

Salud con Sabor Latino para los Niños: A Feasibility Study

by

Carol Stevens

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Graduate Supervisory Committee:

Bonnie Gance-Cleveland, Chair
Gabriel Shaibi
Kimberly Arcoleo
Pauline Komnenich

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ABSTRACT

Obesity in Hispanic youth has reached alarmingly high levels, increasing the risk of type 2 diabetes, hyperlipidemia, hypertension, and cardiovascular disease. In Mexican American children ages 6-11 years, 41.7% are overweight and obese, 24.7% are obese and 19.6% have a Body Mass Index (BMI) greater than the 97th percentile. While personal, behavioral, and environmental factors contribute to these high rates, emerging literature suggests acculturation, self-efficacy and social support are key influences.

The one-group, pre- and post-test, quasi-experimental design used a community-based participatory research (CBPR) method to test the feasibility, acceptability, and preliminary efficacy of the 8-week intervention. Social Cognitive Theory (SCT) was used to guide the design. Measurements included an analysis of recruitment, retention, participant satisfaction, observation of intervention sessions, paired t-tests, effect sizes, and bivariate correlations between study variables (acculturation, nutrition and physical activity [PA] knowledge, attitude and behaviors, perceived confidence and social support) and outcome variables (BMI z-score, waist circumference and BP percentile)

Findings showed the SSLN program was feasible and acceptable. Participants ($n = 16$) reported that the curriculum was fun and they learned about nutrition and PA. The retention rate was 94%. The preliminary effects on adolescent nutrition and PA behaviors showed mixed results with small-to-

medium effect sizes for nutrition knowledge and attitude, PA and sedentary behavior. Correlation analysis among acculturation and study variables was not significant. Positive associations were found between perceived confidence in eating and nutrition attitude ($r = .61, p < .05$) and nutrition behavior ($r = .62, p < .05$), perceived confidence in exercise and nutrition behavior ($r = .66, p < .05$), social support from family for exercise and PA behavior ($r = .67, p < .01$) and social support from friends for exercise and PA behavior ($r = .56, p < .05$). These findings suggest a culturally specific healthy eating and activity program for adolescents was feasible and acceptable and warrants further investigation, since it may fill a gap in existing obesity programs designed for Hispanic youth. The positive correlations suggest further testing of the theoretical model.

DEDICATION

This paper is dedicated to my family, my mom, Mary G. Stevens, my daughter, Melissa M. Hutchinson and my siblings, Barbara Bilhorn, Nancy Applen and David Stevens, all who have been through this journey with me and have shared their support, patience and love. They have been wonderful troopers in putting up with my late nights, my constant excuses for not going here or there because I have to study and for my incessant devotion and constant attachment to my computer! I also would like to make a special dedication to my father, Richard E. Stevens who passed away during my doctoral studies, and who always wanted me to some day, be a doctor, and here I am! Thanks Dad for believing in me.

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Chapter 1

INTRODUCTION

Problem Description

Epidemiological research conducted in the United States demonstrates the alarming cost of obesity to the health and economic stability of the country (Finkelstein & Trogdon, 2008; Wang, Beydoun, Liang, Caballero, & Kumanyika, 2008). Treatment of obesity-related diseases alone has been estimated to cost as much as \$147 billion per year (Finkelstein & Strombotne, 2010). The White House Task Force on Childhood Obesity resulting in the national campaign “Let’s Move” has called attention to the critical issue of curbing obesity in children (Miller, 2010). In the United States, childhood obesity rates have become epidemic (Flynn et al., 2006; Chatterjee, Blakely, & Barton, 2005; Wang et al., 2006). Among minority children, Hispanic children and adolescents have the highest percentages of overweight (e.g., BMI [body mass index] \geq 85th percentile and $<$ 95th percentile) and obesity (e.g., BMI \geq 95th percentile). “Hispanics”, a term used interchangeably with “Latinos”, describes a diverse multiracial and multinational group of people who consider themselves of Spanish origin (U.S. Census Bureau, 2010b). Mexican-Americans, the largest subgroup of Hispanics, are the focus of this study as this group refers to those with origin from Mexico that have populated the United States southwest where the present study is being conducted (Marsiglia & Kulis, 2009). For the purposes of this study, all ethnicity

terms (e.g., Hispanic, Latino, Mexican-American, etc.) are reported as described by the original author cited.

Data from the most recent National Health and Nutrition Examinations Survey (NHANES), showed that among Mexican-American (MA) children ages 6-11 years, 42.8% were overweight and obese, 23.8% were obese and 17.6% were found to have the highest level BMI (e.g., BMI \geq 97th percentile) (Ogden, Carroll, Curtin, Lamb, & Flegal, 2010). Currently, there is no recommended label for individuals who have a BMI at or above the 97th percentile, yet over the last decade, while rates of overweight and obesity have appeared to stabilize somewhat, rates of obesity at this level are significantly increasing, particularly in boys, ages 6-19 years, a statistic that is very disturbing (Ogden et al., 2010). Among rates for MA children ages 12-19 years, 38.9% were overweight and obese, 21.1% were obese and 15% were at the highest level BMI percentile, which are slightly lower rates than those of MA children ages 6-11 years (Ogden et al., 2010).

High rates of obesity put increasing numbers of Hispanic children at risk for obesity-related diseases including type 2 diabetes, hyperlipidemia, hypertension, osteoarthritis, cardiovascular disease (CVD), and certain types of cancer (Johnson et al., 2007; Koplan, Liverman, & Kraak, 2005; Summerbell, et al., 2005; Rudolf et al., 2006; Crawford, Story, Wang, Ritchie, & Sabry, 2001; McCarthy et al., 2008). Obesity-related chronic diseases previously found in

adults such as hypertension and osteoarthritis are now appearing in minority children (Frenn et al., 2003; Kumanyika & Grier, 2006; McCarthy et al., 2008). In a population-based sample of 5- to 17-year olds, 70% of obese children had at least one CVD risk factor (e.g., high cholesterol, elevated blood pressure (BP), while 39% of obese children had two or more CVD risk factors (Freedman, Dietz, Srinivasan, & Berenson, 1999). Less common health consequences associated with weight increase include asthma, hepatic stenosis and sleep apnea (Berry, 2008). Compared to whites, underprivileged Hispanics have disproportionately higher rates of type 2 diabetes, obesity, cancer and CVD (Reininger et al., 2009; Cowie et al., 2006; Ogden et al., 2006). Left ventricular hypertrophy is more prevalent in Hispanic and African American obese children than white children (Kumanyika & Grier, 2006).

During early adolescence, (defined as children ages 10 to 14 years old, who are typically in middle school grades 6th, 7th and 8th, [Berk, 2003]), children are especially susceptible to intervention, as health habits such as eating healthy foods and engaging in adequate physical activity (PA) are not as established as in older adolescents (Ward-Begnoche, Gance-Cleveland, Harris, & Dean, 2008). Health attitudes and beliefs that elicit health behaviors in adolescents are typically influenced by the cultural environment. Many Hispanics living in the southwestern U.S. have experienced varying degrees of acculturation, defined as the exposure and adaptation to varying cultural characteristics of the dominant

society (Lara, Gamboa, Kahramanian, Morales, & Bautista, 2005). Emerging research informs us that acculturation is particularly relevant to the growing trends of unhealthy eating and activity behaviors in Hispanics (Bowie, Juon, Cho, & Rodriguez, 2007; Unger et al., 2004; Gordon-Larsen, Harris, Ward, & Popkin, 2003; Gustafson & Rhodes, 2006).

According to research reports conducted in 2001, some children and adolescents are at increased risk of becoming overweight adults (Dietz & Gortmaker, 2001). Although the highest risk for childhood obesity continuing into adulthood occurs among adolescents who are already overweight, it is not clear if this translates to Hispanic youth (Whitaker, Wright, Pepe, Seidel, & Dietz, 1997). Rapid maturation in both boys and girls also appears to influence the severity of obesity experienced in adulthood (Van Lenthe, Kemper, & Van Mechelen, 1996).

Factors contributing to the obesity epidemic are complex and not well understood. Research suggests that an imbalance between dietary intake and PA, and physical, behavioral, and environmental factors are major contributors (Flegal, Ogden, & Carroll, 2004; Smedley, 2006). With the prevalence of obesity in Hispanic adolescents, research on specific intervention programs that address the unique factors of the Hispanic culture are needed. Healthy eating and exercise programs targeting high risk groups may be effective in reducing high rates of obesity because there is greater opportunity to show a prevention as well as an intervention effect (Stice, Shaw, & Marti, 2006). Culturally targeted obesity

interventions have been found to be effective in improving eating and activity behaviors in adolescents of ethnic minorities, yet few studies have been conducted in Hispanic adolescents (Stevens, 2010; Crawford et al., 2001). Because Hispanics are the fastest growing population in the United States with rates increasing to 30% of the nation's population (U.S. Census Bureau, 2010a), efforts directed at supporting a healthier Hispanic population are an urgent priority.

Purpose

The purpose of this study was to test the feasibility of a theory-based, healthy eating, activity and behavioral change skills intervention for Hispanic adolescents entitled *Salud con Sabor Latino para los Niños* (SSLN; [*Health with a Latin Twist for Children*]). The 8-week intervention is a culturally appropriate program adapted from a theory-based behavioral skills intervention that has been efficacious in improving nutrition status and increasing activity in overweight youth at risk for type 2 diabetes (Grey et al., 2004). The SSLN intervention strengthens the theory-based behavioral skills intervention by making it culturally sensitive to Hispanic youth, and testing the intervention in a new setting and population. A community-based participatory research (CBPR) approach was used to culturally adapt and conduct a feasibility study on the intervention.

Specific Aims

Specific aim 1. Evaluate the feasibility and acceptability of the SSLN program in Hispanic adolescents in a Hispanic community setting.

Specific aim 2. Estimate the preliminary efficacy of the SSLN program on (a) anthropometric and physiological measures (e.g., BMI z-score, waist circumference and BP percentile, (b) nutrition knowledge, attitude and behavior, (c) PA behavior, (d) peer and parent social support and, (e) self-efficacy in Hispanic adolescents.

Specific aim 3. Explore the relationships between the independent variables (nutrition and PA information and healthy lifestyle skills), the proposed mediators (self-efficacy, peer and parent social support), the proposed moderator (acculturation) and the dependent variables (BMI percentile, waist circumference, BP percentile, nutrition knowledge, attitude and behavior, PA behavior) for future model development.

Chapter 2

BACKGROUND

Theoretical Framework

The theoretical framework for this study was social cognitive theory (SCT), a widely tested framework for obesity prevention interventions in early adolescence (Baranowski, Cullen, Nicklas, Thompson & Baranowski, 2003; Cole, Waldrop, D'Auria, & Garner, 2006; Davis et al., 1999; Gittelsohn et al., 1999). Since the literature review for this study is presented according to the constructs of SCT, the theoretical framework is discussed first, with an extensive review of the literature presented later in the Chapter.

SCT is a multifaceted causal theory in which self-efficacy beliefs operate with goals, outcome expectations, and perceived obstacles, including social and environmental impediments to the regulation of human motivation, behavior, and well-being (Bandura, 2004). SCT explains the complex interactions related to the causes of obesity and reinforces the need to address personal, behavioral, and environmental influences in eating and activity behaviors of youth (Bandura, 1986; Baranowski et al., 2003).

A substantial amount of literature exists on the use of SCT as an effective model for exploring influential constructs of health behavior (Rinderknecht & Smith, 2004). Adolescents typically face many physical, social, and cognitive changes that likely undermine the establishment of healthy eating and activity behavior patterns (Neumark-Sztainer, Story, Hannan & Rex, 2003). In a pilot study in 4th and 5th grade children, Evans and colleagues (2006) evaluated a student-designed media campaign on nutrition with attention to media literacy on healthy eating. Post intervention tests showed a statistically significant increase in motivation scores ($p = .01$) and improvement in self-efficacy although this was not statistically significant (Evans et al., 2006). The children had control over their decisions in creating and developing the media campaign which increased their motivation and interest. Social problem solving can assist adolescents faced with difficult decisions. Their ability to cope reinforces competence and mastery. When an adolescent can problem solve effectively, self-efficacy can be enhanced

(Bandura, 1986) and conversely, ineffective problem solving leads to risky related behaviors (Bandura, 1989). Therefore, it is important for adolescents to be provided opportunities where they can succeed in decision making and problem solving.

Personal efficacy serves as a regulatory function in all major transitions of life, and is especially important during adolescence (Caprara et al., 1998). During early adolescence, children who have greater self-regulatory efficacy are better equipped to cope with the transitional stressors of adolescence. As a result they are better prepared to pursue other activities that build competencies, to effectively voice opinions and aspirations with parents and adults, and to resist peer pressures to engage in risky or antisocial behavior (Bandura, 1997a). Because risky health behaviors may have potential lifelong consequences (Caprara et al., 1998), activities that build self- efficacy can help adolescents make wise decisions related to eating and exercise. Personal concepts of SCT for understanding health behaviors in adolescents include skills (the ability to perform the behavior), self-efficacy (the confidence that one can perform a behavior) and outcome expectancies (the outcomes likely to occur from performing the behavior; Baranowski et al., 2003). Contributing to these concepts are key environmental variables such as modeling (learning how to do a behavior by watching someone do it) and support (the means in which a behavior is encouraged or discouraged). SCT constructs then, provide the best framework for

understanding the dynamic, reciprocal interplay of personal, behavioral, and environmental influences on health behavior.

Review of the Literature

Obesity prevalence in Hispanic youth.

Hispanics account for one-half of the nation's population growth rate and are projected to grow from 46.7 million in 2010 to 132.8 million by 2050, an increase of 178% (U.S. Census Bureau (2010a). The number of Hispanic children has increased faster than that of any ethnic group in the nation (U.S. Census Bureau, 2010a). In Arizona, 25.3% (1.3 million) of the population are Hispanic with 26.3% of Hispanics in Arizona under the age 18 years. These population trends and associated obesity rates further illustrate a growing public health concern (Ogden et al., 2010; Lobstein, Baur, & Uauy, 2004; U.S. Census Bureau, 2010a; Wang et al., 2008). While school-based obesity intervention programs have been associated with improvements in diet and physical activity, there is little evidence that the public health significance has changed (Gittelsohn & Kumar, 2007). Cinar & colleagues (2009) refer to obesity as "a global pandemic" because of its' global prevalence and severe consequences (Cinar & Murtomaa, 2009, p. 357). Global obesity in children and adolescents has been reported by other authors as well (Péneau et al., 2009; World Health Organization [WHO], 2000). In the United States, 38% of Latino children and adolescents (aged 2 to 19 years) are overweight and obese, and 20.9% (aged 2 to 19 years) are considered

obese (Ogden et al., 2010). Unfortunately, rates of overweight and obese (e.g., BMI \geq 85%) significantly increase for second-generation and third-generation Latino immigrants, where rates are 32.1% (second-generation), and 31.7% (third generation) compared to 24.5% (first generation; Popkin & Udry, 1998). These intergenerational differences suggest that as the Hispanic population increases, one aspect of the needed research should focus on the effect of acculturation on health and its ultimate impact on those at risk for overweight and obesity.

Etiology of Obesity

Personal factors. As theorized in the SCT, personal factors include knowledge acquisition of health behaviors, health risks and beliefs of personal self-efficacy including cognitions about self-regulation and self-reflection, emotional states and reactions, and biological events.

