Childhood obesity in rural Latinos: Interventions and implications for its assessment, prevention and management

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Childhood obesity, particularly among minority populations, has become an epidemic in recent years (Spruijt-Metz, 2011). Latinos are the fastest growing minority population in the United States, and currently represent the largest group of minority children in the U.S. (Houston, Waldrop, & McCarthy, 2011; Lichter, 2012). In rural America, the Latino population has grown by 44.6% in the last decade, which suggests that the rural Latino population will only continue to grow exponentially in the coming years (Lichter, 2012). Rates of obesity during childhood are typically higher in rural than urban areas due to a variety of factors, including a lack of healthcare, a decreased number of close proximity supermarket chains and exercise facilities, and a higher risk for lower socioeconomic status (Jilcott et al., 2011; Lutfiyya, Lipsky, Wisdom-Behounek, & Inpanbutr-Martinkus, 2007; Rodriguez, Weffer, Romo, Aleman, & Ortiz, 2011). Latinos have been found to be more susceptible to overweight and obesity than their Caucasian counterparts due to several genetic and cultural risk factors (Buscemi, Beech, & Relyea, 2011; Butte, Cai, Cole & Comuzzie, 2006).

**Purpose**

Though many aspects of childhood obesity have been extensively documented in recent years, evidence regarding implications and interventions for the prevention and management of childhood obesity in Latino youth, particularly in rural areas, is scarce. As Latinos are America’s fastest growing minority population, and many members of this population are living in rural communities, there is a need for an evidenced-based approach to combat the childhood obesity epidemic in this population. The purpose of this paper is to review the literature and describe the primary care interventions and implications for the assessment, prevention and management of childhood obesity in rural Latinos.
Note: This author recognizes that there is much diversity among the different Latino subgroups. However, this paper does not distinguish between the subgroups, and uses “Latino” as an umbrella term to describe general implications and interventions for the prevention and management of childhood obesity in rural Latinos as a whole.

Background

Obesity has been a global health problem for decades (Spruijt-Metz, 2011). In 1997, the World Health Organization declared obesity to be an international epidemic, and since then, numerous organizations have made efforts to decrease the rates of obesity worldwide (Spruijt-Metz, 2011). Despite these efforts, rates of obesity have continued to grow exponentially in adults and children, thus creating a global health crisis that has resulted in devastating individual health outcomes and increasing costs to the public (Spruijt-Metz, 2011).

Obesity is a multifactorial disease, and major risk factors include genetic predisposition, overweight or obesity during childhood and adolescence, poor diet and insufficient regular physical activity (Smith et al., 2011). The consequences of obesity are great, and in addition to increasing the individual risk of numerous health conditions, including diabetes, dyslipidemia, hypertension, heart disease, stroke and certain cancers, obesity is one of the leading causes of preventable, premature death in the U.S. (Biro & Wien, 2010; Smith et al., 2011). When obesity occurs in childhood, the atherosclerotic process is accelerated and almost every organ system can be adversely affected, resulting in serious medical and psychosocial complications (Han, Lawlor, & Kim, 2010).

In adults, obesity is defined as a body mass index (BMI) greater than or equal to 30 kg/m² (Flegal, Carroll, Kit, & Ogden, 2012). There are three grades of obesity: grade one (BMI 30 to less than 35), grade two (BMI 35 to less than 40), and grade three (BMI greater than or equal to 40).
40) (Flegal et al., 2012). Persons with a BMI of 25.0 to 29.9 kg/m$^2$ are classified as overweight (Flegal et al., 2012). Seventy percent of the U.S. adult population is now considered overweight or obese, and in 2010, the prevalence of obesity among U.S. adult men and women was 35.5% and 35.8%, respectively (Flegal et al., 2012; Smith et al., 2011). It is estimated that by 2015 more than 40% of all U.S. adults will be classified as obese (Biro & Wien, 2010).

Numerous studies have demonstrated that childhood and adolescent obesity are strong predictors of adult obesity (Spruijt-Metz, 2011). In children, the evaluation of obesity status must take into account the age and gender of the child (Spruijt-Metz, 2011). The Center for Disease Control (CDC) created gender and age specific growth curves based on BMI for youth from 2 to 20 years of age in the year 2000 to better measure and assess the obesity status of children (Kuczmarski et al., 2002). Children who fall within the 85$^{th}$ to 94$^{th}$ age and gender specific BMI percentile are classified as “overweight”, and children who are in the greater than or equal to the 95$^{th}$ age and gender specific BMI percentile or who have a BMI greater than or equal to 30, whichever is lower, are classified as “obese” (Barlow & the Expert Committee, 2007).

According to data compiled by the CDC and the National Center for Health Statistics (NCHS), the prevalence of obesity among children and teens has almost tripled since 1980, and currently, an estimated 17% of all U.S. children and teens aged 2 to 19 years are obese (Ogden & Carroll, 2010). Preschool aged children, ages 2 to 5 years, had a lower prevalence of childhood obesity than their older counterparts by approximately 10% (Wang, 2011). The highest rates of adolescent obesity in 2008 were seen within the 6 to 11 year age group, where 19.6% of these pre-adolescents were obese, compared with 18.1% of teens in the 12 to 19 year age group and 10.4% of children in the 2 to 5 year age group (Ogden & Carroll, 2010). Rates of childhood obesity are increasing in all ethnic and racial groups, but its prevalence is highest in nonwhite
populations (Caprio et al., 2008). This discrepancy is thought to be due to a combination of complex factors, including genetics, physiology, culture, socioeconomic status and environment (Caprio et al., 2008).

The physiology and consequences of childhood and adolescent obesity are complex, and are thought to begin as early as the prenatal and infancy periods (Taveras, Gillman, Kleinman, Rich-Edwards, & Rifas-Shiman, 2010). Research shows that adipose tissue not only stores energy and provides thermal insulation for the body, but it also secretes adipokines, including leptin (Neary, Goldstone, & Bloom, 2004; Spruijt-Metz, 2011). Together with gastrointestinal peptides and neuropeptides, such as ghrelin and serotonin, respectively, one of the functions of adipokines, particularly leptin, is to signal the brain to regulate appetite (Neary et al., 2004; Spruijt-Metz, 2011). The level of adipokines secreted is, in general, directly related to the amount of adipose tissue present, and when there are high levels of these circulating adipokines, adverse health outcomes occur (de Ferranti & Mozaffarian, 2008; Spruijt-Metz, 2011). Adipokines have great influence on the production of inflammatory mediators, such as TNF-alpha, CRP and IL-6 (de Ferranti & Mozaffarian, 2008). These inflammatory mediators result in a pro-inflammatory state, which has been linked to heart disease, the metabolic syndrome and type 2 diabetes mellitus (de Ferranti & Mozaffarian, 2008; Spruijt-Metz, 2011). Adiponectin is particularly important when considering the processes of type 2 diabetes mellitus and heart disease, as adiponectin has been found to promote pancreatic beta-cell function and survival, in addition to being cardio- and renal- protective (Turer, 2012). Adiponectin is secreted by adipose tissue, but circulating levels are inversely related to the amount of central adipose tissue (Turer, 2012). Thus, with more central adiposity, there is less adiponectin secreted (Turer, 2012). Additionally, adipose tissue secretes free fatty acids, and with increased adipose tissue, there is
an increased concentration of free fatty acids (de Ferranti & Mozaffarian, 2008; Spruijt-Metz, 2011). An increased concentration of free fatty acids results in several events that increase insulin resistance, including the reduction of muscle glucose uptake, increased liver glucose production, and increased insulin secretion (de Ferranti & Mozaffarian, 2008; Spruijt-Metz, 2011).

While both non-Latino African Americans and Latinos are more susceptible to insulin resistance than their Caucasian counterparts, the two ethnic groups differ in their response to insulin resistance (Stovitz, Schwimmer, Martinez, & Story, 2008). Non-Latino African American youth respond to their insulin resistance through a reduction in insulin extraction by the liver, whereas Latino youth secrete more insulin (Stovitz et al., 2008). Thus, Latino adolescents and children are believed to be particularly susceptible to obesity phenotypes, i.e. the metabolic syndrome (Stovitz et al., 2008). In Latino youth with the metabolic syndrome, adiponectin levels have been found to be approximately 25% lower compared with their healthy overweight counterparts, even after controlling for insulin sensitivity, visceral adiposity and total body composition (Shaibi et al., 2007). Thus, adiponectin is a significant and independent predictor of the metabolic syndrome phenotype in Latino youth who are overweight (Shaibi et al., 2007). For adolescents, it is widely believed that insulin sensitivity decreases at the onset of puberty (Koebnick et al., 2008). In Caucasians, this physiological decrease in insulin sensitivity is transient, but studies have demonstrated that Latino adolescents do not experience this transient insulin resistance (Koebnick et al., 2008). In addition, pediatric non-alcoholic fatty liver disease (NAFLD) is more common among Latinos than any other ethnic group, with more boys being affected than girls (Stovitz et al., 2008). NAFLD, defined as “the accumulation of liver fat greater than 5% in the presence of less than 10 grams of daily alcohol consumption” (Kim, Le,
Mahurkar, Davis, & Goran, 2012, p. 158) is commonly associated with obesity, insulin resistance, and dyslipidemia (Stovitz et al., 2008). Furthermore, Latinos are more likely to experience hepatic-related morbidity and mortality, with some hepatic diseases being as much as three times as common in Latinos than in Caucasians (Stovitz et al., 2008).

