERVICES



SAN DIEGO, CALIFORNIA

SCHOOL OF MEDICINE  
 DEPARTMENT OF PEDIATRICS  
 DIVISION OF CHILD DEVELOPMENT AND COMMUNITY HEALTH

9500 GILMAN DRIVE  
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February 25, 2011

University of San Diego IRB Board  
 Office of the Executive Vice President and Provost  
 Hughes Center 214  
 5998 Alcalá Park  
 San Diego, CA 92110

RE: Data use for doctoral dissertation research

To Whom It May Concern:

This data use agreement outlines the disclosure of data from the Division of Child Development and Community Health in the Department of Pediatrics at UC San Diego. As Principal Investigator for the Vida Saludable study (UC San Diego Comprehensive Research Center in Health Disparities, Grant Number 5 P60 MD 0002200 NIH), I authorize Melinda Bender access to all relevant Vida Saludable data for her doctoral dissertation research study. Ms. Bender is a co-investigator on the larger Vida Saludable study, approved by UC San Diego's IRB.

As one of her dissertation committee members, I understand Ms. Bender is planning to conduct a retrospective data-based analysis of a subset of data from the larger Vida Saludable study. Her dissertation research study is entitled "A Retrospective Analysis of Maternal and Child Outcomes Following an Obesity Intervention." Ms. Bender has agreed to use appropriate physical, technical, and administrative safeguards to prevent use or disclosure of the data other than permitted in the data use agreement. It is required that any improper uses or disclosures of data be reported to UC San Diego, Division of Child Development and Community Health.

The Vida Saludable data relevant to Ms. Bender's dissertation research includes: 1) demographic data pertaining to maternal age, number of pregnancies, number of years mother has lived in the United States, and number of maternal non-program visits with the promotora/health educator (PHE); 2) pre- and post-program data of children's consumption of high carbohydrate beverages; 3) pre- and post-program data of maternal walking, including maternal pedometer steps; 3) pre- and post-program data of maternal attitudes (beliefs and knowledge), control beliefs/self-efficacy, and subjective norms; and 4) pre- and post-program data of the mother's ability to build relationships with other participants and the PHE.

If you have any additional questions, please contact me at 619-243-2422 or [sgahagan@ucsd.edu](mailto:sgahagan@ucsd.edu)

Sincerely,

Sheila Gahagan, MD, MPH  
 Professor & Chief, Division of Child Development & Community Health  
 Principal Investigator, Vida Saludable  
 UC San Diego, Department of Pediatrics