Energy Imbalance. Most research supports the etiology of obesity as an imbalance of energy that occurs when energy intake exceeds energy expenditure (Stafford et al., 2007; Catenacci, Hill, & Wyatt, 2009). Actions that have the greatest influence on energy balance are eating and PA (IOM, 2006). There is ample evidence that the trend for total caloric intake is increasing among all race, age, gender and socioeconomic groups (Popkin, Duffey, & Gordon-Larsen, 2005). Evidence also suggests trends in the declining rate of energy expenditure through lack of physical activity and/or increased sedentary activity (Lowe, 2003; United States Department of Health & Human Services [USDHHS], 2009). Resnicow et

al. (2006) found energy imbalance in adolescents is highly variable, with individual differences in attitudes and beliefs about health playing major roles.

Knowledge. Knowledge is a logical prerequisite to intentional performance of health related behaviors, yet the relationship of knowledge to healthy eating and activity in adolescents is not well understood (Baranowski, Cullen, Nicklas, Thompson, & Baranowski, 2003). The acquisition of knowledge is different than the competencies to change and sustain behavior change. Children acquire knowledge through observational learning, inferences from exploratory experiences, and information conveyed by verbal instruction, where adolescents draw on their knowledge, and cognitive and behavioral skills to make decisions about healthy eating and activity (Bandura, 1989). In a study of 532 middle school children, nutritional knowledge was correlated with healthy food choices in both girls and boys in the 7th and 8th grade but not in 6th graders (Pirouznia, 2001). Zhao et al. (2001) found that students who received nutritional knowledge changed unhealthy living attitudes and dietary habits. Turconi et al. (2008) studied eating habits, behaviors, and nutritional knowledge in adolescents and found that having knowledge of healthy behaviors does not translate into healthy behaviors because of the adolescent's general lack of concern and persistent encounters with barriers.

Nutrition. Energy intake is directly related to food consumption. In Hispanics, the adoption of specific dietary behaviors during acculturation has

been shown to add to unhealthy food consumption (Benavides-Vaello, 2005). Diets among low-income and ethnic minority children and adolescents are becoming unhealthier as calories more frequently come from energy-dense, nutrient-poor foods (Popkin et al., 2005). As Hispanics whose traditional healthy diet is high in legumes, fresh vegetables, rice, and beans (Chatterjee et al., 2005; Fitzgibbon, Stolley, Dyer, VanHorn, & Kaufer Christoffel, 2002) become more acculturated, unhealthy dietary behaviors are adopted from the westernized culture at increasing rates (Satia-Abouta, Patterson, Neuhouser, & Elder, 2002). The phenomenon known as “dietary acculturation” is described as a multi-dimensional, dynamic, and complex phenomenon that varies depending on personal, cultural, and environmental attributes of the individual (Satia-Abouta et al., 2002, p.1105). Dietary acculturation occurs in Hispanic cultures as new ways to use traditional foods and/or consume new foods becomes more common. For example, many Hispanics replace corn tortillas with processed flour tortillas or flavor traditional undressed chopped lettuce with high calorie, high fat salad dressings (Satia-Abouta et al., 2002).

Hispanic diets when combined with fast foods and limited time to prepare traditional meals, quickly lack their nutritional value, and food consumption becomes driven more by access, availability, and affordability (Frenn et al., 2005; Gordon-Larsen, Harris, Ward, & Popkin, 2003; Hampl & Sass, 2001). Since food is inextricably linked to culture, variables that impact culture will also impact

food habits (Benavides-Vaello, 2005). In a review of cultural influences on diet, Satia-Abouta et al. (2002) found that fat consumption, source of calories, and food group choices were the major influencing factors. Xie and colleagues (2003) investigated ethnic differences in dietary intake behaviors in children and adolescents and found that Hispanic children and adolescents have higher mean cholesterol intakes than African American and Non-Hispanic Caucasians. In another study, first generation Latinos had higher fruit and vegetable consumption and lower soda consumption than whites, yet fruit and vegetable consumption decreased and soda consumption increased with subsequent generations, so that by the third generation, Latino adolescent's nutrition was poorer than whites (Allen et al., 2007). The role of gender was found to influence intention to eat healthfully in a study of 265 Latino adolescents (Diaz, Marshak, Montgomery, Rea, & Backman, 2009). Findings from the Diaz et al. (2009) study showed that female adolescents had stronger intention, a more positive attitude to eat healthier and had stronger maternal support to eat healthier than male adolescents. In another study, highly acculturated Hispanics ate fewer servings of fruit and vegetables per day when compared with those not highly acculturated ($p < .05$; Neuhouser, Thompson, Coronado, & Solomon, 2004). In one study, high levels of poverty and high concentrations of ethnic minorities were factors that contributed to diets with low nutritional quality, high caloric density, and high rates of obesity overall (Ford & Dzewaltowski, 2008).

Parental influence on adolescent dietary intake has also been shown to adversely affect eating behaviors. According to one report, MA adults offered children the same kinds of unhealthy foods that they liked, which accounted for the fact that the favorite vegetable listed by the children was the french fry (Clark, 2006). Other components of the American cultural environment that have influenced the nutritional dietary consumption in both the Hispanic and general population are America's media culture and its heavy advertisement of high-fat energy dense foods and large portion sizes (Gordon-Larsen et al., 2003; Kumanyika & Grier, 2006), and the lack of shared and prepared meals (Blanchette & Brug, 2005a). High-caloric, low-nutrient food intake has steadily increased in adolescents who are exposed to an increasing frequency of commercials advertising such foods (Blanchette & Brug, 2005b; Kumanyika & Grier, 2006). According to Gittelsohn & Kumar (2007), the ease of access to cheap snacks at local stores, fast food, and the unavailability of healthy foods at home are barriers to healthy food consumption. As a consequence, most minority children have low intakes of fruits and vegetables.

Physical Activity. The U.S. Center for Disease Prevention and Control (CDC) recommends that children and adolescents participate in at least 60 minutes (1 hour) or more of PA each day (CDC, 2011), however emerging literature on Hispanic youth engagement in PA is not encouraging (Kumanyika, 2008; Martin, Oliver, & McCaughtry, 2007a; Strong et al., 2005; USDHHS,

2009). Wolf et al. (1993) examined PA in adolescent girls and found Hispanics had the lowest reported PA levels. Almost half of the girls reported less than one hour per week of strenuous PA. Butte et al. (2007) found that both nonoverweight and overweight Hispanic children and adolescents fell short of the 60 minutes per day. Gender plays a role in the participation of PA, with female adolescents participating less in PA because of concerns about menstruation and physical appearance (Dwyer et al., 2006).

Cultural values also influence the potential for changing behaviors related to PA. For instance, many adolescents of ethnic minority descent do not respond to traditional PA programs such as running, walking and playing organized sports, nor do they have access to resources such as fitness gymnasiums (Olvera, 2008). However, increased PA has been associated with lower rates of obesity in Hispanic adolescents (Martin et al., 2007b). Determinants of physical activity were evaluated in a study of 470 MA children ages 9-12 years. Researchers found that subjective norms, attitudes, intentions and feelings of control were strong predictors of PA (Martin et al., 2007b). In a study of immigrant families, Liu and colleagues (2009) found that adolescents ages 10-17, engaged in less than 20 minutes of PA daily. At the time of Liu et al.'s (2009) study, the CDC recommendations were for adolescents to engage in PA lasting at least 20 minutes that was vigorous enough to cause sweating and hard breathing, for at least three days per week (CDC, 2009). Interestingly, the authors reported that first

generation adolescents were more likely to not meet the CDC's recommendations (adjusted odds ratio [AOR] = 1.50, 95% confidence intervals [CI]: 1.09, 2.05) than were second generation adolescents (AOR = 1.29, 95% CI: 0.99, 1.69). In contrast, and more commonly found in the literature, are studies of Hispanics that show acculturation to the U.S. is associated with a lower frequency of PA participation (Unger et al., 2004; Everson, Sarmiento & Ayala, 2004; Gordon-Larsen et al., 2003).

Sedentary Behavior. Sedentary behavior or physical inactivity has been associated with increased rates of overweight in minority, economically disadvantaged, and rural children and Hispanic youth (Chatterjee et al., 2005; Gordon-Larsen, Nelson, & Popkin, 2004). Sedentary behavior changes the energy balance equation and for adolescents who experience less caloric expenditure through sedentary behavior, the consequences can be severe. Research on Hispanic youth has shown that adolescents exceed the recommended limit of 2 hours per day of watching TV and playing video games (CDC, 2009). While these recommendations reflect limits set before the new CDC standards were presented in 2011, several earlier studies reported Hispanic youth watch more television and movies, and play more video games than white or higher-income youth (Roberts, Foehr, & Henry J. Kaiser Family Foundation, 2004; Roberts, Foehr, & Rideout, 1999; Kain et al., 2004; Kumanyika & Grier, 2006). In a study of 278 middle school-age students (70% Hispanic) enrolled in an innovative curriculum called

Choice, Control and Change (3C Curriculum), students reported an higher intent to increase walking and/or stair climbing and a significant decrease in sedentary behaviors such as playing video games and watching TV following a 24-session intervention (Contento, Koch, Lee, Sauberli, & Calabrese-Barton, 2007).

Acculturation is also a factor in the increase of sedentary behaviors in Hispanic adolescents because of the tendency for adolescents to mimic westernized cultures by playing more video games and watching more television (Esparza et al., 2000).

Behavioral Factors. As theorized in SCT, behavioral factors are a function of aspects of the environment and of the person that guide health behavior outcomes. This complex interplay of interactions involves outcome expectations, decision making, goal setting and risk taking.

Adolescence is a period of heightened vulnerability for the development of health behavior patterns that may lead to obesity and overweight (Baranowski et al., 2003; Dietz, 1994; Dietz & Gortmaker, 2001). Many unhealthy behaviors that begin in adolescence persist throughout adulthood. Developmental psychologists report that during early adolescence, psychological and physiological development is characterized by struggles with sense of identity, self-worth, and self-confidence (Berk, 2003). Decision making, goal setting, and coping skills are key to an adolescent's ability to practice a healthy lifestyle (Davis, Davis, Northington, Moll, & Kolar, 2002; Grey et al., 2004). Davis and colleagues (1999) identified health behaviors in early adolescence as high risk (e.g., fewer

family-based activities especially outside the home, little opportunity to do PA at home) and moderate risk (e.g., eating fast foods outside the home or at special events at school). Many of these risk-related health behaviors have been found to be greater in Hispanic adolescents. Rodriquez-Santos et al. (2005) investigated behavioral risk factors leading to nutrition and PA choices in African American and Hispanic adolescents and compared clinical factors (e.g., hip adiposity, BMI percentile, insulin), health behaviors (e.g., fat intake, positive support for activity and parental reinforcement), and psychosocial factors (e.g., dietary knowledge, activity self-efficacy). Results showed Hispanic youth had lower activity self-efficacy than African American youth despite having greater parental reinforcement, suggesting that cultural differences related to family dietary practices and parental support may have played a role in improving clinical, health, and psychosocial outcomes in these youth. In a study of 4th - 6th grade middle school children, Jenkins et al. (2005) found that Hispanic adolescents use eating as a coping mechanism for high levels of stress.

Obesity and low self-esteem among other psycho-social issues have been associated in the literature (Melnik et al., 2006; Summerbell et al., 2005). Self-esteem is important in adolescence and can be related to perceptions of self-worth, physical appearance and ability to make healthy eating and activity choices (Adams et al., 2008; Davison, Werder, Trost, Baker, & Birch, 2007; Dixon & Stein, 2000; Story, 1999). Among ethnic minorities, cultural norms surrounding

body size play a role in perceptions and acceptance of obesity and overweight (Davis et al., 2002; Feldman, Feldman, & Goodman, 1988). In a study examining adolescents' intent to engage in physical activity, Hispanic adolescent females who exercised, reported more favorable self-esteem and body image compared to those with less exercise (Martin, Oliver & McCaughtry, 2007b). In a descriptive study of 25 Hispanic mother-child dyads, mothers were shown photographs of children to elicit perceptions of body sizes (Reifsnider et al., 2006). Findings showed that neither the mothers' BMI, their acculturation status, nor the actual sizes of their children were consistent predictors of whether the mothers would pick the photograph of a child that corresponded to their child's actual BMI. The authors concluded that the Hispanic mothers did not consider a child who was happy, active and capable of performing normal childhood activities to be overweight, despite a high BMI. This finding supports other studies that maintain the Latino community views obesity not as a physical flaw, but an endearing characteristic (Treviño, 2010).

Environmental Factors. As theorized in SCT, environmental factors are social and physical environmental influences that provide the context for health behaviors. These include social factors (e.g., influences such as family and peer social support, perceived safety, and community cohesion) and physical factors (e.g., influences such as neighborhood safety, access, and availability to health promotion activities).

The literature on health disparities suggests that among minority and low-income adolescents, there are social and economic environmental factors that contribute to obesity (Kumanyika & Grier, 2006; Franzini et al., 2009).

Socioeconomic trends associated with increased childhood obesity rates in Hispanic children and adolescents are (a) income levels (e.g., medium income level of all Hispanics decreased 5.6% from 2007 to 2008, with 14.1% Hispanics in Arizona below the federal poverty level), (b) families without health insurance (e.g., 30.7% of Arizona Hispanic families with children) and, (c) lack of routine care and prevention (e.g., Hispanics are one-third less likely to be counseled on obesity than are whites) (U.S. Census Bureau, 2010b; Agency for Healthcare & Research Policy [AHRQ], 2009).

Much of the literature on environmental correlates of diet, physical activity and obesity has focused on the built environment, a term defined as a multidimensional concept that includes patterns of human activity within the physical environment (Popkin et al., 2005, p. 603). Research has shown that inequities in the physical environment such as unsafe neighborhoods, fewer recreational facilities and poor transportation options put Hispanic youth at risk for decreased recreational play and PA (Kumanyika & Grier, 2006; Popkin et al., 2005). Babey et al. (2008) found that access to safe parks was positively correlated with regular PA but in lower income families living in unsafe neighborhoods, adolescents were more likely to be inactive. Minority populations

in general are discouraged from engaging in PA because of such factors as access to safe and affordable recreational facilities (Popkin et al., 2005).

Characteristics of communities in which ethnic minority and low-income adolescents live also impact access and availability of nutritious food (Kumanyika & Grier, 2006). Hispanic and low-income neighborhoods have fewer supermarkets that stock fresh fruits and vegetables (Kumanyika & Grier, 2006; Robert Wood Johnson Foundation [RWJF], 2009), and have a disproportionate share of fast-food restaurants (Block, Scribner, & DeSalvo, 2004). In addition, portion sizes are known to be larger in fast-food restaurants than in other restaurants further escalating unhealthy eating habits in Hispanic youth (Nielsen & Popkin, 2003). In examining the association between food environments and obesity, Ford and colleagues (2008) found poor-quality retail food environments in conjunction with limited individual economic resources contributed to increased risk of obesity in neighborhoods with socioeconomically disadvantaged populations.