The role of genetics in the development of childhood obesity has been studied extensively in recent years (Han et al., 2010). One of the strongest predictors of whether a child is overweight or obese is the BMI of the mother and father (Vos & Welsh, 2010). The FTO (fat mass and obesity-associated) gene located on chromosome 16 and its variations are strongly associated with overweight and obesity (Vos & Welsh, 2010). A defect in the melanocortin 4 receptor gene (MC4R) is associated with a severe form of childhood obesity (Vos & Welsh, 2010). Rare single gene mutations, such as those related to the leptin signaling pathway, the key biological pathway controlling energy balance, have been found to cause obesity in affected individuals due to the subsequent development of hyperphagia (Farooqi & O’Rahilly, 2006). Individuals who are born with a leptin deficiency typically have normal birth weight but experience rapid weight gain in the first several months of life, resulting in severe obesity (Farooqi & O’Rahilly, 2006). Other genetic syndromes, such as Prader-Willi syndrome, and the mechanism of DNA methylation of regulatory genes in utero have been studied with animals in relation to the development of obesity, but clear evidence of how these relate to obesity in humans is scarce (Han et al., 2010). A genetic diagnosis should be considered in a severely obese young child (less than 5 years of age) with hyperphagia and a positive family history of early-onset obesity (Farooqi & O’Rahilly, 2006).

Genetics are thought to be highly contributory to the development of childhood obesity in the Latino population (Butte et al., 2006).
6q that is highly prevalent in Latinos has been identified as having strong effects on obesity phenotypes (Duggirala et al., 2001). Another major locus that influences plasma triglyceride concentrations that is located on chromosome 15q has also been found to be highly prevalent in Latinos (Duggirala et al., 2000).

Primary perinatal risk factors for childhood obesity and metabolic dysregulation include low birth weight and intrauterine growth restriction, in addition to early infant catch-up growth and fetal overgrowth (Catalano et al., 2009). There are also many parental risk factors that are associated with intrauterine fetal growth, especially maternal pregravid obesity and diabetes (Catalano et al., 2009). These factors contribute significantly to the development of childhood obesity because they have been shown to increase fetal adiposity (Catalano et al., 2009). Several environmental exposures predispose children of overweight women to obesity, including over- and undernutrition during the fetal period, never breastfeeding or early termination of breastfeeding, and lack of control over the child’s eating (Johnson et al., 2011). These factors are more likely to affect children of low socioeconomic status because of the strong association between low socioeconomic status and overweight or obesity in women (Johnson et al., 2011). Data also suggests that the percentage of body fat at birth, rather than birth weight, is an important risk factor for the development of childhood obesity (Catalano et al., 2009).

Behavioral risk factors in early and late childhood have also been shown to significantly contribute to the prevalence of childhood obesity (Han et al., 2010). High energy intake in early infancy and high consumption of sugar-sweetened beverages in childhood are associated with an increased risk of childhood obesity (Han et al., 2010). Additionally, high levels of physical inactivity are associated with a high risk of childhood obesity (Han et al., 2010). Research has also shown that a higher risk of childhood obesity exists in children who spend a large number of
hours viewing television, and in children who have short sleep duration in infancy and childhood (Han et al., 2010).

Racial and ethnic disparities are significant with regards to the prevalence of childhood obesity (Ogden & Carroll, 2010). Though rates of childhood obesity are increasing in all ethnic and racial groups, its prevalence is highest in nonwhite populations (Caprio et al., 2008). A review of national survey data indicated that American Indians had the highest prevalence of childhood obesity, African Americans and Mexican Americans had rates of childhood obesity higher than Caucasians, and Caucasians and Asians had the lowest prevalence of childhood obesity (Wang, 2011). It is thought that these racial and ethnic disparities in childhood obesity prevalence are present as early as the preschool years (Taveras et al., 2010). Among U.S. adolescents aged 12 to 19 years in 2008, 26.8% of Latino males were obese and 19.8% of non-Latino black males were obese, compared to 16.7% of non-Latino white obese males (Ogden & Carroll, 2010). In U.S. adolescent females aged 12 to 19 years in 2008, 29.2% of non-Latina black females and 17.4% Latina females were obese, compared with only 14.5% of non-Latina white females being obese (Ogden & Carroll, 2010). The discrepancy in the prevalence of childhood obesity among racial and ethnic groups is thought to be due to a combination of complex factors, including genetics, physiology, culture, socioeconomic status and environment (Caprio et al., 2008). For example, Taveras et al. (2010) found that even after adjusting for socioeconomic status and parental obesity, Latino and African American children were more likely than their Caucasian counterparts to experience rapid weight gain, sleep for shorter periods as infants, have televisions in their bedrooms, and have a higher intake of sugar-sweetened beverages and fast food.
Socioeconomic status is a contributing factor to the increasing disparities in childhood obesity partly because of the fact that individuals with a higher socioeconomic status tend to have more knowledge of nutrition, have positive attitudes towards healthy behaviors and are more likely to live in environments in which a healthy lifestyle is easier to attain (Singh, Siahpush, & Kogan, 2010; Johnson, Pratt, & Wardle, 2011). Levels of adiposity are higher with each incremental decrease in socioeconomic status (Johnson et al., 2011). From 2003 to 2007, socioeconomic inequalities related to race and ethnicity in childhood overweight and obesity prevalence increased because Latino children and children of lower socioeconomic status experienced increases in obesity rates at a faster pace than Caucasian children and children of higher socioeconomic status (Singh et al., 2010). Children who lived below the poverty line in 2007 had 243% higher odds of developing childhood obesity than children from households with an income greater than 400% of the poverty threshold (Singh et al., 2010). However, other research has shown that large ethnic disparities in the prevalence of childhood obesity can exist in homogenous socioeconomic groups (Wang, 2011). For example, one National Health and Nutrition Examination Survey (NHANES) found that socioeconomic status was inversely related to obesity in white children, but not among black or Mexican-American children (Wang, 2011). Thus, evidence suggests that even after adjusting for socioeconomic status, minorities are still more likely to experience childhood obesity than their Caucasian counterparts.

Parental education is another contributing disparity in childhood obesity and overweight prevalence (Singh et al., 2010). Many studies have found parental education, particularly maternal, to be the strongest single socioeconomic predictor of child obesity (Johnson et al., 2011). In 2007, children with parents who had less than 12 years of education had 325% increased odds of developing childhood obesity than children with parents who had a college
degree (Singh et al., 2010). Additionally, children from households with higher unemployment, households that are non-English speaking, single-mother households, and households in unsafe neighborhoods were at a significantly increased risk of being obese and overweight in 2007 (Singh et al., 2010). Although most studies indicated an association between the neighborhood and obesity of the individual, there is not enough evidence to assume a causal relationship between the environment of a group of residents and their overweight status (Johnson et al., 2011). Furthermore, minority children may experience health disparities when it comes to their health care access and quality, including disparities in the health status and insurance coverage among minority youth (Wilson, 2009).

Geographic location has been recognized in recent years as encompassing its own group of health issues (Lutfiyya et al., 2007). NHANES III data demonstrated that the combined prevalence of overweight and obesity was higher in urban areas for children aged 6 to 9 years, but was higher in rural areas for adolescents (Wang, 2011). Still, some researchers have suggested that there is a possible health benefit to non-rural residence (Lutfiyya et al., 2007). Children who live in rural areas of the U.S. are approximately 25% more likely to be overweight or obese than their urban counterparts (Lutfiyya et al., 2007). A national study found that rural residency is an independent risk factor for being obese or overweight during childhood (Lutfiyya et al., 2007). Other evidence indicates that the obesity prevalence in adolescents from small rural communities, especially males, is almost two times that of their urban counterparts (Rodriguez et al., 2010). Though the exact reasons as to why rural children are more likely to be obese than their urban counterparts are uncertain, there are some risk factors that occur more frequently in rural populations, such as lower socioeconomic status and poor dietary habits, that contribute to this disparity (Rodriguez et al., 2011). Additionally, the “features of the rural environment that
create special challenges for rural children to be physically active, including limited access to parks, exercise facilities, fewer sidewalks, a lack of public transportation, and limited physical education classes” also contribute to the disparities in childhood obesity rates among rural children (Lutfiyya et al., 2007, p. 2354).

Additional elements in the rural setting, such as decreased access to healthy foods, increased cost of fruits and vegetables, fewer opportunities for education and limited access to nutrition experts contribute to its tendency to be obesegenic (Lutfiyya et al., 2007). “One study found that greater distance from a child’s home to the nearest chain supermarket was associated with greater risk of overweight only among children dwelling in less densely populated areas” (Jilcott et al., 2011, p. 1611), which is significant because children living in rural areas are more likely to be obese and typically live further from chain supermarkets than urban children (Jilcott et al., 2011). Not only do health disparities with regards to health care status and access exist among racial and ethnic groups, they also exist among geographic locations (Lutfiyya et al., 2007). “Rural children were almost 50% less likely to have a preventive healthcare visit and also less likely to have health insurance” (Lutfiyya et al., 2007, p. 2354).

Latino children are the largest minority group of children in the United States (Houston et al., 2011). Latino children are more likely to be considered to be overweight or obese than Caucasian or African American children (Rosas et al., 2011). In 2004, 37% of all Mexican American children aged 2 to 19 years were overweight or at risk of being overweight compared with 35.1% of African American children and 33.5% of non-Hispanic White children (Ogden et al., 2006). Rates of childhood obesity among Latinos are surpassed only by those of American Indians (Wang, 2011). However, due to the rapidly increasing number of Latinos in the U.S., which is expected to exceed 132 million by the year 2050, childhood obesity among Latino
children is a serious health issue that requires immediate attention (United States Census Bureau, 2011).

Latinos are America’s largest minority population, and currently represent 16% of the total U.S. population (Lichter, 2012). Between the years 2000 and 2010, the rural Latino population grew by 44.6% (Lichter, 2012). The concept of *acculturation*, which is “the process of adjusting to a new culture [and] describes the social, psychological, and behavioral changes that an individual undergoes as a result of immigration” (p.149), has long been considered to be a factor in the health disparities of Latinos (Buscemi et al., 2011). Acculturation is multi-factorial and difficult to measure (Liu, Probst, Harun, Bennett, & Torres, 2009). However, obesity has been found to be strongly associated with acculturation in Latino children (Buscemi et al., 2011). Additionally, Latino youth are at greater adjusted odds of having no health insurance and no usual source of healthcare than their Caucasians counterparts (Flores & The Committee on Pediatric Research, 2010).

Food insecurity, the “limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways” (Cook & Frank, 2008, p. 193), is a socioeconomic factor associated with acculturation that is a predictor of becoming overweight or obese (Buscemi et al., 2011). Moreover, children in households that are food insecure are more likely to have poor health than their food secure counterparts (Sano et al., 2011). Food insecurity can result in obesity through several mechanisms, including over reliance on inexpensive, energy-dense foods and overeating (Rosas et al., 2011). The negative effects of food insecurity are particularly consequential in children, who are undergoing substantial physical and mental development (Cook & Frank, 2008). Food insecurity is believed to be especially prevalent among Latinos in rural areas due to cultural and
language barriers (Sano, Garasky, Greder, Cook, & Browder, 2011). Furthermore, Latinos typically live in spatial isolation from non-Latinos, which may contribute to their limited access to information about local support and services (Sano et al., 2011).

Most minority populations, including Latinos, consume an excess of sugar-sweetened beverages and fast food, and have a suboptimal consumption of fruits and vegetables, compared to their Caucasian counterparts (Odoms-Young, Zenk, Karpyn, Ayala, & Gittelsohn, 2012). Traditional Latino dishes are often high in fat and calories (Caballero, 2011). Latino youth who are overweight or obese are more likely to have experienced chronic malnutrition and consequently have a higher prevalence of height deficit, or stunting, than their Caucasian counterparts (Iriart, Handal, Boursaw, & Rodriges, 2011). Research demonstrates that home and parental eating behaviors significantly influence a child’s eating behavior (Hartley, Anderson, Fox, & Lenardson, 2011). Latino families tend to use larger quantities of sodium, oils and sugars than their Caucasian counterparts (Sealy, 2010). They are also more likely to fry foods, rather than bake or broil them (Sealy, 2010). Latino families also eat together during meals at home, thus making it potentially difficult to alter food choices for an obese child because the entire family will be affected (Caballero, 2011). However, family meals have the potential to be beneficial for the obese child if the entire family understands and commits to cooking and eating healthy foods. Hammons and Fiese (2011) found that children who share family meals at least 3 times per week are more likely to eat healthier and be of normal weight.

The role of physical activity in preventing and decreasing rates of childhood obesity is well documented. Latino adolescents in rural areas engage in less physical activity than non-Latino white adolescents, regardless of BMI category (Rodriguez et al., 2011). This shows that there may be strong cultural and socioeconomic barriers preventing Latino adolescents from
engaging in physical activity in rural communities (Rodriguez et al., 2011). One cultural value among some Latinos is the belief that physical robustness is an indicator of physical health (Caballero, 2011). Thus, some Latinos are less likely to perceive themselves as overweight, decreasing the likelihood that they will engage in physical exercise (Caballero, 2011).

Non-pharmacologic interventions including dietary modifications and increased physical activity are the cornerstones of obesity prevention and management in youth of all ethnicities (Han et al., 2010). It is well documented that provider failure to be culturally competent has negative consequences on the affected populations, especially minorities and non-English speaking patients (Brotanek, Seeley, & Flores, 2008). Regarding obesity prevention and management in Latino youth, there is a great need for interventions that are specific to Latinos and their culture (Ramirez, Chalela, Gallion, Green, & Ottoson, 2011). The level of the acculturation of the individual, as well as cultural health beliefs, have great influence on the success of general recommendations for preventing and treating childhood obesity in Latinos, such as breastfeeding (Metzger & McDade, 2009). Additionally, preventing and treating childhood obesity is not simply the responsibility of the individual (Vos & Welsh, 2010). Successful interventions in preventing and treating childhood obesity require change at governmental and community levels, school and childcare levels, and familial and individual levels (Vos & Welsh, 2010). It is particularly challenging to implement change at these levels in rural communities, particularly those of minorities, due to a lack of resources, opportunities and funding (Lutfiyya et al., 2007). Thus, specific interventions to prevent and manage childhood obesity in rural, minority youth are necessary. This paper aims to provide primary care clinicians with a review of evidenced-based interventions and implications that may be helpful in the assessment, prevention and management of childhood obesity in rural Latinos.
Methods

Evidenced-based journal articles were chosen using the following search terms: “childhood”, “obesity”, “Latino”, “youth”, “treatment”, “causes”, “genetics”, “rural”, “physical activity”, “feeding practices”, “prevention”, “consequences”, “management”, “medications”, “interventions”, “policies”. Additionally, all articles selected were in English and the majority pertained to children and teens 21 years and under. A few articles not pertaining to this age group were used for background information on obesity in general. Articles used in this paper range from years 1994 to 2013, with the vast majority of articles ranging from the year 2007 to the year 2013. Numerous articles were found using the criteria above, and 109 unique evidenced-based sources were used for this paper. I met with committee members periodically to continue to focus the paper.

Discussion

Improving the Cultural Competence of the Providers Who Care for Rural Latino Youth

For Latinos, one of the most commonly reported themes among barriers to seeking health care is distrust in providers, which likely stems from a general consensus among Latinos that health providers “aren’t like [them]” and “don’t understand [them]” (Sherrill & Mayo, 2009). Additionally, a review of national provider statistics found that Latino patients were significantly less likely to receive pediatric obesity prevention counseling at office visits than patients of other ethnicities (Branner, Koyama, & Jensen, 2008). Thus, there is a great need for culturally sensitive and linguistically appropriate health care, particularly for the prevention and management of childhood obesity in rural Latinos.

Appropriate, thorough and frequent communication between providers and patients is of great importance when considering the health of rural Latino youth. Improved communication
between patients and providers is considered to be one of the greatest potentials for promoting quality health among Latinos (Elder, Ayala, Parra-Medina, & Talavera, 2009, p. 238). Research shows that the language barrier not only prevents this group from seeking and obtaining quality healthcare, it also increases their risk for adverse medical events (Brotanek et al., 2008). It is unrealistic to expect that every provider caring for rural Latino youth be fluent in Spanish. However, it should be the expectation that there are sufficient resources in the practices and communities of these clinicians to provide routine and quality healthcare for rural Latino youth. One such resource is on-site medically trained interpreters (Brotanek et al., 2008). Another is promotores, or lay health advisors, who can be used to provide ongoing health education and support for the members of their rural Latino community in addition to helping bridge the gap between health delivery and patient compliance and understanding (Elder et al., 2009).

Telemedicine, mailed information, and information disseminated through Telenovela storylines have also proven to be effective forms of communication for health education that can be used with rural Latinos because they are convenient, cheap, relevant and easily offered in Spanish (Elder et al., 2009). Clinicians of rural Latino youth must also consider more convenient office hours and location, and better marketing through Spanish radio, newspaper and television ads as methods to decrease the health disparities seen in this population (Elder et al., 2009).

Providers should implement certain strategies into their practice that convey cultural sensitivity and competence to the rural Latino population (Wilson, 2009). Krueter et al. identified five strategies that can be used by providers to enhance cultural appropriateness: peripheral, evidential, linguistic, constituent-involving and sociocultural strategies (as cited in Wilson, 2009, p. 232). When considering childhood obesity prevention and management in rural Latinos, one peripheral strategy that could be utilized is to give health education materials regarding diet and
exercise the appearance of cultural sensitivity by including images of rural Latino youth engaging in culturally appropriate interventions for obesity (Wilson, 2009). An evidential strategy that could be used for the prevention and management of childhood obesity in rural Latinos is to make materials relevant by including statistics regarding the prevalence of obesity and obesity-related behaviors in this ethnic group (Wilson, 2009). Creating materials that are available in Spanish can also enhance the prevention and management of childhood obesity in rural Latinos (Wilson, 2009). Additionally, these materials must be of an appropriate reading level, as “more than half of the minority population in the U.S. is functionally or marginally illiterate” (Elder et al., 2009, p. 240). Using the personal experiences of members of the rural Latino community, a constituent-involving strategy, and integrating certain cultural values of rural Latinos, a sociocultural strategy, can be effective in improving the understanding of and compliance with interventions to combat childhood obesity in this group (Wilson, 2009).

The Impact of Acculturation on Childhood Obesity and its Measurement

As stated in the background section, the level of acculturation of the individual is strongly associated with obesity in Latino children (Buscemi et al., 2011). In Latino youth, acculturation is believed to mediate certain obesity-related behaviors, such as dietary choices and physical activity (Allen et al., 2007). Evidence demonstrates that acculturative stress, rather than the process of acculturation itself, has the greatest impact on the physical and emotional health of Latinos (Caplan, 2007). Additionally, acculturation stress is linked to disruptions in allostasis and chronic stress, which can contribute to and increase the risk of childhood obesity (D’Alonzo, Johnson, & Fanfan, 2012). Though acculturation is difficult to accurately measure, it is important for primary care providers to consider and attempt to assess the level of acculturation of each
patient in order to best meet the health care needs of the individual and their family regarding childhood obesity prevention and management (Liu et al., 2009).