The family plays an important role in the social environment influencing adolescent health behaviors. Family knowledge, as well as attitudes, beliefs, and daily practices (e.g., choice of foods, food preparation), and family support for physical activity influence the adolescent's ability to eat healthy and exercise adequately (Dietz & Gortmaker, 2001). In an obesity prevention program for low-income Hispanic and African American families, family meals with nutrition and

food demonstrations, and family exercise classes were found to help families adopt healthy eating and physical activity behaviors, and improve weight management patterns (Frable, Dart, & Bradley, 2006). There is growing evidence that environmental influences such as peer and parental support are factors that also contribute to obesity related behaviors during adolescence (Beets, Vogel, Forlaw, Pitetti, & Cardinal, 2006; Dowda, Dishman, Pfeiffer, & Pate, 2007; Steinberg & Morris, 2001). Social supportive behaviors of peers in particular, behaviors such as performing activities with others, encouragement and praise have been found to directly influence a teens' activity level (Beets, Pitetti, & Forlaw, 2007). In a study of 499 parents of mixed ethnicities where 35% of the sample were Hispanics, the majority of parents felt that they could influence their child's food choices and amount of PA (Eckstein et al., 2006). Frenn et al. (2005) found that social support from parents and peers was associated with higher rates of PA in low-income African American and Hispanic middle school girls. Among female adolescents attending a rural high school in the Midwest, Beets and colleagues (2007) found that parent- and peer-social support (e.g., encouragement, *doing* PA together) positively influenced immediate and long-term health behaviors in female adolescents.

In communities where most women or adults are obese as in many ethnic minority and low-income communities, parental attitudes, norms, behaviors, and cultural influences contribute to the acceptance of obesity in children (Kumanyika

& Grier, 2006). Previous research has shown that parents' activity and dietary patterns can be used to predict children and adolescent risks of obesity (Eckstein et al., 2006). Understanding the impact of environmental factors on health behaviors is critical to moving forward population specific interventions to promote physical activity and healthy dietary intake (Popkin et al., 2005).

Multicomponent Obesity Intervention Programs for Hispanic Youth

The literature on obesity prevention and intervention studies for children and adolescents is extensive. In a recent meta-analysis of 40 obesity intervention studies on minority children in the U.S., Seo & Sa (2010) found that those with more intervention components had a higher mean effect size than those with fewer components (e.g., Cohen's $d = .07$ for one component [$n = 6$], Cohen's $d = .08$ for two component [$n = 15$], Cohen's $d = .33$ for three component [$n = 10$] and Cohen's $d = .71$ for four component [$n = 1$]; Seo & Sa, 2010). Components in the review included diet education with exercise programs, interventions to reduce sedentary behaviors, counseling interventions, and interventions including parents. In a review of the literature on intervention programs for middle school-age children of ethnic minority, a range of combinations of diet, activity, and behavioral strategies were reported to be effective in minority children (Stevens, 2010). Although all interventions showed modest results in increased healthy eating and activity behaviors, none were targeted for Hispanic adolescents only. Interventions that included multiple strategies were the most effective in

improving dietary intake and increased PA. Twenty-two studies were reviewed to determine the effectiveness of interventions that included diet, PA, and/or lifestyle and social support in multi-ethnic adolescent populations (Summerbell et al., 2005). In Summerbell et al.'s (2005) review, six of the ten studies combined diet education and PA, five resulted in no difference in overweight status, and only one resulted in improvements in girls but not boys. The majority of studies in the review were short term (e.g., 12 weeks to 12 months) and in general, failed to improve BMIs.

In sum, systematic reviews suggest that intervention programs that are multicomponent are the most effective in improving healthy behaviors in youth. While programs that include both a dietary and a PA educational component are amply described (Kamath et al., 2008; Campbell, Waters, O'Meara, & Summerbell, 2001; Peterson & Fox, 2007; Stice et al., 2006; Summerbell et al., 2005; Baranowski et al., 2003; Doak, Visscher, Renders, & Seidell, 2006; Shaya, Flores, Gbarayor, & Wang, 2008) few address behavior change components, few address interventions for minority children, and even fewer discuss interventions for Hispanic children and adolescents. The few intervention studies for Hispanic adolescents are discussed here.

Nutrition & PA Interventions. Health education on nutrition and PA was incorporated into the Dance for Health program, a culturally sensitive health program designed for African American and Hispanic youth ages 10-13 years

(Flores, 1995). Findings from this study showed a greater decrease in BMI percentile ($p < .05$) and heart rate ($p < .01$) in treatment versus control groups. In another study of 60 Mexican American 6th and 7th grade children, a multicomponent intervention program consisting of nutrition education, intense PA, and behavior change strategies significantly reduced standardized BMI scores compared to a control group ($F = 11.72$; $p < .001$; Johnston et al., 2007). In the 3C Curriculum intervention mentioned earlier, knowledge of nutrition reinforced by motivators and reinforcers was thought to increase frequencies of fruit and vegetable intake, decrease intake of sweetened beverages, packaged snacks and eating at fast-food restaurants (Contento, et al., 2007). In the Contento et al. (2007) study, knowledge and having control over which PA the student engages in, also decreased overall sedentary behaviors.

The Bienestar program is a school-based diabetes prevention program to improve fitness and healthy eating in 4th grade MA children (Treviño et al., 1998). The bilingual health curriculum used culturally and contextually relevant materials that focused on health and physical education. Although dietary fat intake did not decrease significantly, mean fasting capillary glucose levels ($p = .03$), physical fitness scores ($p = .04$) and dietary fiber ($p = .009$) increased (Treviño et al., 2004). In a randomized control trial (RCT) with a sample of 54 overweight Latino high school students, participants were stratified into a control group ($n = 16$), a nutrition education group ($n = 21$) and a nutrition education plus

strength training group ($n = 17$; Davis et al., 2009). Using analysis of covariance (ANCOVA), across intervention group effects showed reductions in total energy intake ($p = .05$), carbohydrate intake ($p = .04$) and dietary fat ($p = .03$). While nutrition education showed improvement in reducing dietary protein, total sugar, and added sugar, these improvements were not statistically significant when compared to the control group.

In a sample of 4,704 Hispanic adolescents, second generation youth from immigrant families failed to meet the previously set PA recommendations of 20 minutes of vigorous activity for at least three days a week when compared to third generation adolescents (Liu et al., 2009). Living in homes where English was not the primary language was also associated with not obtaining the recommended PA levels. In a sample of adolescents, predominately Hispanic high school students, Melnyk et al. (2009) found that knowledge of how to lead a healthier lifestyle combined with coping skills lead to healthier lifestyle choices such as exercising on a regular basis. Davis and colleagues (1999) found that information about PA and food selection provided through a culturally designed obesity-prevention program (Pathways) increased healthy nutrition resulting in a significant reduction in the percentage of energy from fat among 3rd, 4th, and 5th grader American Indian children (Caballero et al., 2003).

The Salud con Sabor Latino (SSL) program is a bilingual obesity-prevention program for Hispanic adults and children attending the community

center which is the site of the present study. The 4-week 8-session intervention focuses on diet and exercise education in a culturally responsive environment (Araiza, Valenzuela, & Gance-Cleveland, 2009). Preliminary findings showed that the mothers who completed the programs had a decrease in BMI percentile ($F [1,75]=10.96, p =.01$), in body fat ($F [1,71] = 6.25, p =.02$), and in waist circumference ($F [1,73]=32.03, p < .01$). Sixty-one percent of participants showed a decrease in weight pre- and post-SSL program, with 47.6% having lost weight 6 months after completing the program. Participants reported that weekly cooking classes provided social support in this community based obesity intervention program (Araiza, Valenzuela, & Gance-Cleveland, in press).

Behavioral Interventions. There is emerging evidence that nutrition and physical activity education programs for adolescents are more likely to be effective in promoting healthy eating and activity if they are provided in conjunction with strategies for behavior change (Hawley, Beckman, & Bishop, 2006). A review of behavioral obesity programs for adolescents that are most likely to be successful in behavior change include: self-monitoring, goal setting, problem solving, stimulus control to motivate adolescents to change diet and exercise, contracting and skills for maintenance and relapse prevention (Wing & Gorin, 2003; Kamath et al., 2008; Robinson, 1999). Central to all of these behaviors is the ability to cope. Coping skills training (CST) is an intervention based on social cognitive theory, which proposes that individuals can actively

influence many areas of their lives, particularly health behaviors (Bandura, 1997b). A major premise is that practicing and rehearsing a new behavior such as learning to cope successfully with a problem situation can enhance self-efficacy and promote positive behaviors (Marlett & Gordon, 1985). There is some evidence that behavioral strategies such as coping skills training incorporated into health promotion and/or multicomponent obesity intervention programs are effective in adolescents.

In a RCT of middle school-aged children with type 1 diabetes (T1D) ($n = 100$), CST was found to lower the impact of diabetes, improve coping skills and self-efficacy, reduce depressive symptoms and reduce the level of parental control (Grey et al., 2009). In another study of female adolescents ($n = 77$), CST was found to prevent weight gain in girls and improve metabolic control and psychological well-being (Martin et al., 2007a). Favorable attitudes and feelings of self-control accounted for 45% of the variation in intention to moderate to vigorous PA in a study of Hispanic youth, ages 10-13 years. In another study, health education on nutrition and active healthy lifestyles was combined with behavioral skills training and tested in 6th, 7th and 8th graders of ethnic minority (Gance-Cleveland, Harris, & Ward-Begnoche, 2005b; Ward-Begnoche, Gance-Cleveland, Harris & Dean, 2008; Ward-Begnoche et al., 2009). The age-appropriate curriculum contained topics such as goal setting, communication skills, social problem solving, cognitive behavior modification, conflict

resolution, and coping with relapse. Results to date have shown a positive impact on participants' nutritional choices and improved family and peer support for healthy eating and exercise (Ward-Begnoche et al., 2009).

Environmental Interventions. Research has shown that adolescents are more likely to attend community-based programs if environmental variables such as location, time, convenience for parents, and the adolescent's ability to travel safely are considered (AHRQ, 2009; Dwyer et al., 2006; Stolley & Fitzgibbon, 1997). In a study of eating behaviors in African American mother/daughter dyads (e.g., adolescent girls were ages 7 -12 years) program location was found to be a safety issue (Stolley & Fitzgibbon, 1997). The 11-week program was offered at a local tutoring center that was within walking distance and gang-neutral. The low drop-out rates of the dyads (e.g., 17% for daughters and 22% for mothers) were thought to be partially related to the fact that the program was conducted in a safe and familiar community location although empirical data from participants was not collected. In a study to explore barriers to PA, Dwyer et al. (2006) conducted focus groups with 73 adolescents aged 15-16 years, living in a large ethno-racially and socioeconomically diverse city. Participants expressed that facilities were inaccessible and/or costly and that physical activity opportunities in school had decreased as reasons for not engaging in PA regularly. Some reported that their parents' concern about their safety deterred them from participating in activities

away from home. For example, they did not use a local basketball court because it was a “hang-out” for gangs (Dwyer et al., 2006, p. 82).

In a sample of 4,010 adolescents, Babey et al. (2008) found that access to safe parks was positively associated with regular physical activity and negatively associated with inactivity (Babey et al., 2008). Additionally, adolescents with access to safe parks were less likely to be inactive compared to those adolescents who lived in apartments, unsafe neighborhoods and lower income families. Settings outside schools (e.g., church, clinics, and community centers) have shown to be more appropriate for building family role models and support (Frenn et al., 2005) as well as increasing healthy behaviors in ethnic minority adolescents (Patrick et al., 2001; Stolley & Fitzgibbon, 1997).

Social support as a key socio-environmental factor influencing adolescent health behaviors has gained attention in obesity intervention research. In fact, differentiation between parent and peer social support and types of social support are evident in studies with adolescents. Prochaska and colleagues (2002) found that peer and parent social support combined, significantly influenced higher rates of self-reported PA in middle school-age children. Other studies have found parent and peer social support were associated with levels of sedentary behavior. In one study, Zabinski and colleagues (2007) found that encouragement to reduce sedentary behaviors by parents was not a significant predictor for adolescents’ time spent watching TV and playing video games. In another study, adolescents

11- to 15-year-olds were more likely to consume fruits and vegetables when they perceived higher overall social support from parents, rather than peers (Zabinski et al., 2006). In a sample of 3,957 middle and high school students, fruit and vegetable consumption was found to be mediated by the availability of fruit and vegetables in the home (Neumark-Sztainer, Story, Hannan, & Rex, 2003).

In sum, the literature on multicomponent obesity intervention programs for youth is quite extensive. We know from the literature that multicomponent interventions that include a nutrition and PA component, strategies to reduce sedentary behaviors, a behavioral change component, and parental involvement are the most efficacious. Many studies have demonstrated positive changes in health behaviors, yet few have reported reductions in BMI, where factors such as length of programs, adolescent growth and development and setting may be a factor (Stevens, 2010; Summerbell et al., 2005). While more obesity prevention / intervention research has been conducted with adolescents of ethnic minority, research on the growing population of Hispanics is almost not existent. The few studies that have included Hispanic adolescents have shown promising outcomes (Flores, 1995; Contento, et al, 2007; Treviño, et al., 1998; Davis et al, 2009; Araiza et, al., 2009).

Intervention Studies Using CBPR. Community-based participatory research (CBPR) has emerged in the past two decades as an alternative research paradigm (Wallerstein & Duran, 2006). The focus in CBPR is on the relationship

between academic and community partners that collectively combine knowledge and action to impact social change, improve community health and eliminate health disparities (Minkler, & Wallerstein, 2003). To date, CBPR research has typically focused on prevention and promotion of lifestyle changes, reducing barriers to care and developing culturally appropriate programs (Horowitz, Brenner, Lachapelle, Amara, & Arniella, 2009). Obesity intervention programs using CBPR methodology have shown promising results particularly when targeting minority and low-income communities where environmental factors play a major role in adolescent behavior. Although many CBPR studies have reported findings on process and methods that help to inform program development, limited outcomes have been reported (Dulin, Tapp, Smith, Urquieta de Hernandez & Furuseth, 2011; Perry & Hoffman, 2010).

Filbert and colleagues (2009) reported on an obesity intervention program developed for children ages 5-10 years living in rural Kansas, using a CBPR approach. In the first phase, researchers and community partners (e.g., school district and county health department representatives) identified at risk youth using mean BMI and percentile scores. In phase 2, community action groups used BMI data to develop a coordinated school health program called Team Challenge. Included in the program were nutrition education classes, school districts using grant funds to develop walking trails, and a program to recognize school faculty who modeled healthy lifestyles. Over 2,100 students received the nutrition

education and longitudinal data on BMIs are being tracked as an indicator for success. Another outcome from phase 2, was the growing use of the walking trails by the community, parents, and physical education classes. After the success in the walking trails, two other county schools have submitted for grants to build walking trails on their campuses. Lastly, more than 300 school employees have participated in the healthy lifestyles program.

CBPR research ensures research and intervention strategies that are culturally appropriate (O'Fallon & Dearry, 2002). The Healthy Weigh (El Camino Saludable) is an obesity prevention program designed for low-income Hispanic and African American families (Frale et al., 2006). Unique to the program is the community campus partnership where multi-disciplinary health care providers and community representatives came together to design the 12-week culturally appropriate program. Early program evaluation revealed participants needed forms read aloud because of limited literacy, children attended interventions without parents and participants needed frequent reminders for program activities. Community leaders plan to use the program evaluation to improve the obesity prevention outcomes in future programs (Frale et al., 2006).