Common measures of acculturation include, but are not limited to, how long the individual has been in the U.S., the language use, preference and ability of the individual, the culture of the individual and the location of their residence (Springer et al., 2010). Additionally, the generation status of the individual can also be used to assess acculturation, as it “has been associated with variations in health care access and utilization, education outcomes, and health-risk behaviors” (Allen et al., 2007, p. 337), particularly in Latino youth. For example, among Latinos, generational trends demonstrate worsening nutrition with regards to fruit, vegetable and soda consumption (Allen et al., 2007). Compared with Caucasians, first-generation Latino youth consumed more fruit and a similar amount of vegetables, but third-generation Latino youth consumed fewer fruits and vegetables (Allen et al., 2007). With regards to soda consumption, first- and second-generation Latino youth had approximately the same amount of soda consumption as Caucasians, but third-generation Latino youth had a soda intake approximately 25% more than Caucasians (Allen et al., 2007). The more acculturated a Latino child is, the more likely they are to reject more healthful, traditional Latino dishes (Kumanyika & Grier, 2006). Latino school-aged children, particularly those who are bilingual, frequently reject the lower-calorie traditional foods prepared at home in favor of the high-calorie substances offered at school or advertised on television (Caprio et al., 2008). Additionally, in rural areas, Latinos often abandon their traditional diets, which are rich in vegetables and instead prefer processed foods (Caprio et al., 2008).

There are several evidenced-based scales that can be used in primary care to measure a child’s level of acculturation. The Acculturation, Habits and Interests Multicultural Scale for
Adolescents (AHIMSA) has been proven to be a valid measure of acculturation in adolescents (Unger et al., 2002). The AHIMSA is comprised of eight brief and age appropriate questions that assess multiple components of acculturation (Unger et al., 2002). The questions must be answered with one of four response items: the U.S., the country the adolescent’s family is from, both and neither (Unger et al., 2002). The AHIMSA scale generates four scores based on the responses, and include an assimilation score (based on the number of “U.S.” answers), a separation score (based on the number of “the country my family is from” answers), an integration score (based on the number of “both” answers) and a marginalization score (based on the number of “neither” answers) (Unger et al., 2002). Another acculturation scale that can be used in Latino youth is the Short Acculturation Scale for Hispanic Youth (SASH-Y) (Barona & Miller, 1994). The SASH-Y consists of 12 self-rated items that form a composite score from 12 to 60 where higher scores indicate the individual is more acculturated to the U.S. (Barona & Miller, 1994). In addition, the Acculturative Stress Inventory for Children (ASIC) has also been proven to be valid and accurate in assessing the amount of acculturative stress in Latino children (Suarez-Morales, Dillon, & Szapocznik, 2007).

**Cultural Implications for the Health Management of Rural Latino Youth**

*Respeto*, or respect, “refers to the importance of teaching younger generations their obligations for proper levels of courtesy and decorum required in various social contexts with people of a particular social status, sex or age” (Elder et al., 2009, p. 242). *Respeto* for health providers can prevent rural Latinos, particularly youth, from asking questions, which can lead to poor health outcomes (Sherrill & Mayo, 2009). The cultural concept of *simpatia*, “a deferent compliance with others’ wishes in order to maintain interpersonal relationships” (Caballero, 2011, p. S12), often results in the Latino population overeating at social occasions in order to be
polite and maintain interpersonal relationships. Fatalismo is “the belief that individuals cannot alter their disease processes because it is part of their destiny” (Caballero, 2011, p. S12). Also, Latinos may view illness as unavoidable or as a punishment from God (Elder et al., 2009). Thus, Latinos may be less likely to adhere to treatment regimens (Caballero, 2011). The cultural concept of machismo refers to the expectation that men should engage in behavior that is considered masculine, which often results in the beliefs among Latinos that physical robustness indicates physical health and that visiting a clinician is a sign of weakness (Caballero, 2011).

Another important cultural concept among Latinos is familismo, the “feelings of loyalty, reciprocity, and solidarity towards members of the family, as well as the notion of the family as an extension of self” (Elder et al., 2009, p. 242). Many Latinos prioritize the needs of the family over individual needs, and therefore, may not be influenced by health messages that only appeal to personal autonomy (Elder et al., 2009). On the other hand, the concept of familismo may potentially be used to elicit behavioral modifications of parents to positively affect the health of the family as a whole, including their obese or overweight children. Culturally competent clinicians must understand the importance of the family as the unit of change within Latino populations (Lindsay, Sussner, Greaney, & Peterson, 2009).

**Familial and Multi-ecological Implications and Interventions for the Prevention, Assessment and Management of Childhood Obesity in Rural Latinos**

The prevention, assessment and management of childhood obesity in rural Latinos require interventions for all members of the family that must occur prenatally and continue throughout childhood and adolescence. Family clinicians have a unique and important opportunity to address obesity in rural Latino youth through interventions that affect the family unit and take place on multiple ecological levels.
Preventive interventions in the early years.

The prenatal period. Childhood obesity prevention should begin in the prenatal period and continue through the postnatal, infancy, childhood and adolescent periods (Adair, 2008). The in utero environment is widely considered to be a critical period for the development of obesity later in life (Kelly et al., 2008). Maternal factors that influence the in utero environment include overweight or obesity, gestational diabetes, smoking and depression (Taveras et al., 2010). The prevalence of maternal obesity and gestational diabetes is higher among Latinas than Caucasian women (Kumanyika, 2008). In many cases, maternal overweight or obesity and/or gestational diabetes result in an infant who is of an increased birth weight (Kelly et al., 2008). For Latinos, evidence shows that increased birth weight is significantly associated with increased BMI and total body fat by age 11 (Kelly et al., 2008). Maternal smoking during pregnancy is associated with a 50% increase in the risk of childhood obesity (Taveras et al., 2010). A study of approximately 1200 pregnant Latina women in Massachusetts found that 21% of these women smoked during pregnancy, and that higher levels of acculturation were associated with an increased likelihood that Latina women would smoke during pregnancy (Detjen, Nieto, Trentham-Dietz, Fleming, & Chasan-Taber, 2007). Maternal smoking during pregnancy restricts fetal growth and often results in low birth weight infants (Adair, 2008). To compensate for this low birth weight, there is often a period of rapid weight gain after birth that increases a child’s risk for obesity (Adair, 2008). Dennison et al. (2006) found the rate of infant weight gain during the first 6 months of life to be associated with a significantly increased risk of being overweight at the age of 4. Latino ethnicity was found to be an independent risk factor for childhood obesity, as Latino children were more than two times as likely as children of other ethnicities to be overweight at the age of 4, even after adjusting for breast-feeding history and infant weight gain.
CHILDHOOD OBESITY IN RURAL LATINOS

(Dennison et al., 2006). Latina women are also more likely to experience maternal depression during pregnancy than their Caucasian and African American counterparts, which increases their child’s risk of obesity (Taveras et al., 2010).

**Breastfeeding.** In the postnatal and infancy periods, providers should strongly encourage all Latina mothers to exclusively breastfeed their infants for at least the first 6 months, as breastfeeding has been found to be protective against childhood obesity (American Academy of Pediatrics [AAP], 2011; Metzger & McDade, 2009; U.S Department of Health and Human Services, 2010). Research indicates that the majority of Latinas do not consistently breastfeed or exclusively breastfeed their children for the first 6 months of life, which is believed to be largely due to their level of acculturation and individual health beliefs that are highly influenced by their culture (Houston et al., 2011). Increased acculturation of the Latina mother decreases the likelihood that she will breastfeed because she, like many Latinos, believes bottle-feeding to be the “American way” (Houston et al., 2011; Faraz, 2010). In order to increase breastfeeding rates among Latinas, the culturally competent provider must incorporate relevant cultural beliefs and traditions including “la cuarenta del bebe” (Faraz, 2010). The word “cuarentena” is the origin of this phrase, and in this context, it refers to “the 40 days after birth during which nothing except the mother’s breast should enter the baby’s mouth” (Faraz, 2010, p. 296). Other interventions providers can implement to improve breastfeeding rates among Latinas are personalized breastfeeding plans and personal bilingual advocates, such as those trained by the La Leche League (Faraz, 2010).

**Sleep.** Sleep is also an area that clinicians should address in the prevention of childhood obesity in rural Latinos (Hart, Kuhl, & Jelalian, 2012). Latino children are sleeping less than their Caucasian counterparts, especially between the ages of 6 months and 2 years (Taveras et al.,
Children who sleep less than 8 hours per night are at three times the risk of developing obesity, as well as infants aged 6 months to 24 months who sleep less than 12 hours per night (Paul et al., 2012; Spruijt-Metz, 2011). Chen et al. (2008) found a 58% higher risk for overweight or obesity in children with shorter sleep duration. When sleep is restricted in children, leptin levels decrease and ghrelin levels increase (Hart et al., 2012). Also, short sleep is believed to be associated with hyperglycemia, increased insulin resistance, and lower fasting C-peptide (Hart et al., 2012). Further, shorter sleep duration among school-aged children is associated with an increased consumption of energy-dense foods (Hart et al., 2012). The following are evidenced-based sleep duration guidelines per night for children: greater than or equal to 11 hours for children less than 5 years of age, greater than or equal to 10 hours for children aged 5 to 10 years, and greater than or equal to 9 hours for children greater than or equal to 10 years of age (Chen, Beydoun, & Wang, 2008). The risk for overweight and obesity in children is decreased by an average of 9% for every one-hour increase in sleep per night (Chen et al., 2008). Thus, these sleep recommendations should be shared with parents and children, and clinicians should assist families in increasing the number of hours of sleep per night for children through a variety of interventions, such as setting bed time rules and teaching parents of infants soothing strategies for non-hunger-related fussiness (Paul et al., 2012).