In a study of American Indian youth at risk for obesity, tribal communities partnered with academic researchers to assess tribal youth's level and patterns of PA, delineate preferences and determinants, explore cultural beliefs about PA and identify activities that would increase PA (Perry & Hoffman, 2010). Surveys and

focus groups elicited information on the youth's patterns of PA, barriers, and motivators which were then applied to PA youth programs (e.g., a boys' and girls' basketball group was initiated). While the tribal communities are exploring other ways to improve PA in youth, the CBPR approach has brought positive change in the community that will foster healthy behaviors (Perry & Hoffman, 2010).

Kidfit is a weight management program for native Hawaiian adolescents (Beckham, Bradley, & Washburn, 2005). To determine the fitness activities for the program, youth participated in focus groups and shared their preferences on what activities they liked, how often they would attend a program, the best times for their schedules, if they needed transportation, what kind of music they liked, and if they wanted individual trainers. Focus group feedback helped to create the program which consisted of 30 minutes of weight training sessions (including use of fitness machines), followed by 30 minutes of rotating activities such as kickboxing, hip hop, basketball and soccer drills. Attendance fluctuated over 6 months, but those that consistently participated formed a small core group who encouraged one another in *getting fit*. The authors reported difficulty in collecting data because some was recorded on paper charts and other data was recorded on electronic records. Of the data collected, 75% ($n = 8$) of the participants decreased body fat, 33% ($n = 36$) had weight loss and 64% ($n = 11$) experienced a decrease in waist circumference. While no other quantitative data was collected, results of

the program indicated summer months were better attended, and new KidFit members have been successful at recruiting others into the program.

Summary of the Literature. The causes of obesity are multifaceted, yet lacking in the literature are multi-component, culturally-specific, obesity prevention / intervention studies for Hispanic youth. Current trends in obesity suggest adolescent lifestyles across populations contribute to poor dietary habits, decreased PA and increased sedentary activity resulting in an energy imbalance and a growing population of overweight and obese youth. Contributing factors include biological and psychosocial personal factors (e.g. knowledge of healthy nutrition and PA, attitudes and beliefs associated with eating/exercise and overweight, motivation to change behavior), behavioral factors (e.g. self-efficacy, increased intake of energy dense, nutrient-poor foods, low levels of PA, and increased sedentary lifestyles), and environmental factors (e.g. characteristics of the built environment, family and peer support).

The literature on obesity intervention programs clearly inform us that multicomponent obesity intervention programs that include nutrition, PA, and behavioral components are far more effective in changing lifestyle behaviors in adolescents, than those with one or two components (Johnston et al., 2007). Yet, it is not as clear, as to the effects of interventions on BMI and overall obesity rates over time (Kamath et al., 2008). The literature on intervention programs for ethnic minorities further informs us that consideration of cultural factors are key to

promoting healthy eating and activity behaviors (Johnston et al., 2007; Treviño et al., 1998; Davis et al., 1999). Cultural norms surrounding food and perceptions of healthy weight, access to greater venues for healthy eating and activity, and family and community social structures are determinants that require further attention. Emerging literature indicates that acculturation of Hispanic youth is associated with dietary intake, PA, and sedentary activity and should be considered vital to programs reaching out to multi-generational populations (Schaefer et al., 2009; Unger et al., 2004). The literature on behavior change suggests that adolescents may benefit from intervention programs that include behavior change strategies such as coping skills, problem solving, and self-regulatory skills (Robinson, 1999). Combined with social support, adolescents are more likely to develop self-worth (Sahota et al., 2001), feel efficacious in their efforts to perform behavior and develop healthy eating and activity behaviors (Trost et al., 2003). Research on the role of social support in obesity prevention adds to the evidence that social support is another key environmental influence in adolescent health behaviors (Beets et al., 2006; Dowda et al., 2007). Community-based obesity intervention programs are gaining attention as researchers have found school-based programs do not address the larger environmental factors that influence obesity (Gittelsohn & Kumar, 2007). Recognizing the potential to expand into the community, more and more healthy eating and activity programs are using CBPR as a method to enhance healthy communities that support healthy

behaviors, yet the efficacy of interventions for Hispanic adolescents have not been well evaluated (Filbert et al., 2009). Therefore, effective obesity interventions must address multiple areas of influence including individual, family, and community. A CBPR approach provides the best strategy for addressing the unique needs of Hispanic youth at risk for high rates of overweight and obesity.

Salud con Sabor Healthy Eating and Exercise (SSLN) Model

The SSLN model which describes the hypothesized relationships among study variables is presented in Figure 1. Definitions and description of model constructs are presented in the following paragraphs.

Model Constructs and Assumptions.

Acculturation. Acculturation to the U.S. culture has been implicated as a risk factor for unhealthy behaviors among adolescents (Unger et al., 2004). The SSLN program used a culturally responsive approach to teach adolescents about healthy eating, activity, and behavior change skills. The construct is important to understanding cultural influences on diet and PA in Hispanic adolescents.

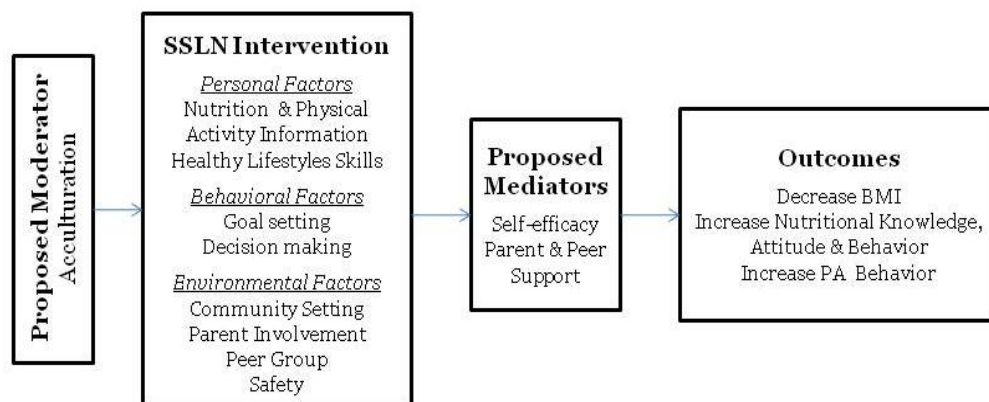


Figure 1. Salud con Sabor Latino para los Niños (SSLN) Intervention

Personal Factors. Knowledge about nutrition and physical activity is the precursor to action. As adolescents acquire knowledge that can assist them in making healthy lifestyle choices, they assimilate acquired knowledge with their personal attitudes, beliefs, and perspective from which they view the world around them. In SCT, beliefs of personal self-efficacy explain the way people acquire and maintain certain behavioral patterns (Bandura, 1997a). The use of contracts with goals and rewards can regulate and reinforce newly acquired behaviors and improve self-efficacy (Cole et al., 2006). SSLN integrated goal setting, self-monitoring, and self reflection throughout the intervention, along with rewards and recognition that helped to motivate the children to improve eating and PA behaviors.

Behavioral Factors. In the SSLN model, behavioral factors include dietary intake and levels or amount of physical activity. An assumption of SCT is that people learn from their own experiences as well as from observing the

behaviors and behavioral outcomes of others (Bandura, 1986; National Cancer Institute [NCI], 2009). In adolescents, observational learning is not always enough to motivate children to change behavior (Bandura, 1986). In the present study, adolescents were able to observe others and model healthy behaviors through participation in group activities. Incorporating PA through a structured physical activity program that is also fun and competitive provided the participants opportunities to perform moderate to vigorous PA for 30 minutes. Cooking activities which included making nutritious snacks, helped participants relate cultural traditions and norms to food preparation practices.

Environmental Factors. The environmental factors considered in the intervention model reflect the setting and surroundings influencing the adolescent eating and activity behaviors. Each adolescent was influenced to varying degrees by the involvement and characteristics of their parents and peers and the social structure that encompasses both. The community center environment provided a safe physical setting for the SSLN intervention and a safe place to go to afterschool. Environmental influences can also be cues and opportunities associated with calorie intake and inactivity. Examples of these can be found throughout the SSLN curriculum. Topics such as access and availability to high – low caloric foods, eating outside the home, serving larger portions, limiting TV and video game time, and establishing routines (i.e. walking to the community center) were discussed during the classroom sessions.

Self-efficacy. Adolescents must have a sense of self-efficacy to initiate a behavior. Research suggests the higher an adolescent's self efficacy, the greater the chance one will change a health habit such as eating nutritiously or engaging in an active lifestyle (Bandura, 2004). Knowledge of risks and benefits create a precondition for change, which can be a critical factor in adolescent behavior as adolescents who have greater self-regulatory efficacy are better prepared to avoid risky behaviors (Bandura, 1997a). In this study, participants received education on strategies for dealing with daily stressors that lead to unhealthy eating and inadequate physical activity (e.g., building competence through better coping, problem solving, and responding to stimulus skills).

Social Support. SCT points to the importance of social and environmental factors that influence both psychosocial and behavioral aspects of children's behaviors throughout their development (Perry et al., 1989). Social support from key persons in an adolescent's life (i.e. peers and parents) may influence a child's motivation to change health behaviors. During early adolescence, youth transition from parental control to independence and increasing peer influence where risk-related behaviors can include deciding what, when and how much to eat, how frequently one engages in moderate or vigorous activity or how strong parent- and peer-influence is in pressuring youth towards unhealthy or risky behaviors (Davis et al., 1999). Clear benefits have been demonstrated from involving parents in

behavioral treatment programs of childhood obesity, although the benefits are less clear when treating adolescents (Robinson, 1999).

Chapter 3

METHODS

Research Design

Study Design. This study uses a community based participatory research (CBPR) approach in a one-group, pre- and post-test, quasi-experimental design. The purpose of the study is to evaluate the feasibility, acceptability, and preliminary efficacy of a theory-based healthy eating, PA, and behavior change skills intervention program, Salud con Sabor Latino para los Niños (SSLN). SSLN is a culturally adapted intervention designed to prevent obesity related chronic conditions in Hispanic young adolescents by teaching healthy lifestyle skills for eating and activity. This pilot study is the first step in this program of research which will ultimately test the efficacy of the SSLN intervention in a larger full-scale RCT.

Sample. Typically, a feasibility study uses a small sample size for the purpose of calculating a preliminary effect size (Cohen, Cohen, West, & Aiken, 2003). A power analysis indicated a sample size of thirty (30) adolescents would be ideal for the pilot study. The original sample size numbers were based on recommendations from a university statistician (the sample number adequate for establishing an effect size), and recommendations on feasibility of recruitment by

Golden Gate Community Center (GGCC) staff, who have enrolled approximately 20-30 adolescents in this age group in afterschool programs in previous years. Consistent with small feasibility studies, attrition was anticipated (Bowen et al., 2009), and we anticipated that 10% would drop before being consented and/or assented, and 10% would not complete all data collection time points, resulting in 24 participants included in the study.

Setting. The study was conducted at GGCC, a local community center located in a primarily Hispanic neighborhood in southwest Phoenix, Arizona. GGCC is one of 40 nonprofit child welfare and behavioral health agencies of the Arizona Children's Association (GGCC, 2005). GGCC was founded in the 1930's and incorporated in 1952 as a settlement house for the immigrant poor. GGCC serves over 6,000 low-income individuals, predominantly Hispanic children and families. Programs include Head Start for preschoolers, after-school life skills and educational programs (e.g., computer classes, life skills training), arts and crafts, and sports-related activities. GGCC had the necessary physical entities required for this pilot study (e.g., classrooms, large gymnasium equipped with sports equipment, and kitchen).

GGCC employs approximately 36 employees. The Health Coordinator, the Wellness Instructor, the Director of Health Programs, two promotoras and a male member of the Health program who provides PA instruction were the six GGCC

employees along with the Primary Investigator (PI) that comprised the research team for this study.

Human Subjects

All policies, regulations, and guidelines set forth in the Code of Federal Regulations and by the Institutional Review Board (IRB) of Arizona State University (ASU) were adhered to by the investigator. An application to conduct the study was submitted and approved by the ASU Office of Research Integrity and Assurance IRB (See Appendix A). Included in the application was a letter of support from the Program Director at GGCC who was apprised of and approved the study during the early planning phase. Consents from the parent/legal guardians and assents from the children were obtained.

Consistent with the CBPR approach, there were situations that occurred during the implementation of the research study that required IRB modifications. For example, there was a need to change the process for data collection as the original study personnel were no longer available. IRB modification permitting the investigator, the investigator's mentor, and GGCC staff to collect study data was submitted and approved. Also, as recruitment issues surfaced (e.g., no adolescents from the Boys and Girls Club had enrolled in the study during the recruitment period), a revision to collecting parental permission was made that allowed adolescents to take home consent forms with cover letters in both English and Spanish. Because GGCC staff were involved in obtaining informed consent

and collecting data from participants, they were required to complete training in the protection of human research participants prior to study initiation. In concert with CBPR, the GGCC research team led by the PI completed the Collaborative Institutional Training Initiative (CITI) IRB training. This provided an opportunity for the investigator to discuss with GGCC research team, the application of human subjects principles to the SSLN study. Another step in the IRB process was created when the community partners at GGCC learned that the SSLN study required approval by the Arizona Children's Association (ACA), the governing board of GGCC. Therefore, IRB approval was obtained from the Professional Staff Executive Committee (PSEC) of the ACA.

Recruitment

Inclusion Criteria. To be included in this study, adolescents had to (a) be in the 6th, 7th or 8th grade, (b) speak and write English, (c) give assent for participation, and (d) have one custodial parent or legal guardian who consented for his/her participation in English or Spanish. There were no inclusion or exclusion criteria related to weight.

Exclusion Criteria. Exclusion criteria included adolescents who (a) had behavioral problems that would interfere with participation, (b) had endocrine diseases, (c) were on a special diet, or (d) were already enrolled in an obesity treatment program. Information on whether the adolescent was the child of

parents who attended the SSL program offered at GGCC was collected, but this information did not exclude an adolescent from participating in the study.

Participant Recruitment. In true community-based participatory fashion, recruitment and enrollment of participants into the SSLN study was a collaborative effort with the investigator and the staff at GGCC who were familiar with the community and had ready access to parents of potential study participants. Participants were recruited from the afterschool recreation program at GGCC, local Boys and Girls Club, and Isaac School district schools which are 94% Hispanic (Isaac School District, 2004). Three weeks before the study was to start, the investigator provided recruitment fliers to GGCC staff who posted the fliers at the center in areas where programs and special events are typically posted. Recruitment fliers were also provided to the Boys and Girls Club and the Isaac School District school's liaisons who work with GGCC staff throughout the year. During the development of the fliers, input from the GGCC research team such as specifics about the program and verbiage used was incorporated to make the flier more culturally sensitive to potential participants. For example, the word "Investigator" was replaced by "Project Lead" as GGCC staff were concerned that the term "Investigator" had a possible negative connotation. This concern was because the community surrounding GGCC had a sizeable population of immigrants and several staff mentioned that this was a sensitive topic among the adult members who attended GGCC programs.

While both the investigator's name and the GGCC Health Coordinator's name and telephone number were on the fliers, the GGCC Health Coordinator was identified as the contact person. For this study, the children had to speak and understand English, but GGCC staff knew that many of the parents or legal guardians did not speak English. Therefore, interested parents or legal guardians were directed to the GGCC Health Coordinator or any of the bilingual members of the GGCC research team who could explain the study to a Spanish-only speaking parent or legal guardian. A mutual decision was to have the GGCC Health Coordinator be the central contact for all parents as this would be beneficial for developing relationships and addressing any concerns parents or legal guardians might have throughout the SSLN study.