**Parenting behaviors.**

Understanding the parenting behaviors of rural Latinos is crucial to the proper prevention, assessment and management of childhood obesity in this population. Not only is parental involvement significantly related to adherence to treatment plans and weight loss in children, dietary and physical activity patterns between parents and their children are similar (Caprio et al., 2008; Heinberg et al., 2010; Vos & Welsh, 2010). Parental feeding behaviors, such
as restriction, food prompting, and pressuring, have been shown to exacerbate the relationship between uninhibited eating and increased BMI (Vos & Welsh, 2010, p. 282). Restrictive feeding practices are more common among Latinos than Caucasians or African Americans (Taveras et al., 2010). These feeding behaviors can result in “child preferences for foods that are high in calories and fat, food consumption in the absence of hunger, and being overweight” (Wisniewski, 2009, p. 78). Parents should be encouraged to allow their children to self-regulate their meals within reason (Barlow & the Expert Committee, 2007). Latino parents are also more likely to introduce solid foods to their infants before the recommended 4 to 6 months of age (AAP, 2011; Taveras et al., 2010). The early introduction of solids in infancy increases the energy density of the diet compared to a diet of formula or breast milk only, thus resulting in an increased risk of obesity without adequate energy expenditure (Adair, 2008). Evidence shows that Latina mothers have a preference for heavier babies, and therefore they may fail to see their child as overweight and the need to alter feeding practices or seek medical help (Houston et al., 2011; Olvera, Suminski, & Power, 2005). Additionally, within Latino families, extended family members, particularly grandmothers, have a strong influence over the way a mother feeds her baby (Houston et al., 2011).

**Interventions that both prevent and manage childhood obesity.**

Providers should consider and encourage the implementation of the following dietary and activity interventions in all children, particularly those with a BMI between the 85th and 95th percentile, and should absolutely implement these in children with a BMI greater than or equal to the 95th percentile (AAP, 2011). Dietary interventions and activity behavior modifications are recommended for both the prevention and management of childhood obesity in rural Latinos.
**Dietary interventions.** Interventions to modify dietary behaviors are a cornerstone of childhood obesity prevention and treatment (AAP, 2011; Barlow & the Expert Committee, 2007). The AAP (2011) created the evidenced-based Cardiovascular Health Integrated Lifestyle Diet (CHILD-1), which is comprised of recommendations for a pediatric heart healthy diet. The CHILD-1 focuses on and encourages pediatric diets that have limited total fat, saturated fat, mono- and polyunsaturated fat content, in addition to restricted trans fat and cholesterol content (AAP, 2011).

Children should consume between three to six servings of fruits and vegetables per day depending on their individual caloric needs (AAP, 2011). Detailed components of the CHILD-1 diet and the individual caloric needs of children can be found in the “Expert panel on integrated guidelines for cardiovascular health and risk reduction in children and adolescents: Summary report” by the AAP (2011). The number of cups of fruits and vegetables recommended per day is based on the age of the child and can be calculated through My Pyramid or the DASH eating plan outlined in the “Expert panel on integrated guidelines for cardiovascular health and risk reduction in children and adolescents: Summary report” (AAP, 2011; Barlow & the Expert Committee, 2007). Infants can discriminate between the flavors of different fruits and vegetables, and thus, in order to promote a child’s willingness to eat and preference for these foods, parents should be encouraged to provide repeated opportunities for their children to experience a variety of fruits and vegetables (Mennella, Nicklaus, Jagolino, & Yourshaw, 2008). In order to consume fruits and vegetables, they must be accessible (Gatto, Ventura, Cook, Gyllenhammer, & Davis, 2012). When children have first-hand experience with growing food, their understanding of food and its relationship to health is increased (Gatto et al., 2012). A gardening and nutrition program that also included exposure to farmer’s markets implemented
among Latino school aged children found that after 12 weeks, this population had an increased preference for fruits and vegetables (Gatto et al., 2012). Clinicians should promote gardening and the use of farmer’s markets in rural Latino families. Assisting rural Latino families in creating a coding system for foods can help educate children about nutrition, which can further promote reduced rates of childhood obesity in this population (Johnston et al., 2007).

Beginning at age 2, children should consume the recommended amount of whole grains each day and should make half of all of their grains whole (Whole Grains Council, 2012). Whole grain intake is believed to delay the digestion and absorption of starch, which leads to lower postprandial insulin and glucose responses (Choumenkovitch, 2012). Additionally, whole grains are a major source of energy and fiber (AAP, 2011). Choumenkovitch et al. (2012) found that children who consumed more than 1.5 servings of whole grains per day had lower BMIs and were less likely to be obese than children who consumed less than one serving of whole grains per day. After adjusting for age, gender, state of residence, race/ethnicity and physical activity, whole grain intake was inversely related to BMI among rural minority children in the 3rd to 6th grades (Choumenkovitch et al., 2012).

Sugar-sweetened beverages (e.g. fruit juice, soda, sports drinks) should be eliminated or at least minimized to no more than one serving per day in all children and adolescents (AAP, 2011; Barlow & the Expert Committee, 2007). In all children, water should be encouraged, and 100% fruit juice should be limited to less than or equal to four ounces per day (AAP, 2011). Beginning at age 2, the primary beverage for children should be fat-free unflavored milk (AAP, 2011). In a study of rural Latino children aged 2 to 5 years, over half of them consumed soda on a regular basis (Warner, Harley, Bradman, Vargas, & Eskenazi, 2006). Even modest reductions
in the amount of sugars consumed per day can have an impact in the preservation of beta-cell function in Latino youth (Davis et al., 2007).

Providers should encourage Latino families to eat out less, prepare more meals at home, and eat at the table as a family at least five or six times per week in order to further prevent and treat childhood obesity (Barlow & the Expert Committee, 2007). There are many traditional Latino foods that have decreased calorie density, including hot cereals, breads, tortillas, rice, fresh fruits, fresh vegetables, poultry, fish, eggs and beans (Johnston et al., 2007). Clinicians must be cognizant of the fact that though these foods have decreased caloric density, sometimes the preparation of these foods in traditional Latino manner (i.e. the addition of large quantities of sodium, sugar and fat products and frying) makes these foods undesirable from the standpoint of obesity prevention and treatment (Sealy, 2010). Thus, clinicians should provide local resources or culturally appropriate handouts that assist Latino families in becoming knowledgeable of the types of fruits and vegetables available in their community and how to prepare them (Morello, Madanat, Crespo, Lemus, & Elder, 2012). Additionally, youth should be strongly encouraged to eat a healthy breakfast every day (Barlow & the Expert Committee, 2007). In Latino youth, eating breakfast is strongly associated with lower visceral adiposity (Alexander et al., 2009).

Clinicians caring for rural Latino youth should be very conscious of the retail food environments of this population. In general, rural Latinos have decreased access to larger food stores, which typically provide a better availability, selection, quality and price of foods (Liese, Weis, Pluto, Smith, & Lawson, 2007). This decreased access is due in part to the general unavailability of larger food stores in rural areas, and also to the fact that even if a larger food store is present in a rural area, Latinos still have decreased access because they are less likely to have access to a car (Emond, Madanat, & Ayala, 2011). As a result, Latinos who live in rural
areas are more likely to shop in Latino grocery stores, known as *tiendas* (Emond et al., 2011). In these tiendas, the cost of skim milk and 1% milk is higher and the availability of lean meats is often limited (Emond et al., 2011). Thus, it is more difficult for rural Latino youth to meet the lean meat and low-fat milk recommendations set forth by the AAP (2011). Additionally, the availability of some canned and frozen alternatives to fresh produce has been shown to be lower in tiendas than in larger food stores (Emond et al., 2011). This is significant because families who cannot grocery shop frequently or have unreliable home refrigeration often prefer canned or frozen alternatives to fresh produce because fresh produce spoils more quickly (Sano & Richards, 2011).

*Interventions related to activity behaviors.* Modifications in activity behaviors are crucial in the prevention and treatment of childhood obesity (AAP, 2011; Barlow & the Expert Committee, 2007). All children at least 5 years of age should be physically active for greater than or equal to 1 hour per day, which can be divided into short bursts of activity throughout the day if necessary (AAP, 2011; Barlow & the Expert Committee, 2007). Unstructured play is recommended for young children, and older children (aged 6 years and up) should be encouraged to participate in activities they are interested in and enjoy (AAP, 2011; Barlow & the Expert Committee, 2007). Beginning at age 5, children should engage in moderate-to-vigorous activity daily (AAP, 2011). The activity chosen should be a combination of aerobic, muscle-strengthening and bone-strengthening activity (National Association for Sport and Physical Education [NASPE], 2012). Physical activity during school hours should also be supported and encouraged; however, recent evidence demonstrates that for Latino youth, particularly females, participation in physical activity outside of school is crucial in minimizing their risk of being overweight or obese (AAP, 2011; Rodriguez et al., 2011). Gender differences in physical activity
participation and health benefit from physical activity are present in all ethnic groups, but are very pronounced among Latinos, particularly in rural areas (Rodriguez et al., 2011). In rural areas, girls participate in less moderate-to-vigorous physical activity than boys, particularly after the transition to adolescence (Rodriguez et al., 2011). Additionally, the relationship between cardiorespiratory fitness and obesity in Latino youth is gender specific (Byrd-Williams et al., 2008).