In the preplanning stage, the investigator and GGCC research team discussed having a parent information meeting to share information about the SSLN program and potentially enroll, consent and assent interested adolescents. GGCC staff had used this approach before for announcing new programs at GGCC and had suggested using this forum to inform the parents about the details of the SSLN program and provide an opportunity for them to ask questions. Fliers announcing the meeting were created and sent home with adolescents who attended GGCC afterschool programs. They also suggested having the meeting a week before the program was to start because too far in advance would not be as effective as the adults in the GGCC community seemed to respond better to short

notices. Two weeks before the SSLN program was to start, Maryvale on the Move (MOM), a community-based initiative to promote changes in support of healthy eating and active living opportunities, was having a meeting at GGCC (MOM, 2010). GGCC staff suggested the investigator attend the meeting to recruit participants for the study. Spanish translation was provided by members of the GGCC research team for both the parent information meeting and the MOM meeting.

Once a parent or legal guardian expressed interest for their child's participation in the SSLN study, they were directed to the GGCC Health Coordinator who ensured that they met inclusion and exclusion criteria. As parents of potential participants were contacted, the investigator worked closely with the GGCC Health Coordinator in monitoring the numbers of parents contacted and the communication that took place. Adolescents and/or parents or legal guardians who expressed interest in participating in the study were asked by GGCC Health Coordinator, if they had conditions specified in the adolescent inclusion/exclusion criteria. During the screening process, the GGCC Health Coordinator also asked parents and legal guardians who declined to have their child participate to explain reasons for declining. Reasons for refusal to participate were documented on the Screening form.

The GGCC Health Coordinator received names of potential participants and notified them of the parent information meeting which was held one week

before the SSLN program was to start. The investigator or GGCC Health Coordinator (if the parent was Spanish-only speaking) obtained informed consents and assents from those that attended the meeting. During this meeting and at all other times children were enrolled in the study, the parent and legal guardians and adolescents were provided with information on the study's purpose and goals, participants' rights, risks, benefits, privacy and confidentiality measures and options for withdrawal with contact information for the investigator and the IRB at ASU. They were informed that the study had minimal risks to the participants. Assent forms were in English and consent forms were in English and Spanish.

Even though information cover letters and consent forms were distributed to all 6th, 7th and 8th graders at all recruitment sites, there were no children from the Boys and Girls Club that expressed interest in the SSLN program. Based on the low turnout at the parent information meeting and no interest from the children or parents from the Boys and Girls Club, the recruitment strategy was adjusted to allow the middle school-age children interested in the study who met the inclusion criteria to take consents home. Using this approach, the children could return their signed consents when they attended the first SSLN session and the child would be assented at the session. This necessitated an IRB modification to the consent/assent process which was made and approved by the ASU IRB.

The SSLN program was scheduled to start on Tuesday February 1, 2011, and only seven children had been recruited for the study. Because much of the recruitment process depended upon word of mouth communication by the GGCC research team and staff, additional children were expected to “show up” with their parents at the first SSLN session on February 1, 2011. Only two additional children, however, attended and both were consented/assented at the session.

With low numbers of participation, the investigator and GGCC research team collaborated and decided to postpone the start of the study intervention for one week while continuing to recruit. The goal was to talk to parents attending programs and functions at GGCC and to target children participating in the afterschool recreation program at GGCC. The leader of the recreational program had informed the research team that there were twelve 6th, 7th and 8th graders attending the recreational program, yet none had contacted the Health Coordinator to express interest, and none had attended the first SSLN session. On Thursday, February 3, 2011, two more children, whose parents had contacted the GGCC Health Coordinator and wanted their children to participate in the study, arrived for the SSLN program and were consented/assented. On Tuesday February 8, 2011, an additional five children, all from the GGCC afterschool recreation program showed up for the SSLN program with signed consents and were assented. The five children completed baseline measurements and surveys, and then joined the classroom session where the intervention was being delivered by

the two SSLN Instructors (GGCC Health Coordinator and the GGCC Wellness Instructor) who were members of the GGCC research team. A final participant was recruited into the program on Thursday, February 11, 2011, making a total of 17 participants recruited and enrolled.

Retention and Incentives

Different strategies were used to retain the participants for the duration of the study. First, GGCC staff provided verbal reminders to study participants any time they saw the adolescents or their parents and/or legal guardians at GGCC. Second, phone calls were made each week by the GGCC Health Coordinator to the parents and legal guardians of the children enrolled in the study to remind them of the weekly classes. The decision to have the GGCC Health Coordinator who was bilingual make the phone calls instead of the investigator was made because many of the parents did not speak English and/or preferred to speak Spanish and this would further reinforce the relationship between a parent and a bilingual representative to the SSLN study. Similarly, text messages were sent to the children who provided their phone numbers during enrollment to remind them of the classes. During the planning of the SSLN study, GGCC staff had reported that many adolescents attending GGCC programs have cell phones and regularly use them, so this strategy seemed to be appropriate and potentially very effective. Lastly, at the end of each session, the participants were reminded of the next session.

For the SSLN program to be feasible, attendance had to be 80%.

Attendance was recorded for each session and included the number of participants who attended a session, including those who arrived late. Soon after the program started, the investigator and GGCC research team became keenly aware that the participants were not very punctual, resulting in the delayed start of many of the sessions. Since this could impact the delivery of the intervention, action was taken and *on time* incentives were provided. Inexpensive prizes were purchased by the investigator and the GGCC research team from the dollar store to award those participants who arrived *on time*. This process of adapting as a study evolves and making changes to ensure the delivery of the intervention is a key principle in community-based research methodology (Minkler & Wallerstein, 2003). When a child missed a session, the GGCC Health Coordinator called the parent to provide the information from the class that the child missed, assess for potential barriers for further participation, and encourage continued attendance in future sessions. We found, however, that once the SSLN program began, many of the participants told the investigator and research team ahead of time that they were going to miss a session due to various reasons, including doctor and dentist appointment, scheduled sports or school activities or family vacations. These absences were noted in the session attendance records. During one week in the program, when the GGCC Health Coordinator was out of town, another bilingual member of the

research team made the weekly phone call reminders to the parents of the participants.

Initially, planned incentives included \$5 gift cards for pre- and post-intervention data collection and raffle prizes for each session. In collaboration with the GGCC research team, a decision was made to provide both a girl and a boy raffle prize at the end of every session. So that all participants would have a chance to win a prize, the team decided that once a boy or girl won, they would volunteer to be out of the drawing until every other boy or girl won a prize. Prizes were purchased by the investigator and included items such as footballs, basketballs, soccer balls, jumping ropes, athletic bags, and lunch bags. As an incentive for completing data collection, participants received a \$5 gift card for pre-intervention data collection and a \$10 gift card for post-intervention data collection. The difference in the amount for pre- and post-intervention was partly related to an intent to increase the incentive so that the participants would return for the last session when the post-intervention data was collected and partly because the study's community partners (e.g. GGCC) midway through the study, made it known that funds were available to pay for additional \$5 gift cards.

While most of the sessions of the SSLN program did not include the parents and legal guardians, all participants were encouraged to share with their parent and/or legal guardian what they learned and experienced in each class. Although the literature on obesity prevention emphasizes the importance of

including parents (Seo & Sa, 2010, Nader et al., 1996), the investigator and GGCC research team thought the only feasible option was to include the parents at the final session due to the times the program was offered (4:15pm – 5:15pm) and the short duration of the program (8 weeks). Therefore, participants were directed to invite their parents and legal guardians to a celebratory session at the end of the program when they would receive recognition of successful program completion. Invitations inviting parents to the last celebratory session were created by the investigator and handed out one week before the last session. During the last session, data collection would be performed, participants would receive their \$10 gift card, and a healthy meal would be provided for participants and their parents, legal guardians and/or family members. Two grand prizes would be raffled (a raffle prize worth 4 times as much as the weekly raffle prizes), one for a boy and one for a girl. They would have to be present to be eligible for the grand raffle prize.

Intervention

SSLN Curriculum Development. A CBPR approach to research design was utilized throughout the development and implementation of the SSLN intervention. Initially, GGCC expressed to the investigator's mentor, interest in offering a healthy eating and activity program to children and adolescents in their community after seeing the success of the adult SSL program at GGCC and knowing that children and adolescents attending GGCC were at risk for obesity

and overweight. In March 2009, the investigator began to attend meetings at GGCC with her mentor to establish a relationship with the GGCC staff. Soon after a decision was made to collaborate on the healthy eating and activity study for children, the investigator and GGCC staff began regular meetings. Over a period of 12 months, the investigator and GGCC research team collaborated to adapt the theory-based obesity intervention used in earlier studies, first by Grey et al. (2004) and then by Gance-Cleveland et al. (2005a), to the GGCC community setting and adolescent population. While using the CBPR approach increased the amount of time devoted to the preparation of the study, the development of a strong community partnership between investigator and GGCC staff enhanced trust and mutual respect and allowed for the study design to be tailored to the community needs as collaboration on the study progressed.

The curriculum was in English and included a student workbook that contained colorful graphics of adolescents and healthy eating and exercise activities, many of which reflect Hispanic youth (pictures of Hispanic people and Hispanic foods). During weekly preplanning meetings, GGCC staff provided culturally responsive input into both the Student Workbook and the Instructor's Manual. The Instructor's Manual included goals, objectives, materials and lessons for all 16 sessions. The lists for materials needed for each session were revised to match the adapted lessons. For example, when the curriculum called for household items to use to get the participants up and moving, GGCC staff

suggested we use what was available in the room, such as the chairs and tables, rather than towels and ropes that were included in the original curriculum. Participants were asked to stand against the wall with their knees flexed to build lower extremity strength. Adaptations like this were made to teach the participants that they can be active in their own homes without special equipment. Other adaptations to the lessons included revising terminology. For example, in the discussion about body image, there are Hispanic words used frequently to describe *terms of endearment*, or in other words, Spanish words for “overweight”. Discussions on how using the terms can be hurtful or empowering were included in the lesson. Other words used for instruction were adapted to be more appropriate for the literacy level of the participants. An example of this was the substitution of “trigger” for the term, “antecedent”. Activities were also adapted for the study population. For example, a popular Hispanic dance instruction (Zumba) was added to one of the group physical activities and a healthy nacho preparation was added to one of the nutritional activities. The investigator and GGCC research team also adapted activities from the *Salsa Sabor y Salud* program, a nationally recognized healthy nutrition and physical activity program for Latino families. For example, pre-cut pictures of Hispanic foods were used to create a plate of food the adolescents like to eat. The original curriculum did not use Hispanic foods. Program components that were used in the adult SSL program at GGCC were also applied to the study to enhance the potential for

replication and to support GGCC's efforts to offer a healthy eating and activity program for adolescents that is consistent with their current adult program. One activity, for example, was lessons on kitchen and food safety. Through the community-partnered approach, a rich cultural adaptation to the curriculum was achieved and community commitment was ensured.

The intervention teaches adolescents knowledge and skills related to healthy nutrition, PA, and behavior change; as well as, information on how to apply the knowledge and skills to day- to-day living. The intervention sessions were conducted twice a week for a total of 8 weeks and included content as outlined in Table 1.

Consistent with community-based participatory methodology, the intervention schedule required flexibility and adaptation as the study progressed. Changes to the intervention schedule involved adjusting some of the classroom sessions by moving lesson content from one session to another. The SSLN instructors, who were involved in the adaptation of the SSLN curriculum, knew the curriculum well which made moving lessons within a session easy and kept the curriculum intact. For example, when the participants made edible arrangements, the kitchen and food safety lesson (originally scheduled for Session #8) was moved to Session #9 so that the participants could learn to use knives when cutting their fruit for the edible arrangement activity. Overall, the adjustments of the intervention schedule were kept to a minimum.

The nutrition activities were 30-minute sessions designed to combine hands-on participation and nutrition learning while the 30-minute PA sessions were designed to engage the participants in PA and reinforce the importance of daily PA for a healthy lifestyle. It was the intent of the curriculum that the 30-minute nutrition and PA activity alternate every other session so that the participants would receive an equal amount of both. The behavior change components were woven throughout the sessions. While many of the 30-minute classroom sessions focused on teaching behavior change skills (e.g., behavior chains, cues for eating, problem solving, essential life skills, and communication) opportunities to practice the skills were provided during the 30-minute nutrition and PA sessions. For example, an essential life skill is sensible eating and personal rewards. When the participants chose healthy fruits for their edible arrangements, they were praised and encouraged. When the participants demonstrated that they would arrive on time for class, they were given a small reward.

During the preplanning stage, the PA activities were planned for the first session of the week (Tuesday) and the nutrition activities were planned for the second session of the week (Thursday). Two weeks before the SSLN program began, however, the investigator and GGCC research team were notified that the gymnasium was being used on Tuesdays for another GGCC program. Therefore, the PA and nutrition sessions had to be adjusted so that SSLN participants

Table 1

Intervention Components

Session #	Theoretical Construct	Intervention Component	Title	Class Curriculum (30 min)	Nutritional or PA Activity (30 min)
1	Personal, behavior	N/A	Welcome & Introduction*	Introduction - It's All about Energy Balance Data Collection	None
2	Behavior	N/A	Data Collection		Dodgeball
3	Personal, behavior	Nutrition & PA information, behavior activity	Active Lifestyles	Setting Your Personal Goals Being a Group Member (Ropes) Are You Moving? The Behavior Chain	Tested pedometers in the gym
4	Personal, behavior	Behavior activity	Behavior Chains		Dancing activity (Zumba)
5	Personal, behavior	Nutrition & PA information, behavior activity	Burning Calories	Get up and Move Burning Calories PA Pyramid Collect pedometers	English muffin pizza
6	Personal, behavior	Nutrition & PA information, behavior activity	Cues for Eating	What Drives Us to Eat My Cues for Eating How Hungry Am I?	The Anchor Game (group relay competition)
7	Personal, behavior	Self-efficacy, behavior activity	Problem Solving	Problem-Solving Skills Healthy Body Image	Healthy nachos
8	Behavior, Environment	Lifestyle skills, behavior activity	Essential Life Skills	Essential Life Skills SMART Habits Kitchen Safety & Food Safety	Outdoor team competitions
9	Personal	Nutrition information	Food Pyramid – part 1	What Is the Food Pyramid? Serving Size Portion Control	Edible arrangements
10	Personal	Nutrition information, behavior activity	Food Pyramid – part 2	Grains, Vegetables, Fruit	Do You Know Your Friend? (group activity)

11	Personal	Nutrition information	Food Pyramid – part 3	Milk & Yogurt, Meat & Beans, Oils & Fats Pyramid review	Food pyramid
12	Personal, behavior	Nutrition information, Behavior activity	Food Labels	Color Your Plate / food combinations Food Labels Healthy Eating Guidelines	Thunder Feet activity
13	Personal, behavior	Self-efficacy, behavior activity	Communication	Effective Communication Skills Skill Development Techniques Life Excesses Lapse & Relapse	The Poisons We Drink
14	Personal, behavior environment	Social support	Reaching Goals School Lunch	School Lunch Program Asking for What you Need Blood Sugar	Dodgeball
15	Personal, behavior environment	Nutrition & PA information, social support, behavior activity	Fast Food – Eating Out Special Occasions	Dining out the Healthy Way Eating at McDonald's Special Occasions Foods for traditional celebration PA & nutrition goals Distribute pedometers	Volleyball
16	Personal, behavior	PA information, social support, behavior activity	Sharing Event & Celebrate Data collection**	Data Collection Reaching Goals Celebration meal (with family)	Healthy meal

Note. * denotes a 90 minute session. ** denotes a 120 minute session.

would use the gym on Thursdays. The intervention schedule also had to respond to challenges that arose during the delivery of the program. For example, on one

occasion when a PA activity was scheduled, the gymnasium was closed for an unanticipated renovation and the PA activity portion of the session had to be moved outside. When the investigator and research team were notified of this change, the PA activity was altered to include outdoor competitions that could only be done outside. These activities included a water balloon toss and egg-carry races that were fun and promoted group participation and team spirit.

Critical to community-based research is the mutual exchange of ideas and expertise that occurs throughout the research study (Horowitz, Robinson & Seifer, 2009) and in this study, such was the case. While the investigator and SSLN instructors planned to discuss what worked and what did not work well after each session, the team did not anticipate how valuable the *debriefing sessions* were and how they contributed to the curriculum adjustments. For example, once it was evident that the participants enjoyed hands-on activities, two of the nutrition 30-minute activities were adjusted. An activity called Making a Food Collage using pre-cut pictures of foods to create a display of healthy foods was adjusted to Making a Food Pyramid where the participants had to cut out food pictures from magazine ads, draw a food pyramid on a poster board and glue the foods in the proper sections of the food pyramid. The Combination Foods activity was another activity that was revised from being a discussion of healthy and unhealthy foods to an action activity of Making Healthy Nachos using healthy ingredients, such as low-fat cheese instead of high fat cheese. Similarly, some of the PA 30-minute

activities were adjusted once it was clear that the participants enjoyed more competitive team games than individual sports activities. Circuit training was an individual activity that was changed to dodgeball, an activity where participants formed teams and engaged in competition. The last scheduled nutrition activity was changed to volleyball after the participants told the instructors that this was their favorite sport and one that they wanted to do with the SSLN instructors before the program ended. These changes increased participant interest by including them in the decision making process and ultimately enriched the acceptability of the SSLN program by offering more fun activities that promoted healthy lifestyles.

The theory-based SSLN curriculum included behavioral strategies such as goal setting, coping skills, self-monitoring, and contracting which are known to reinforce positive health behaviors in adolescents (Cole et al., 2006). The participants developed both nutritional and PA goals that were reviewed once a week. Participants were asked to revisit their goals to see how they were doing, and to identify barriers and strategies to overcome barriers to performing healthier behaviors. Integral to the SSLN program were activities designed to help the adolescents meet their nutritional and PA goals. Pedometers have been shown to be a reliable and valid method for determining physical activity in adolescents, age 10-15 years (Jago et al., 2006). In this study, pedometers were used as (a) an incentive to encourage self-monitoring and help the adolescent achieve his/her PA

goals and (b) a motivator for the participants to remain engaged in the study. A DMC03 Multi-Function Pedometer is one of the easiest to use, requires no set up process, has a two-button operation and is ideal for adolescents participating in a fitness/wellness program. While recording daily pedometer steps for a week was encouraged for self-monitoring, they were not used for an outcome measure for physical activity based upon the mentor's previous experience with pedometer use in adolescents in this age group. GGCC staff were trained by the investigator in the use and monitoring of the pedometer, however, the two SSLN instructors had previous experience with pedometers and required little instruction in the use of the specific brand of pedometers used for the study. Participants were given pedometers during Session #3 and were instructed to wear them until the next session, record daily steps on the Physical Activity & Pedometer log [PAPL] and return with their pedometers and logs the following session. Participants were instructed to use the goal of 10,000 steps for each day. When only one participant tracked their pedometer steps between Session #3 and #4, it became clear that they were not going to track their steps at the end of the study either, when the goal was to add an additional 2,000 steps to their usual daily step count. Incorporating small lifestyle changes such as adding 2,000 steps to daily activities has been shown to be effective in reducing weight gain in at risk children aged 7-14 years (Lown & Braunschweig, 2008). Following Session #4, the SSLN Instructors reminded the participants to bring in their pedometers, which many did

over the next few sessions, yet they returned the pedometers without any recording of their steps. Due to the poor compliance of tracking their steps, pedometers were distributed at the end of the study for the participants to keep. While the plan to have pedometer steps and self-reported minutes of light-moderate -vigorous activity recorded at the beginning and end of the study in order to provide information about whether or not the adolescent reached their PA goals was a good plan, it became apparent early on that the participants viewed the pedometers as fun incentives to promote PA.

Instructor Training. In the early planning phase of the community-based research study, five members of the GGCC research team committed to being SSLN instructors. Using the Instructor's Manual as a guide, the investigator trained the GGCC Health Coordinator and the GGCC Wellness Instructor to deliver the classroom portion, the GGCC promotoras to deliver the nutrition activities, and the male member of the Health Program to deliver the PA activities in the SSLN curriculum (See Table 1). In concert with CBPR, all instructors had worked closely with the investigator in adaptation of each session of the SSLN curriculum. Two weeks prior to the start of the study, the investigator reviewed the classroom portion of the SSLN intervention (e.g., the section in the Instructor's Manual that had been culturally adapted by the research team and the investigator) with the GGCC Health Coordinator and the GGCC Wellness Instructor who were responsible for teaching this part of the intervention. Both

expressed interest in going through a *dry run* on their own prior to the study start. Shortly after the program started, the two instructors began to meet prior to each session to review the teaching plan. Two weeks prior to the start of the study, the investigator also trained one of the GGCC's two promotoras to deliver the nutritional activity portion of the curriculum. Due to scheduling conflicts, the second promotora was not available for training, however the one who received the instruction would take the lead and no problems were anticipated. It became apparent shortly after the SSLN program began, that the two promotoras did not feel comfortable teaching or leading the participants in the nutrition activity. They were insecure in speaking in front of the classroom and verbally expressed their desire to have the two classroom instructors, not themselves, initiate the nutrition activities. The GGCC Health Coordinator and the Wellness Instructor who were familiar with the entire SSLN curriculum were then assigned to lead the nutrition activities, while the promotoras served as support and helped to prepare the food and materials for each nutrition activity. This change in role assignment worked well, as the participants had already developed a relationship with the two classroom instructors and had not developed a relationship with the two promotoras. Additionally, the one promotora whose primary language was Spanish was able to contribute more in this supportive role, increasing her comfort and satisfaction in participating in the SSLN study. Also, two weeks before the study was to start, the investigator trained the Health Program member

in the delivery of the PA activities. As part of his role at GGCC, the Health Program member routinely teaches and coordinates physical education (PE) classes at GGCC, so he was very comfortable performing as an instructor for this part of the SSLN intervention. Initially, he was instrumental in the development of the 30 minute PA activities as he had the experience and knowledge about PA activities the adolescents enjoyed. Throughout the planning phase of the SSLN intervention, the two promotoras and the Health Program member attended regular SSLN planning meetings and provided input into the adaptation of the nutrition and PA activity portions of the SSLN curriculum.

Measurement

Demographic Variables. Demographic variables measured in the study were: age, race (Hispanic / Latino or Non-Hispanic / Non-Latino), ethnicity (White, Black or African American, American Indian or Alaska Native, Asian, Native Hawaiian or Other Pacific Islander and Other), gender, and level of education in years. Race and ethnicity categories reflect standardized variables used by the Bureau of the Census, U.S. Department of Commerce (USDC, 2003). Anthropometric measures included height, weight, and waist circumference, and physiological measures included blood pressure. All were measured according to measurement protocol. For the analysis, average blood pressure (systolic and diastolic) readings were converted to blood pressure percentiles which better reflect blood pressures in children as they are adjusted for age, gender and height

(Baylor College of Medicine [BCN], 2010; National High Blood Pressure Education Program [NHBPEP], 2004; Rosner, Cook, Portman, Daniels & Falkner, 2008). Table 2 summarizes the instruments and the established reliability and validity for all study variables and measures. All instruments were provided in English and the time required for completion of each instrument is specified.

Evaluation of Feasibility and Acceptability. Feasibility and acceptability of the SSLN intervention was measured by (a) an evaluation of recruitment and retention strategies, (b) participant satisfaction survey, and (c) observations about the fidelity of delivery of the intervention. Evaluation of the recruitment and retention strategies included tracking the number of parents and adolescents expressing interest in participating in the SSLN program, the number of parents and adolescents who signed an informed consent/assent, and the number of adolescents and parents who attended the parent information meeting. Retention was measured by comparing how many participants completed the program to the number who consented. Attrition was measured by attendance which was taken at each session. Participant satisfaction was measured by the Healthy Eating and Exercise Survey (HEES) described below. Observations by the investigator that would provide valuable information about the intervention fidelity included time spent on task, deviations from the session activities and task accomplished, feedback from the instructors, and participant verbal and nonverbal behaviors that would indicate participant engagement and learning.

Table 2

Measures for Data Collection

Aim	Construct	Instrument	Reliability & Validity	Data Collection Session	Time re-quired
	Demo-graphics	Demographic Questionnaire, Anthropometric Data Form	.85 (BMI percentile)	#1 - #4	5 min
2,3	PA and Nutritional Knowledge & Behavior	School PA and Nutrition Survey (SPAN)	.66*, .97* (*HS version)	#1 - #4, 16	20 min
Proposed Mediator					
2,3	Self-Efficacy	Perceived Competence Scale (PCS)	.84, .94	#1 - #4, 16	5 min
2,3	Social Support	Social Support for Eating and Exercise Survey (SSEES)	.78, .88 (friends) .78, .91 (family)	#1 - #4, 16	5 min
Proposed Moderator					
2,3	Acculturation	Short Acculturation Scale for Hispanic Youth (SASH-Y)	.92, > .70	#1 - #4	5 min
1	Intervention Fidelity	Task, Time, Observations	N/A	#1 - #16	N/A
Feasibility & Acceptability Evaluation					
1	Participant Satisfaction	Healthy Eating and Exercise Survey (HEES)	Content validity established	#16	10 min
1	Adherence	Attendance Roster	N/A	#1 - #16	N/A

Following the spirit of participatory research, feedback from the instructors on what worked well and what did not work well, contributed to refining parts of the intervention as the study progressed. Feedback from the program instructors was collected during the *debriefing sessions* held after each SSLN session. Initially these sessions included the GGCC Health Coordinator and the Wellness Instructor (the two classroom instructors), however after Week 3, the two promotoras and the Health Program member began to attend the debriefing sessions to provide additional feedback on the nutrition and PA 30-minute activity sessions. While the two instructors attended all SSLN classroom and nutrition activities, some of the PA activities were attended by just the member of the Health program and the investigator. It was important to have feedback from all instructors involved in delivering the SSLN program for evaluation of the feasibility and fidelity.

The Healthy Eating and Exercise Survey (HEES) is a participant satisfaction survey used to measure acceptability of the SSLN program by the program participants. The questionnaire is a 16-item survey adapted from a satisfaction scale used by the investigator's mentor in prior studies where content validity was established in 6th, 7th and 8th graders (Ward-Begnoche et al., 2009). Participants used a five-point Likert-type scale, to rate the first eleven responses ranging from “None” (1) to “Very much” (5). This part of the survey measures how much they learned, how much they think they will change behavior, and

what parts of the program were enjoyable. Mean scores were computed with a higher score indicating a stronger level of satisfaction. The second part of the survey includes open ended questions asking participants to respond to items about the environment, recommendations for the program for others, favorite and least favorite parts of the program, what the participants would change about the program, and what would they call the program if they were going to give the program a different name.

Study Measures.

Short Acculturation Scale for Hispanic Youth (SASH-Y). The SASHY measured the level of participant acculturation (Barona & Miller, 1994). The scale is a 12-item scale with established validity and reliability in adolescents (Table 2). Different from other acculturation scales, SASH-Y measures cultural behaviors related to both family and social contexts through self-report responses to questions designed for Hispanic youth. The survey uses a five-point Likert-type scale. Responses for questions #1-9 (questions related to language) range from “Only Spanish” (1) to “Only English” (5), and responses for questions #10-12 (questions related to personal relationship) range from “All Hispanic” (1) to “All White” (5). Mean scores were computed and a higher score indicated a higher level of acculturation.

Perceived Competence Scale (PCS). The PCS is a two-part scale measuring confidence in healthy eating and PA. Individuals who feel more

competent have been more likely to consistently make and maintain behavior change and achieve positive healthy outcomes (Williams et al., 2002). The first part of the scale (PCS-Maintaining a Healthy Diet) is a 4-item questionnaire that assesses participant confidence in making a change toward more healthy eating behaviors. The second part of the scale (PCS-Exercising Regularly) is also a 4-item questionnaire that assesses the degree to which an individual feels competent about being able to make a change toward PA. Both scales use a Likert-type scale ranging from “Not at all true” (1) to “Very true” (7). The two parts of the PCS (maintaining a healthy diet and exercising regularly) were treated as two different subscales. Mean scores were computed with the higher scores indicating a higher level of self-competence. Reliability and validity have been reported in individuals over eighteen years (Table 2).

Social Support for Eating and Exercise Survey (SSEES). The SSEES measured social support from parents and peers (Sallis, Grossman, Pinski, Patterson, & Nader, 1987). The survey consists of 10-items on eating and 13-items on exercise and uses a six-point Likert-type scale ranging from “None” (1) to “Very Often” (5), with an option for “Does not apply”. All “Does not apply” responses were recoded as “None” for consistency in interpretation of the scale results (Sallis et al., 1987). For each survey, the adolescent was asked to score each item twice, first, with questions related to family, and second, with questions related to friends. The survey asks how often anyone in the household said or did

what was described during the last 3 months and asks what people might do or say to someone who is trying to improve their eating and exercise habits. The same questions are asked about friends who, according to the author of the instrument, are defined as acquaintances of the adolescent during the last 3 months (Sallis et al., 1987). For this present study, friends were considered acquaintances of the adolescent for the last 2 months, as the study was only 8 weeks long. Mean scores were computed separately for family and friends. Subscales include questions that encourage positive behavior and questions that discourage positive behavior. Questions that discourage positive behaviors were reversed scored so that a higher score is considered a more positive result.

Body Mass Index (BMI). Body mass index (BMI), BMI z-scores and BMI percentile have been used as measures of adiposity in children (Cole, Faith & Heo, 2005). While BMI does not measure body fat directly, it is a reasonable indicator of body fat (CDC, 2011; Barlow, 2007). When adjusted for age and gender, the term BMI-for-age is used to describe “overweight” (when the child or adolescent’s BMI is $\geq 85^{\text{th}}$ percentile and $< 95^{\text{th}}$ percentile) and “obese” (when the child or adolescent’s BMI is $\geq 95^{\text{th}}$ percentile) (CDC, 2011). Both BMI z-score and BMI percentiles are used interchangeably to determine weight status in children and adolescents, however, the BMI z-score is a better analytic variable to use for determining adiposity change over time (Must & Anderson, 2006). In this study, BMI percentile was used to describe the sample population at baseline and

post-intervention, and the BMI z-score was used for determining the effects of the intervention on the participant's weight.