Cardiorespiratory fitness is defined as “the ability of the cardiovascular and respiratory systems to supply oxygen to skeletal muscles during sustained physical activity” (Byrd-Williams et al., 2008, p. 1075). Cardiorespiratory fitness is important in the prevention and treatment of childhood obesity because it is believed to decrease blood pressure, total cholesterol and proinflammatory markers in youth (Byrd-Williams et al., 2008). Additionally, cardiorespiratory fitness has been shown to result in higher scores in math, reading and language among adolescents (Vos & Welsh, 2010). In overweight Latino boys, increased initial cardiorespiratory fitness results in less body fat gain, but this is not the case for their female counterparts (Byrd-Williams et al., 2008). This may be due in part to the fact that in general, girls have a greater fat mass, have a distinct pattern of fat distribution and are less sensitive to insulin than boys during infancy, childhood and adolescence (Wisniewski & Chernausek, 2009). Therefore, providers must keep in mind the age and gender of the child when formulating individualized plans to prevent and manage childhood obesity in rural Latinos (AAP, 2011).

Specific physical activity interventions that have proven to be effective in the prevention and management of childhood obesity in rural Latinos include strength training, aerobic exercise, community-based interventions with familial support, and organized activities involving local parks and fields (Davis et al., 2010; Olvera et al., 2010; Perry, Saelens, & Thompson, 2011;
Strength training has been found to significantly improve insulin sensitivity in Latinos, particularly boys (Davis et al., 2010; Stovitz et al., 2008). Combination regimens including aerobic exercise and strength training significantly reduce all adiposity measures in Latina girls (Davis et al., 2010).

Community-based interventions for Latino youth with familial support are also effective in changing lifestyle behaviors of this population (Olvera et al., 2010). One study of low-income mother-daughter Latina pairs found that after participation in a 12-week exercise, nutrition education and counseling intervention, the daughters’ aerobic capacity had significantly increased and they had a higher reduction in fatty foods and sugar-sweetened beverages in addition to an increased intake of fruits and vegetables compared to the control group (Olvera et al., 2010). Additionally, the mothers in this study reported they had learned more strategies to increase the fruit and vegetable consumption of their children than the mothers in the control group (Olvera et al., 2010).

For the majority of rural Latino youth, organized activities, particularly those involving the use of parks and fields, are a main source of physical activity (Perry et al., 2011). Even without organized activities, parks and fields are the preferred facilities for physical activity among rural Latino youth (Perry et al., 2011). However, in many rural areas, there is a lack of adequate fields and parks, or the parks and fields available are in poor condition and are unsafe (Kaiser & Baumann, 2010). Clinicians in rural areas need to be familiar with the community resources available to best serve the physical activity needs and preferences of the local Latino youth.

As screen time is strongly associated with childhood obesity, clinicians should instruct and encourage that daily screen time (e.g. television viewing and computer usage) be less than or
equal to 2 hours for all children greater than 2 years of age (AAP, 2011). For children less than 2 years of age, the goal should be no screen time (AAP, 2011). Children with increased screen time per day are more likely to snack more frequently, particularly on low-energy dense foods and sugar-sweetened beverages that are advertised on television or the Internet (Dennison et al., 2006). Additionally, children with televisions in their bedrooms are more likely to be overweight or obese (Dennison et al., 2006). Further, evidence shows that televisions in rooms where children sleep is one of the strongest predictors of overall sleep disturbance (Taveras, Hohman, Price, Gortmaker, & Sonneville, 2009). Providers should encourage a standard of no televisions in bedrooms among patients and their families (AAP, 2011).

Latino children have high rates of total media exposure (Kumanyika & Grier, 2006). Latino children are more likely to have a television in their bedroom; one study of minority children found that 74% of Latino children had a television in the room where they slept (Taveras et al., 2009). Many Latino parents report the use of bedroom televisions as distracters or babysitters for their children (Taveras et al., 2009). Thus, clinician efforts to remove televisions from the bedrooms of Latino youth must include parental counseling regarding the importance of this behavior change on the weight and overall health of their child, in addition to the provision of alternatives to keep children occupied while they are at home (e.g. reading or drawing) and rewarding good behavior (Taveras et al., 2009).

**Assessment of childhood obesity and status.**

The AAP (2011) and Barlow and the Expert Committee (2007) outline a universal assessment of childhood obesity risk for all children, including Latinos. Primary care providers should assess the obesity risk of all pediatric patients at every visit, including a thorough history, physical exam and laboratory testing, if indicated (Barlow & the Expert Committee, 2007).
Accurate assessment of a child’s obesity risk or status requires the provider to thoroughly investigate the dietary and physical activity patterns of the child, as these patterns are inextricably linked to weight status (Krebs et al., 2007). As comprehensive dietary and physical activity assessments are often difficult to implement due to time constraints, Barlow and the Expert Committee (2007) recommend that providers focus on the assessment of certain health behaviors that are most strongly associated with energy balance and are modifiable. These eating behaviors include the frequency of eating food prepared outside the home (e.g. fast food and food prepared in restaurants), the amount of sugar-sweetened beverages (including fruit juice) consumed each day, portion sizes, the frequency and quality of breakfast, the number of fruits and vegetables consumed each day, the number and quality of snacks consumed each day, and the daily consumption of foods that are of high energy density (Barlow & the Expert Committee, 2007). Traditional tools for determining energy intake, such as a 24-hour diet recall and a food diary, have proven to be impractical for use in the majority of clinical settings (Krebs et al., 2007). The WAVE measure, Rate Your Plate, and the Healthy Eating Index are feasible and reliable measures of a child’s energy intake that are easy to use in most clinical settings (Krebs et al., 2007). The physical activity patterns on which providers should focus their assessments include the time spent in moderate to vigorous physical activity each day, routine activities (e.g. walking to school) and sedentary activities (e.g. television watching) (Barlow & the Expert Committee, 2007). Providers should use their focused physical activity assessments to determine if the goals of 60 minutes of moderate-vigorous activity each day and less than 2 hours of screen time per day are being met (AAP, 2011).

Clinicians should also obtain a focused family history assessment if a child’s BMI is high (Krebs et al., 2007). Assessment of obesity, type 2 diabetes mellitus, hyperlipidemia and
hypertension in parents and grandparents is helpful in determining the risks of co-morbidities that may be associated with a child’s overweight or obesity status currently or in the future (AAP, 2011). Parental obesity is strongly related to the risk for overweight or obesity in children less than 6 years of age (Krebs et al., 2007).

A comprehensive physical exam for assessing the overweight or obese child includes anthropometry, vital signs, and a head to toe examination (Krebs et al., 2007). The BMI is the best screening tool of obesity risk, and therefore should be plotted and used to assess weight-for-height relationships at each well-child visit (AAP, 2011; Barlow & the Expert Committee, 2007). In children less than 2 years of age, growth curves do not include BMI percentiles (Barlow & the Expert Committee, 2007). Thus, providers should plot weight for height values and pay special attention to those values that are above the 95th percentile, in addition to parental weight status, as these are strong indicators of obesity risk (AAP, 2011; Barlow & the Expert Committee, 2007). Skin fold thickness and waist circumference measurements are not recommended in the assessment of childhood obesity (Barlow & the Expert Committee, 2007). Relevant vital signs include the pulse rate and blood pressure, and values should be interpreted with the use of evidenced-based reference tables (AAP, 2011). Annual blood pressure measurements should be obtained in all children beginning at age 3 (AAP, 2011). At age 18, youth should undergo a blood pressure measurement at each office visit (AAP, 2011). Several findings on physical examination can indicate overweight and obesity related problems, such as insulin resistance (Krebs et al., 2007). For example, “acanthosis nigricans may be a valid indicator of insulin resistance and decreased plasma HDL cholesterol levels in Mexican American adolescents” (Krebs et al., 2007, p. S216). Other physical exam findings of concern when considering childhood obesity include headaches with photophobia, keratosis pilaris, cardiac arrhythmias,
wheezing, organomegaly, early development of secondary sexual characteristics and premature pubarche, Blount disease and slipped capital femoral epiphyses (Krebs et al., 2007).

As a thorough history and physical examination cannot adequately screen and assess all conditions associated with overweight and obesity, serum laboratory testing is often indicated (Barlow & the Expert Committee, 2007). The most common dyslipidemic pattern in obese children is mildly elevated total cholesterol and LDL-cholesterol levels, a moderate to severe elevation in triglycerides and a low HDL-cholesterol level (AAP, 2011). For children from birth to age 2, lipid screening is not recommended (AAP, 2011). At ages 2 to 8 years, lipid screening is recommended for children with a significant family history of heart disease or cardiovascular events, parental history of total cholesterolemia or known dyslipidemia, or an individual history of diabetes, hypertension or a BMI greater than or equal to the 95th percentile (AAP, 2011). This group should have a fasting lipid panel drawn twice, after 2 weeks but within 3 months, and the average of those tests should be calculated (AAP, 2011). All children aged 9 to 11 years should undergo universal screening via two fasting lipid panels, with the results of those tests averaged (AAP, 2011). Children 12 to 16 years of age should have a fasting lipid panel measured twice if there is new knowledge of significant familial cardiovascular events, a parent with total cholesterolemia or known dyslipidemia, or individual history of diabetes, hypertension, a BMI greater than or equal to the 85th percentile, or cigarette smoking (AAP, 2011). Otherwise, routine screening in this age group is not recommended (AAP, 2011). At ages 17 to 21 years, youth should undergo universal screening for dyslipidemias once (AAP, 2011). Screening for type 2 diabetes mellitus should occur in children at 10 years of age, or at the onset of puberty if it comes first, who have a BMI greater than or equal to the 85th percentile plus any two of the following risk factors: a family history of type 2 diabetes mellitus, being of an ethnic minority population,
having signs of insulin resistance, or maternal history of diabetes or gestational diabetes during the child’s gestation (American Diabetes Association [ADA], 2013). Screening should occur in these children every 3 years via fasting serum glucose (ADA, 2013). Other specialty tests may be warranted to evaluate obesity related illnesses depending on the history and physical exam findings (Krebs et al., 2007). Additionally, a child or adolescent may need pharmacotherapeutic management of co-morbidities based on their lab results, history and physical exam, but management of these co-morbidities is beyond the scope of this paper.