School PA and Nutrition Survey (SPAN). The SPAN is a self-report of nutritional knowledge, attitude, and behavior, and PA behavior (Hoelscher, Day, Kelder, & Ward, 2003b). Using the SPAN survey is superior to other instruments because of its ease in administration, its ease of use in low literacy population, its availability in English and Spanish, and its ability to address both nutrition and PA (which are the targeted behaviors in the SSLN intervention; Hoelscher, Day, Kelder, & Ward, 2003a). The SPAN survey has two versions, an elementary-school version for fourth grade children, and a high-school version for eighth grade to eleventh grade children. The one used in this study is the elementary-school version which was validated in fourth grade students and is more appropriate for the study population than the version for older children due to limited literacy issues (Thiagarajah et al., 2008). The decision for using the fourth grade version was reinforced by reviewing both versions of the SPAN with the GGCC research team, who felt the added pictures and wording of the questions in the elementary version would help the participants understand the questions. While all study participants are required to read English, some may have varied reading levels and this survey was written for children with a reading level appropriate for a 9-year old.

Psychometric properties of the SPAN are reported. Preliminary evaluations of the elementary version indicate an assessment of validity of the food consumption items, which were tested in fourth grade students by comparing the food intake behavior questions to a 24-hour dietary recall (Thiagarajah et al., 2008). Correlations between SPAN item responses and recall data ranged from .25 for bread and related products, to .67 in other items (e.g., gravy and beans) (Thiagarajah et al., 2008). The kappa statistic for the survey items varied from .06 (chocolate candy) to .69 (beans). Reproducibility of an earlier version of the SPAN, the SBNM (School-based Nutrition Monitoring) was also tested in fourth grade students using a test-retest design to measure nutrition behavior, PA, activity behavior and overall food selection skills (Penkilo, George, & Hoelscher, 2008). Of the 43 questions that were included in the reproducibility analyses, test-retest kappa values were moderate to high (greater than .40) for more than 90% of the questions.

The fourth grade (elementary) 2004-2005 version of the SPAN used in this study has 49 questions. The survey contains subscales addressing the adolescent's dietary and physical activity behaviors. These subscales include nutrition knowledge, nutrition attitude, PA behavior, and sedentary behavior. A subscale for nutrition behavior was created that included 23 SPAN questions about nutrition behavior. Questions from the survey that addressed the intake frequency of various foods by asking the child to recall high fat food items, high

caloric/low nutrient food items, fruits and vegetables, and grain products from the day before were included in the nutrition behavior subscale. Positive nutrition behaviors were combined with negative nutrition behaviors (total of 23 items) that were reverse scored such that a higher number represents healthier nutrition behavior. Nutrition knowledge included five items that addressed which of the food groups one should eat the most servings each day and which of the food groups one should eat the least servings. “How many total servings of fruits and vegetable should you eat each day?” is an example of a nutrition knowledge question. The nutrition attitude subscale included three items, such as “The foods that I eat and drink now are healthy” and “Skipping meals such as breakfast or lunch makes it hard for me to do well in my classes”. Mean scores were computed for all nutrition subscales and a higher number indicated healthier nutrition.

Other items on the survey measure the adolescent’s PA behaviors, both active and sedentary. Specifically, two items ask how often the child participates in moderate and vigorous PA, and three items ask how many hours are spent in sedentary activities such as television viewing, computer and video games. The PA behavior subscale (moderate or vigorous activity) asked how many days the adolescent participated in PA in the last seven days. Similarly, the sedentary subscale asked how many hours the adolescent spent viewing television, playing video games or working on the computer per day. Mean scores were computed for both subscales, PA behavior and sedentary behavior, with high scores for PA

behavior and low scores for sedentary behavior indicative of more positive behavior.

Data Collection

One week prior to the first Session, the investigator reviewed all survey instruments and measurement protocols, included in the Instructor's Manual, with the two GGCC instructors and the investigator's mentor. Survey packets that included pre- and post-intervention surveys and measurement forms were put into one document for ease in administration using a Case Report Form (CRF) document for each participant. All survey forms in the CRF packets contained code numbers and dates. Both GGCC instructors were familiar with survey administration and required little training except for orientation to the SSLN survey instruments which was completed in one of many meetings during the planning phase of the SSLN study.

The investigator and GGCC research team collected data over a three week period. The two GGCC instructors collected the survey data and the investigator and the investigator's mentor performed the anthropometric and physiological measurements. Data collection consisted of survey instruments and anthropometric / physiological measurements (e.g. height, weight, waist circumference and BP). The adolescents completed the surveys individually at their own pace. Participant measurements took place in two classrooms of GGCC

where privacy was ensured and the participants were comfortable. All measurements were taken per study protocol.

Data Analysis

Data Management. Prior to data collection, data files for the study were set up by a graduate student trained in data management processes by an ASU faculty with expertise in research data management. Identification codes were assigned to all data collection forms. Identifiers linking the codes to individual names were created by the GGCC Health Coordinator and entered electronically into a master list on a secured computer. The list was printed and sealed, and provided to the investigator who placed the list in a locked file drawer in the investigator's locked office. The graduate student worked with the investigator to set up the electronic data files. Confidentiality of all study materials and survey data was maintained at all times by restricting all use of study materials and survey data to be done in the investigator's locked office.

All quantitative survey data was entered by the investigator into a designated computer, using PASW Statistics (SPSS) 18.0 software that was not linked to public access servers, was password protected and restricted to only study personnel (investigator and graduate student). All data was protected with a computer antivirus protection program and a hacking protection for systems and files. Weekly computer backups of study materials and survey data were performed by the investigator and were archived on a secure external hard drive

kept in the investigator's locked office. Observation notes for each session were recorded by the investigator and entered into the same secure computer. Once all survey data was entered and verified, paper forms of survey data were shredded.

Missing Data. Missing data points were entered as 99. There were a total of four out of 303 missing data points in both pre- and post intervention data. Missing data from pre-intervention data (one data point) was identified to be on a survey completed by the only participant who did not complete the program and this individual's data was not used in the data analysis. Three missing data points on post-intervention included (a) a question from the SPAN instrument not used in the data analysis, (b) a question from the SPAN instrument that was scored as correct or incorrect and the missing data point indicated the participant selected two responses when only one was required and both of the two responses were "incorrect", so this item was scored as zero, and (c) a question from the HEES instrument where a simple imputation was performed by substituting the sample mean for the missing data point (Shadish, Cook & Campbell, 2002). Missing data were managed as stated, prior to data analysis. Pre-intervention survey data was entered by the investigator and verified 100% by the investigator and the investigator's mentor; post-intervention survey data was entered by the investigator and verified 100% by the investigator and the graduate student. There was only one discrepancy found and the data was re-verified using the original data entry.

Data Analysis Procedure. The study was a one group, pretest-posttest design developed and implemented as a feasibility pilot study. Data analysis was completed using only cases where pre and post data were available ($n = 16$). Univariate descriptive statistics (frequencies, means, ranges, skewness, kurtosis, and standard deviations) were run on all variables. After examining a histogram of the data, no outliers were identified. Data distributions identifying skewness or kurtosis were analyzed and none necessitated using a logarithmic transformation to achieve an equality of variance (Maxwell & Delaney, 2004).

Evaluation of Intervention Fidelity. Intervention fidelity refers to the extent to which the delivery of the intervention adheres to the protocol and theoretical premises (Planas, 2008). Monitoring the fidelity of the intervention is essential to explaining the results of the study and to ensuring internal validity. Evaluation of intervention fidelity in the SSLN study included (a) start and end times of each SSLN session as well as time spent on each task for each session as outlined in the Instructor's Manual, (b) deviations from session activities including lessons not done and activities added, (c) feedback from the observer (investigator) and provider (instructors), and (d) participants "receipt of the treatment" as indicated by verbal and nonverbal behaviors. These measures are consistent with reported process evaluation measures in feasibility studies (Fulkerson et al., 2010) and treatment fidelity recommendations in health behavior studies (Bellg et al., 2004). The Instructor's Manual served as the

protocol for the study and contained a detailed description of all activities for each of the 16 SSLN sessions. The investigator observed all sessions and recorded each session using the Observation Record included in the Instructor's Manual.

Start and end times for each session (as well as each activity within the sessions) were recorded to determine the feasibility for providing the content in the allotted time for delivery. Each SSLN session was scheduled for 60 minutes except for the first and last session, and when sessions went over the 60 minutes, these were recorded. When a session ran out of time, content from that session was covered during the next session. During the pre-planning stage, the investigator and GGCC research team discussed the possibility of some content taking more time than other content, so a consensus decision was made that if this should occur the content would be taught in a future session and when other lessons took less time.

Time spent on task for each of the activities included in a session was recorded for all 16 SSLN sessions. While all lessons included in the SSLN intervention were delivered, there were occasional times when activities (lessons) were not delivered to the level of detail as outlined in the Instructor's Manual and these were recorded. Also included in time spent on task, was the recording of deviations from the scheduled curriculum which included lessons added and workbook exercises not completed or partially completed. Since the SSLN program was a small pilot study, it was considered feasible if 80% of the lessons

in all 16-sessions were delivered at 100% (e.g., they followed the Instructor's Manual step by step), and if content could be delivered as planned in the allotted time frame.

One of the key assets in assessing fidelity is whether the participant "received the treatment." This was evaluated by observing verbal and nonverbal behaviors. Behaviors that demonstrated the participant's ability to comprehend the content and apply the behavior skills that were delivered in the intervention were recorded on the Observation Form. Observation notes were reviewed and summarized for evidence that participants were engaged in the activities and learning had occurred.

Data related to evaluation of fidelity was analyzed by quantifying those areas that could be quantified (e.g., number of sessions that started on time, number of deviations from protocol) and summarizing qualitative data such as observations of behaviors and feedback from instructors.

Analysis for Specific Aim 1. Feasibility and acceptability of the SSLN intervention was evaluated by analysis of recruitment, retention, and participant satisfaction. The recruitment strategies include the number of parents and adolescents expressing interest in participating in the program, the number attending the parent information meeting, and the number of participants/parents signing an informed assent/consent. Retention was measured by the number who consented compared to those who completed the SSLN intervention. Analysis of

the retention strategies (e.g., phone calls and text messages reminding the participants of future sessions, raffle prizes awarded at the end of each session, attendance at each session) provides information on avoiding attrition. Attrition rates including declining participation and dropping out were analyzed by the investigator. The intervention feasibility criteria for overall attendance were set at 80% for participants who complete all intervention sessions. Acceptability was determined by participant satisfaction reported in the HEES findings and from observation data collected at each intervention session identifying perceived acceptability of the intervention through engagement in activities. Lastly, monitoring the fidelity of the intervention is essential to pilot testing an intervention to help determine the degree of execution, the success or failure of the execution, and what factors affect the ease or difficulty in implementing the intervention (Bowen et al., 2009). Observations of verbal and nonverbal behaviors that indicate the participant was engaged and learning and observations of the delivery of the curriculum were recorded. Observation data was used to determine the extent to which the delivery of the intervention adhered to the protocol and theoretical premises.

Analysis for Specific Aim 2. Preliminary efficacy was measured by conducting paired *t*-tests of all study variables. A statistically significant result provides information on whether or not the intervention made any difference. Criterion for statistical significance was set at .05. Cohen's *d* was run to quantify

the size of the intervention effect. An effect size of .2 indicated a small effect, a .5 indicated a medium effect and a .8 indicated a large effect (Maxwell & Delaney, 2004). Confidence intervals were run on pre- and post-test data which inform the likelihood that the estimate of effect size is representative of the overall population (Kazdan, 2003).

Analysis for Specific Aim 3. Bivariate correlations between moderating, mediating, and outcome variables were performed to determine the direction and magnitude of the relationships among the variables illustrated in the conceptual model. Baseline data was used for bivariate correlations as the intent of the study was not to test a predictor model but to explore relationships which would be useful for future model testing. Establishing existing relationships between variables influencing healthy eating and activity behaviors of Hispanic adolescents is the first step in developing a multivariate model where mediators and moderators can be tested.

Chapter 4

RESULTS

Demographics

The sample consisted of 17 participants, 7 boys and 10 girls from the 6th, 7th, and 8th grade. While 30 middle school-age adolescents were initially targeted to participate in the study, the final number of participants failed to meet this target. Demographics of the sample adolescents participating in this study are

summarized in Table 3. There were four pairs of siblings from four families; one pair was twin girls, and the other pairs were a brother and sister. Ethnicity was reported as 94.1% “Hispanic or Latino” and 5.9% “Not Hispanic or Latino”, as one child checked the Not Hispanic or Latino” category. One child checked the race category labeled, “American Indian or Alaskan Native” (5.9%) and another checked “Asian” (5.9%). Results of the Acculturation Scale (SASHY) showed that the sample was bicultural with a preference for Spanish language and Hispanic personal relationships ($M = 2.97$, $SD = .52$).

At baseline, there were nine (56%) participants who were normal weight ($BMI < 85\%$), two (13%) participants were overweight ($85\% \leq BMI < 95\%$) and five (31%) participants who were obese ($BMI \geq 95\%$).

Specific Aim 1 - Evaluate the feasibility and acceptability of the SSLN Program. Feasibility and acceptability of the SSLN intervention was evaluated by (a) analysis of recruitment, retention, and attrition, (b) the participants’ responses to the HEES, and (c) observations about the fidelity delivery of the intervention.

Recruitment, Retention and Attrition. Overall recruitment for the SSLN study took five weeks. Although, over fifty fliers were posted at GGCC and disseminated to community organizations and schools, personal contact by GGCC staff was the most effective. Prior to the parent meeting, the GGCC Health Coordinator had collected names of twelve potential participants and called to

Table 3

Demographic Data (N = 17)

Demographic variable		<i>N</i>	Percent
Gender	Male	7	41.2
	Female	10	58.8
Age (yrs)	11	3	17.6
	12	9	52.9
	13	4	23.5
	14	1	5.9
Ethnicity	Hispanic or Latino	16	94.1
	Not Hispanic or Latino	1	5.9
Race	White	2	11.8
	American Indian or Alaska Native	1	5.9
	Black or African American	0	0.0
	Asian	1	5.9
	Other	13	76.5
		Mean (SD)	Min - Max
Acculturation		2.97 (.52)	2.33 – 3.75

invite them to the parent information meeting. Of the twelve that were called, ten of the parents showed interest. While none of them refused to attend, three of them said their children could not participate because of scheduling conflicts such as after school tutoring, and/or sports activities. No further demographics about the refusals were collected. Five out of the ten parents and/or legal guardians attended the parent information meeting. Informed consents and assents for seven eligible children were obtained. At another recruitment event, the MOM meeting, none of the parents who attended had children in the age group appropriate for the study. After word of mouth about the SSLN study spread through the community,

five parents and participants approached the GGCC Health Coordinator and during the first week of the program, five more adolescents were enrolled. Despite having changed the procedure for obtaining informed consents to sending home information about the study with interested adolescents from the Boys and Girls Club, no adolescents were recruited from the club. Five adolescents who were participating in the GGCC afterschool recreation program were enrolled in the SSLN program. A total of 17 participants (10 girls and 7 boys) were enrolled, consented, and assented in the study.

Retention of the SSLN program was measured by the number of participants who consented and completed baseline measures compared to those who completed the program. Ninety-four percent ($n = 16$) completed the program. One girl attended two sessions and did not return. GGCC staff was notified by the girl's mother that she had health problems (asthma) and missed school frequently because of her asthma and going to doctors and it would be too difficult for her to attend the SSLN program on a regular basis.