Management of childhood obesity in rural Latinos.

The following overweight and obesity management interventions are recommended for all children, including Latinos. As described above in the prevention section, interventions that modify both dietary and activity behaviors are the first line treatment for overweight and obesity in all children (AAP, 2011; Barlow and the Expert Committee, 2007). The CHILD-1 diet outlined in the prevention discussion above and described in great detail in the “Expert panel on integrated guidelines for cardiovascular health and risk reduction in children and adolescents: Summary report” is the first stage in dietary modification for those children with clinically identified dyslipidemia, overweight or obesity, and high-risk medical conditions that may eventually require more intensive dietary interventions (AAP, 2011). This diet is also recommended for children with multiple risk factors for obesity and obesity-related co-morbidities, including a positive family history of cardiovascular disease, obesity, hypertension, diabetes, exposure to smoking at home and dyslipidemia (AAP, 2011). At all ages, primary care providers should identify children at high risk for obesity due to parental obesity, excessive BMI increases and changes in physical activity (AAP, 2011). If the child is identified as being obese
or at high risk for obesity, the following age-related management recommendations should be implemented (AAP, 2011).

**Management of children at an increased risk for being overweight or obese.** In infants from birth to 2 years, the CHILD-1 diet should be used to decrease cardiovascular risk related to overweight and obesity (AAP, 2011). Between ages 2 and 21 years, if a child is identified as obese or at high risk for obesity, the provider should develop a focused CHILD-1 diet and physical activity program for the child (AAP, 2011). This program should be sustained for at least 6 months in youths aged 12 to 21 years (AAP, 2011). If the BMI or BMI percentile remains stable, the current program should be continued and follow-up should occur in 6 months (AAP, 2011). If the BMI or BMI percentile is increasing despite the CHILD-1 diet and the activity interventions, the child should be referred to a registered dietician for energy-balanced counseling, physical activity modifications should be intensified, and follow-up should occur in 6 months for children aged 2 to 5 years, and in 3 months for children aged 6 to 21 years (AAP, 2011).

**Management of overweight children.**

**2 to 11 year olds.** If the child’s BMI is between the 85th and 95th percentile between the ages of 2 and 11 years, weight-gain prevention strategies, including physical activity and an energy-balanced diet, should be implemented with the parents as the focus for ensuring child compliance and behavioral change (AAP, 2011). If there is improvement in the child’s BMI percentile after 6 months, the current program should be continued, with another follow-up in 6 months (AAP, 2011). If the child’s BMI percentile is increasing after 6 months, the child and their parents should be referred to a registered dietician for nutrition counseling, physical activity
interventions should be intensified, and follow-up should occur in an additional 6 months or 3 months, for children aged 2 to 5 years and 6 to 11 years, respectively (AAP, 2011).

12 to 21 year olds. If a child’s BMI is between the 85th and 95th percentile between the ages of 12 to 21 years, intensive dietary and physical activity modifications, including the energy balanced CHILD-1 diet, must be implemented with the adolescent as the focus of change and sustained for 6 months (AAP, 2011). If the adolescent’s BMI percentile is improving, the current program should be continued and follow-up should occur in an additional 6 months (AAP, 2011). If the BMI is increasing, the adolescent should be referred to a registered dietician for a weight-controlled diet that emphasizes energy balance and physical activity interventions should intensified for 3 months (AAP, 2011).

Management of obese children with no co-morbidities. In all youth aged 2 to 21 years with a BMI greater than or equal to the 95th percentile, providers should specifically assess for co-morbidities, including hypertension, dyslipidemia and type 2 diabetes mellitus (AAP, 2011). In obese children aged 6 to 21 years with no co-morbidities, an office-based individualized weight-loss program should be developed (AAP, 2011). This program should be family-centered, with the parents as the focus for behavioral modification and change for children aged 6 to 11 years, and the adolescent as the focus for behavioral modification and change for youth aged 12 to 21 years (AAP, 2011). The program should include an energy-balanced diet plan, counseling provided by a registered dietician, interventions to increase moderate-to-vigorous physical activity and decreased sedentary activity for 6 months (AAP, 2011). If there is improvement in the BMI or BMI percentile of the child at 6 months, the current program should be continued (AAP, 2011). If there is no improvement in the BMI or BMI percentile of the child at 6 months, referral to a comprehensive multidisciplinary lifestyle weight-loss program or specialist is
warranted (AAP, 2011). In youth 12 to 21 years of age with no improvement in BMI or BMI percentile, the initiation of pharmacotherapy under the care of a specialist should also be considered (AAP, 2011).

*Management of obese children with co-morbidities or morbidly obese children.*

*6 to 11 year olds.* For children 6 to 11 years of age with a BMI greater than or equal to the 95th percentile with co-morbidities, a BMI greater than the 97th percentile, or a consistent increase in BMI despite the previous stages of management, referral to a comprehensive multidisciplinary weight-loss program for intensive management by a specialist for at least 6 months is warranted (AAP, 2011). Gradual weight loss not to exceed 1 pound per month is recommended (AAP, 2011). If there is improvement in the BMI percentile after 6 months, the current program should be continued (AAP, 2011). If the BMI percentile has not improved after 6 months, the primary care provider should consider referring the child to a different specialist or comprehensive multidisciplinary weight-loss program (AAP, 2011).

*12 to 21 year olds.* Children aged 12 to 21 years who have a BMI greater than or equal to the 95th percentile with co-morbidities or a BMI greater than 35, should be referred to a comprehensive lifestyle weight-loss management program for intensive therapy and monitoring by a specialist for 6 to 12 months (AAP, 2011). Gradual weight loss not to exceed 2 pounds per week is recommended (AAP, 2011). If there is improvement in the BMI or BMI percentile of the adolescent, the current program should be continued (AAP, 2011). If there is no BMI or BMI percentile improvement after 6 to 12 months, the initiation of pharmacotherapy by a specialist should be seriously considered (AAP, 2011). If the BMI of the adolescent is high above 35 with co-morbidities that are unresponsive to therapy for more than 1 year, the primary care provider should consider referral to a bariatric surgeon (AAP, 2011).
Evidence for management interventions used to combat childhood obesity.

The AAP (2011) found that combined weight-loss programs, including behavior-change counseling, dietary modifications that support negative energy balance and increased moderate-to-vigorous activity are effective in managing obesity in children greater than 6 years of age with a BMI of greater than or equal to the 95th percentile. There is no evidence on the effectiveness of weight loss programs in children less than 6 years of age (AAP, 2011). Combination interventions that include dietary and activity modifications are effective at improving the BMI and weight status of children and adolescents compared with diet-only interventions (AAP, 2011).

In children aged 6 to 12 years, family-based comprehensive weight-loss programs addressing both diet and activity are effective at initiating and sustaining significant weight loss for up to 10 years (AAP, 2011). For this age group, the most weight loss is achieved when the parents are the focus of the change or intervention (AAP, 2011). The best results of the effectiveness of comprehensive weight loss programs come from those in research settings (AAP, 2011). For adolescents, the most weight loss occurs in programs that focus on the adolescent as the agent for change (AAP, 2011). Thus, primary care providers in rural settings will likely achieve the best weight loss results for their obese Latino pediatric patients if they implement familial interventions for children and individualized interventions with peers for adolescents. Further, significant weight loss results will be achieved if primary care providers in rural areas implement interventions that address the modification of both diet and physical activity in their Latino pediatric patients.

Pharmacotherapy. The addition of medication under the supervision of a specialist can be safe and effective in achieving significant reductions in weight and BMI with follow-up from
4 to 12 months (AAP, 2011). Unfortunately, safety and efficacy data over long periods of time are not currently available (AAP, 2011).

When combined with intensive lifestyle and behavioral interventions, there is currently one medication that is labeled and available for weight loss in adolescents: orlistat (AAP, 2011; Caprio et al., 2008). Orlistat is currently approved for weight loss in adolescents greater than age 12 who have a BMI more than two units greater than the 95th percentile for age and gender (Han et al., 2010; Kanekar & Sharma, 2010). Orlistat contributes to weight loss by inhibiting the activity of intestinal lipases, which decreases dietary fat absorption by approximately one third (Bogarin & Chanoine, 2009). The use of orlistat in conjunction with behavioral modifications in adolescents results in significant reductions in weight and BMI (AAP, 2011; Bogarin & Chanoine, 2009). Additionally, orlistat has not been found to affect pubertal development or cause an increase in lean body mass during puberty when it is used in younger adolescents (Bogarin & Chanoine, 2009). However, adolescents are often unable to tolerate orlistat due to its frequent gastrointestinal side effects including fatty and oily stools, oily spotting, abdominal pain, fecal urgency, flatus with discharge and flatulence (AAP, 2011; Viner, Hsia, Tomsic, & Wong, 2010). A rare side effect of orlistat in adolescents is severe liver injury that can result in transplantation or even death (AAP, 2011). If orlistat is used, a multivitamin should be concomitantly prescribed, and providers should be aware that orlistat safety has only been evaluated in up to 1 year of use in adolescents (Bogarin & Chanoine, 2009). No information could be obtained regarding the use of orlistat in an exclusively Latino adolescent population. More research is needed regarding the effects of orlistat in this population.

The biguanide metformin, though only approved by the U.S. Food and Drug Administration (FDA) for type 2 diabetes mellitus in children aged 10 years and up, has also
been used off-label for weight loss in obese adolescents (AAP, 2011; Caprio et al., 2008). Though its weight loss effect is modest compared to orlistat, metformin exudes its main benefits in obesity-related consequences, such as hyperglycemia (Caprio et al., 2008). Currently, the AAP (2011) recommends the addition of metformin to a comprehensive lifestyle weight-loss program at a grade of “B” for severely obese or insulin resistant adolescents, as it has been shown to improve fasting insulin levels and significantly reduce weight and BMI in this population. A 48-week study of the effects of metformin XR with behavioral therapy in obese adolescents found that those using metformin XR compared with placebo had a statistically significant decrease in BMI (Wilson, 2010). Gastrointestinal side effects were minimal, and metformin was found to be safe and tolerated in the population studied (Wilson, 2010). When considering the effects of metformin in minority adolescents, one study found that monotherapy with metformin was not a promoter of weight loss in this population; however, all of the participants in this study who lost any weight were taking metformin (Love-Osbourne, Sheeder, & Zeitler, 2008). No evidence could be found regarding the use of metformin in an exclusively Latino adolescent population. However, if utilized in obese rural Latino youth, metformin may have the most benefit if combined with structured dietary and physical activity interventions.

Sibutramine, a serotonin-norepinephrine reuptake inhibitor, was approved for weight loss in conjunction with behavioral therapy in adolescents aged 16 and older until the FDA removed it from the market in October 2010 due to concerns for serious cardiovascular events in patients (Caprio et al., 2008; FDA, 2010).

Implementing a very restrictive diet for children or adolescents has not been widely studied (Barlow & the Expert Committee, 2007). Clinicians should consider the fact that Latinos who are severely obese are up to six times as likely to suffer from an eating disorder than Latinos
with a BMI between 18.5 and 30 before considering a very restrictive diet (Alegria et al., 2007). Additionally, clinicians in rural areas are less likely to have the local resources needed to monitor and supervise this type of diet in rural Latino youth (Lutfiyya et al., 2007).

There are few centers in the United States that offer surgical treatment, including gastric bypass and gastric banding, for severely obese youth, due in large part to “the perioperative risks, post-procedure nutritional risks, and the necessity of lifelong commitment to altered eating” (Barlow & the Expert Committee, 2007, p. S185). Thus, surgical treatments for childhood obesity are reserved for morbidly obese children who are emotionally mature and despite attempting weight loss for at least 6 months, still have a BMI of greater than or equal to 50kg/m\(^2\) or have a BMI greater than or equal to 40kg/m\(^2\) with a medical condition (Barlow & the Expert Committee, 2007; Han et al., 2010). Even if a child or adolescent meets the above requirements, extreme caution should still be used in choosing surgical treatment (Han et al., 2010). Surgical interventions in obese adolescents have been largely limited to Caucasians (Caprio et al., 2008). No evidence could be found on the use of surgical interventions for obesity in an exclusively Latino adolescent population.

Implementing comprehensive multidisciplinary weight-loss programs in the management of childhood obesity in rural Latinos may be difficult due to a lack of local resources and decreased insurance coverage among this population (Lutfiyya et al., 2007). Thus, the preventive interventions are the most important and effective in the prevention and treatment of childhood obesity in rural Latinos, and must be emphasized by all clinicians caring for this population at every visit.
The Role of the Clinician in the Community to Prevent Childhood Obesity

In rural communities, the role of the clinician in the prevention and treatment of childhood obesity must extend past the clinical setting. Curtis, Waters, & Brindis (2010) recognize that “the context of a rural community presents distinct challenges to the health of adolescents, particularly in an economy with limited private and public resources available to provide for adolescent health services” (p. 61). Additionally, the exponential growth of the Latino immigrant population in rural areas has increased stress on the already limited resources of these communities (Sano et al., 2011). Thus, rural providers must play a role in policy setting locally and nationally and in schools to help develop a healthy environment that prevents obesity in rural Latino youth (Caprio et al., 2008).

Currently, the majority of physical environments of ethnic minority neighborhoods and communities, particularly in rural areas, are less favorable for weight control (Kumanyika, 2008). For example, evidence demonstrates that even after controlling for individual and familial characteristics, there was a strong association between living in a community with or in very close proximity to a large food store and better dietary quality overall (Odoms-Young et al., 2012). Additionally, most rural communities lack a public transportation infrastructure, which further reduces access to resources that are more likely to prevent obesity, such as larger food stores and routine medical care (Sano & Richards, 2011). Clinicians should strongly appeal to local officials to consider a public transportation infrastructure or the provision of a larger food store in their rural communities. Clinicians should also advocate for the safety and availability of areas in rural communities where people could be active (Khan et al., 2009). For example, many rural Latinos have reported concerns about the lack of sidewalks or the number of sidewalks in poor condition in their communities (Kaiser & Baumann, 2010). Rural Latinos have also
supported the availability, promotion and expansion of community gardens (Kaiser & Baumann, 2010).

Policy changes in schools and the development of school-based programs that target childhood obesity prevention have great potential in curbing the childhood obesity epidemic since most children spend the majority of their time in school, particularly in rural communities (Lytle, 2012). According to the Shape of the Nation report, only six states require physical education at every grade level, from kindergarten through grade 12, and over half of states either allow students to substitute another activity for their physical education credit or do not specify the amount of physical education time required (NASPE, 2012). The 2011 Youth Risk Behavior Survey found that 69% of students did not attend a physical education class every day while in school (as cited in NASPE, 2012, p. 4).

Currently, there is no federal mandate requiring U.S. public schools to provide physical education to students, nor are there federal incentives for physical education provisions, despite the fact that childhood obesity rates are growing at an exponential rate (NASPE, 2012). The median physical education budgets for schools in the U.S. each school year are only $460 for elementary schools, $900 for middle schools and $1,370 for high schools (NASPE, 2012). Comparatively, the obesity epidemic is estimated to cost the U.S. health care system $344 billion by 2018 (NASPE, 2012). The NASPE recommends that all schools “provide 150 minutes per week of instructional physical education for elementary school children, and 225 minutes per week for middle and high school students throughout the school year” (NASPE, 2012, p. 4). Thus, it is important for clinicians in rural areas to be strong advocates in their respective communities for adequate physical education in schools. Rural clinicians should advocate for comprehensive physical activity programs in the local schools that include “health education,
elementary school recess, after-school physical activity clubs and intramurals, high school interscholastic athletics, walk/bike to school programs and staff wellness programs” (NASPE, 2012, p. 9).

School-based policy changes regarding healthy food and beverages offered are also a cornerstone to creating an obesity prevention environment (Foster et al., 2008). As the majority of children in rural communities are low-income, particularly if Latino, they partake in the free and reduced-price school meal program, which often provides breakfast and lunch (National Council of La Raza [NCLR], 2010). Latino children comprise approximately one-third of all children receiving free or reduced-priced lunches through the National School Lunch Program (NCLR, 2010). Thus, rural clinicians should advocate for healthy food and beverages to be served in the schools (Khan et al., 2009).

For example, providers should appeal to state and local lawmakers for a ban of sugar-sweetened beverages in schools, as evidence strongly demonstrates that when sugar-sweetened beverages are limited in school, children consume fewer calories from sugar-sweetened beverages at school (Briefel, Crepinsek, Cabili, Wilson, & Gleason, 2009). Further, many states lack legislation that prohibits the sale of sugar-sweetened beverages or high calorie snack foods. Thus, the majority of schools in the U.S. permit the marketing of sugar-sweetened beverages and high calorie snack foods in schools in the form of sponsored athletic fields and educational activities, agreements that place brand names on items such as clothing, fundraising programs and direct advertising through news programs that air in schools during the day (Molnar, Garcia, Boninger, & Merrill, 2008). Latinos, in particular, have high rates of media exposure, and thus are exposed to a large amount of food and beverage advertising (Kumanyika & Grier, 2006). Therefore, policies that improve marketing and advertising, particularly in schools, are likely to
be extremely beneficial for low-income rural Latino children (Kumanyiak & Grier, 2006). Rural clinicians should educate local and state lawmakers on the harmful effects of strong corporate influence via the marketing of sugar-sweetened beverages and high calorie snack food in school. Notwithstanding the increased availability of these obesogenic products in schools with corporate marketing, school children are also likely to interpret the corporate marketing as a school endorsement of the products (Molnar et al., 2008). There is also a great need for the availability of fresh produce in schools (Khan et al., 2009). Rural communities have a unique opportunity to develop a type of farm-to-school program that could incorporate fresh produce into school meals. In order to create a school environment that is conducive to preventing childhood obesity, rural clinicians must educate the public and advocate for local and state policies supporting this environment.

**Conclusion**

In order to curb the childhood obesity epidemic, which is more pronounced in rural Latinos, clinicians caring for this population must aggressively assess for and work to prevent overweight and obesity in every child at every visit. Rural clinicians must recognize that an approach to childhood obesity in their Latino pediatric patients requires intervention at multiple ecological levels, in addition to pre-conception interventions that must be implemented in the whole family and continued throughout childhood and adolescence, as family members have a great influence on many behaviors that affect a child’s weight and overall health (Gentile et al., 2009). Providers should use evidenced-based interventions in addition to the cultural implications discussed in this paper to appropriately prevent and manage childhood obesity in rural Latino youth. Additionally, clinicians must be community educators and staunch advocates
for local and state policies that create and promote an anti-obesity environment, particularly in schools.
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