Attrition was measured by attendance, which was taken at each session. Overall attendance by program completers was 88.1% (192 sessions attended/218 total sessions offered for all participants). Seven (43.8%) adolescents attended all sessions in the SSLN program; one missed two sessions because of illness and another missed one session because of illness; one missed two sessions because of a school sports activity, two missed a session each because the family went out of

town; one missed one session because of a dentist appointment; and one missed a session because of a school concert. The SSLN program was an after school program and during the time the program was offered, the participants had spring break yet were expected to attend both sessions that week. As anticipated, attendance during this week was lower than all other weeks (e.g., Session #13 = 75%, Session #14 = 62.5%) compared to 88.2%, the average session attendance for all sessions.

Participant Response to Healthy Eating and Exercise Survey (HEES).

Acceptability of the SSLN program was measured by participant satisfaction and investigator observations. Results of the survey are summarized in Tables 4-6.

The first part of the survey measured how much the participants learned, how much they thought they would change behavior, and what parts of the program were enjoyable (Table 4). The participants were asked to rate their responses on a five-point Likert-type scale, ranging from “None” (1) to “Very much” (5). The mean scores are reported for each question and a higher mean indicates a higher level of satisfaction. Results showed an overwhelming positive response.

Participants reported they learned more new information about PA ($M = 4.25$, $SD = 1.13$) and slightly less new information about nutrition ($M = 3.81$, $SD = 1.42$).

When asked whether or not they would change their PA behaviors, the participants responded favorably ($M = 3.94$, $SD = .68$). Similar responses to the question of whether or not they would change their nutrition behaviors were

Table 4

Healthy Eating and Exercise Survey – Part 1

Question	Mean (<i>SD</i>)	Min	Max
1. How much of the workbook was easy to read and follow?	4.19 (.75)	3	5
2. How much of the information did the Instructors present clearly?	4.31 (.70)	3	5
3. How much new information did you learn about nutrition during the classes?	3.81 (1.42)	0	5
4. How much new information did you learn about physical activity during the classes?	4.25 (1.13)	1	5
5. How much do you think you will change about your nutrition habits?	3.94 (.85)	2	5
6. How much do you think you will change about your physical activity habits?	3.94 (.68)	3	5
7. How much of the program was fun for you?	4.63 (.72)	3	5
8. How much did you enjoy the classroom discussion part (i.e. learning about nutrition, problem solving, etc.) of the program?	4.44 (.81)	3	5
9. How much did you enjoy the cooking part (i.e. learning how to prepare healthy snacks) of the program?	4.5 (1.1)	1	5
10. How much did you enjoy the physical activity part (i.e. learning new exercises and games) of the program?	4.38 (.89)	2	5
11. How much did you enjoy having your parent participate?	3.88 (1.2)	1	5

reported ($M = 3.94$, $SD = .85$). Not surprisingly, the question that was scored the highest was whether the participants considered the program fun ($M = 4.63$, $SD = .72$). Each session of the SSLN program contained two 30-minute components, the class room lecture / discussion and either a cooking / nutritional activity or PA. While the participants were mostly satisfied with all components of the program, the highest score was for the nutritional activity ($M = 4.5$, $SD = 1.10$), followed by classroom discussion ($M = 4.44$, $SD = .81$) and lastly, the PA ($M = 4.38$, $SD = .89$). The HEES also asked about the student workbooks used for the classroom discussions. The participants reported that much of the workbook was easy to read ($M = 4.19$, $SD = .75$). When asked if the information the instructors presented was clear, the participants responded very favorably ($M = 4.31$, $SD = .70$).

Table 5 shows the results for participant's rating of the learning environment. While most of the SSLN program took place in a GGCC classroom, other areas of GGCC were also utilized. For example, the participants used the gymnasium for the PA activities and the parking lot outside for one of the PA sessions when the gymnasium was unavailable. One of the nutrition sessions started in the kitchen where the participants assembled "Healthy Nachos" and another activity, "Drawing your Body Image," occurred in the hallway of the community center. When rating the satisfaction of the environment, the

participants were allowed to check all that applied. Their responses were mixed. The majority (69%) of the participants rated the environment comfortable and 38% reported they had plenty of room. Interestingly, 38% of the participants reported the environment was noisy and 25% reported the environment was quiet. Even though the program was offered both inside and outside GGCC, 25% of the participants rated the environment hot and 31% rated the environment cold. The most frequently reported aspects of the environment that might be considered as negative were crowding, reported by 6%, and uncomfortable, reported by 6%.

When asked if they would recommend the program to other middle school-age students, options included (a) yes, (b) only for 6th graders, (c) only for 7th and 8th graders, and (d) no. The majority (68%) would recommend the program for other middle school-age students. Only 25% would recommend the SSLN program for only 7th and 8th graders and 6% did not recommend the program at all for other middle school-age students.

Open-ended questions were used to ask the participants what was their favorite and least favorite parts of the SSLN program (Table 6). Interestingly, the nutrition component and the physical activity component received equal responses, overall, for being the favorite part of the program. One participant said his/her favorite part was that “my friend came” and another said “getting to meet new people”. The least favorite part was “writing in the handbook” and “doing the work”. Other least favorite parts were “eating papaya”, “when we had to read”,

Table 5

Healthy Eating and Exercise Survey – Part 2

Question	<i>N</i> (Percent)	
	Yes	No
12. How would you describe the learning environment? *		
Noisy	6 (18.8)	10 (31.3)
Quiet	4 (12.5)	12 (37.5)
Hot	4 (12.5)	12 (37.5)
Cold	5 (15.6)	11 (34.4)
Crowded	1 (3.1)	15 (46.9)
Plenty of room	6 (18.8)	10 (31.3)
Uncomfortable	1 (3.1)	15 (46.9)
Comfortable	11 (34.4)	5 (15.6)
15. Would you recommend this program to other middle school students?		
Yes	11 (34.4)	
Only for 6 th graders	0	
Only for 7 th & 8 th graders	4 (12.5)	
No	1 (3.1)	

Note. The participants were allowed to select more than one response.

and the “learning part.” One participant said he/she did not like “the Zumba”.

Two of the participants reported their least favorite part was “that the program ended so soon”. When asked what they would do to change the program, half of the participants said “nothing”, and half responded “more time”, “less writing”, “more cooking”, and “more physical activity”. Lastly, the satisfaction survey asked the participants, “If they were going to name the program, what would they

Table 6

Healthy Eating and Exercise Survey – Part 3

Question: What was your favorite part of the program?
The cooking part ($n = 5$), the PA part ($n = 3$)
Both the cooking and the PA part ($n = 10$)
That my friend came ($n = 1$)
Getting to meet people ($n = 1$)
Learning how to eat healthy and exercise ($n = 1$)
When we did the fruit tree ($n = 1$)
Playing volleyball ($n = 1$)
When we did the soda thing ($n = 1$)
Everything ($n = 1$)
Question: What was your least favorite part of the program?
Writing in the workbook ($n = 6$)
The learning part ($n = 6$)
That the program ended so soon ($n = 2$)
I didn't dislike anything ($n = 1$)
Eating papaya ($n = 1$)
Physical Education, the Zumba ($n = 1$)
Not doing much exercise ($n = 1$)
Question: What would you change about the program?
Nothing ($n = 8$)
Less writing, more cooking and more PA ($n = 5$)
More time ($n = 2$)
The work ($n = 1$)
Question: If you were going to name this program, what would you call it?
The same as it is ($n = 4$)
Nutrition class ($n = 2$)
Work Well Eat Right ($n = 1$)
I don't know ($n = 2$)
Have fun being healthy ($n = 1$)
Eat healthy and stay active ($n = 1$)
The fun program for kids ($n = 1$)
PAN (Physical Activity & Nutrition) ($n = 1$)
Latino Club ($n = 1$)
Healthy for your Life ($n = 1$)

call it?” While 25% of the participants responded that they would keep the same name, 75% responded with different and even creative titles. These included, “Work Well, Eat Right”, “Eat Healthy and Stay Active”, “The Fun Program for Kids”, “Latino Club”, and “PAN (Physical Activity and Nutrition)”.

Observations about the Fidelity Delivery of the Intervention. A measure of feasibility and acceptability was observation about the fidelity of delivery of the SSLN intervention. This included start and end times of each SSLN session as well as time spent on each task for each session as outlined in the Instructor’s Manual, deviations from session activities including lessons not done and activities added, feedback from the Investigator and instructors, and observations of the participants “receipt of the treatment” as indicated by verbal and nonverbal behaviors.

Time on Task. Excluding Sessions #1 and #16 (data collection sessions), five sessions (36%) were completed in the allotted 60 minutes, two sessions (14%) were completed in less than the allotted 60 minutes, and seven (50%) were completed in more than the allotted time. Because many sessions started late due to the participants not arriving on time, many sessions went over the predetermined stop time to ensure that the participants would receive the complete curriculum. When *on time* prizes were implemented midway through the program, *on time* attendance improved by 50%, resulting in more sessions starting on time and finishing on time.

Deviations to Program. Due to the delay in recruitment, modification of the intervention schedule was made which resulted in each classroom session being delayed by one session. Despite this adjustment, curriculum content was combined so that no content was deleted. Time on task for each of the activities included in each session was recorded for all 16 sessions. Data showed that 86% of all activities (lessons) were delivered as specified in the Instructor's Manual. An example of a lesson that was partially completed was the discussion of what were good sources of fiber, iron, vitamins and minerals. While the importance of fiber, iron, vitamins and minerals was discussed, good sources of the nutrients were not discussed. Another example was during the session on life excesses, the cost of engaging in risky behaviors was not mentioned, yet risky behaviors were discussed. Throughout the SSLN program, there were 3 times the instructors added additional content to the sessions that was not specified in the curriculum. These included during Session #1, when an ice breaker was used to introduce each participant to one another, Session # 9, when bags of sugar were used to compare and discuss the sugar content in different soft drinks, and Session #10, when new foods such as asparagus and papaya were brought to class for the participants to taste. While the lesson discussed benefits from trying new foods, bringing foods into the classroom for the participants to try was not part of the lesson. Time spent on task also included observations of whether the workbook exercises were completed. There were 36 workbook exercises in the SSLN

program and the participants did not complete or partially completed 6 (17%). Some of the exercises that were not completed or partially completed due to the lack of time in the classroom were the PA Diary, the Activity & Exercise Checklist, the New Pyramid Worksheet, and the Healthy Eating Quiz.

Observations of Verbal and Nonverbal Behaviors. Observations of verbal and nonverbal behaviors that indicated the participants were engaged and learning were recorded. Perhaps the most important observation was that the participants were more engaged when the activity required them to do something. The more the children “did something”, the more they were engaged, and this was observed in both the physical activities (e.g., when the students competed in the anchor game in the gymnasium), and the food activities (e.g., the students making an edible arrangement using an assortment of fruit). Participants would get bored, disengaged, and start side conversations when “being lectured to”. When the children were asked to read from the student workbook, engagement increased. When all or most of the sixteen participants were in attendance, it became more difficult to get everyone’s attention.

Another observation indicating the participants were engaged was when they had to form groups or select partners for some of the activities. When asked to find a partner, some children were left out. Counting off one, two, three, etc. and then forming groups of the “ones”, “twos”, etc. worked well and did not exclude any one participant. The participants enjoyed acting funny and laughing

at themselves and one another. For example, when asked how long it takes to develop a habit, one of the participants responded “one day”, another responded “three days” and another stated “a year and a half” and everyone laughed. Behaviors such as this were observed frequently, indicating the participants were not only having fun but paying attention to the content being delivered.

Other observations that suggested learning were questions or comments the participants made throughout the program. For example, one asked, “Does yogurt have sugar in it?” and “Is two hundred calories a lot?” Each week, the instructors would ask the participants what they learned the previous week. Some responses were, “I learned that you eat more in front of the TV”, “You should drink enough water that is half your body weight”, and “Fruits provide vitamins”. At the celebration dinner, a grandparent announced that she thought her granddaughter learned from the program because when she came home from the grocery store with a bottle of FANTA soda, her granddaughter told her that the soda had the highest sugar content of all sodas and that was not good.

Instructor Feedback. Feedback from the program instructors was critical to determining the feasibility of the SSLN program. Debriefing sessions were held with the investigator and the program instructors immediately following each session to discuss what went well and what did not go well, what could have been improved and perceptions of participant engagement and learning. Instructors reinforced the investigator’s observations of nonverbal behavior that indicated

participants were more engaged in active learning than lecture style classroom activities. The instructors also expressed concern that managing the classroom when all or almost all participants were in attendance was a challenge due to the interruptions and normal “kid” behavior of middle school-age adolescents. The 30-minute time allotted for classroom sessions was often problematic as instructors felt rushed to get through the content and on occasion were not able to cover the content in depth. Alternating the nutrition and physical activity component scheduled for 30 minutes after each classroom session, allowed some flexibility in the classroom schedule and kept the program interesting and exciting.

We learned that there were advantages to using two instructors to deliver the SSLN program. While co-teaching was labor intensive, the instructors felt they were better able to deliver the classroom curriculum, keep the classroom more manageable and provide variety in instruction that appeared to be well received.

Since the participants were not always able to complete the exercises in the workbook, the instructors suggested that sending black and white copies of the workbook contents home might help to engage participation in the workbook, however, when copies of the Grains and Vegetables worksheet from their workbook were given to the participants to take them home, none of the students

said they completed them or discussed them with their parent, so no more copies were made and sent home.

One of the objectives in the SSLN program was for the children to develop nutrition and PA goals and revisit these throughout the program. Initially, participants were reluctant to discuss their goals, yet as time went on, they began to verbally express what goals they had written and whether or not they had changed their goals since the beginning of the class. Examples of goals were “more exercise” and “not eat hot Cheetos”. At the end of the SSLN program, more children responded to what their eating and activity goals were and whether or not they had met them. While several replied “Yes” and “Kind of” when asked if they had met their goals, a few offered specifics such as, “I’m still not eating chips” and “I’m trying not to eat sweets”. When asked if the children wanted to share whether they met their goals at the celebration with parents, they said no. Participants were encouraged to set PA goals by using pedometers to monitor their steps. While most were interested in the color of the pedometers, only one participant wore his pedometer as instructed and returned two days later, with his pedometer log and activity sheet completed and exclaiming, “Look how many steps I have!” Only two participants returned wearing their pedometers and when asked if they had recorded their steps, 7 out of 10 raised their hands.

In sum, the SSLN program was a feasible and acceptable program that combined fun, active learning and classroom education on nutrition, PA and

behavior change skills. A retention rate 94% for an 8-week pilot study shows the success of the retention strategies and the acceptability of the SSLN program. The HEES satisfaction survey results suggest adapting the curriculum to be age and culturally appropriate was well received by the participants. While there were few challenges to intervention fidelity, results indicate the participants were for the most part very engaged and some learning took place. Delivering classroom content as planned was not always feasible in the 30 minutes time frame.

Specific Aim 2 – Estimate the preliminary efficacy of the SSLN program. The preliminary effects of the SSLN intervention on middle school-age participants completing the SSLN program were examined by evaluating anthropometric and physiological measures (BMI z-scores, waist circumference, and BP percentile), nutrition knowledge, attitude and behavior, PA behavior and sedentary behavior, peer and parent social support, and perceived confidence in eating and exercise. The descriptive statistics and t-test results are found in Table 7. Positive changes in mean scores pre- and post-intervention that had small effect sizes were; perceived confidence in eating and exercise, social support from family for eating and exercise, social support from friends for eating, nutrition attitude, and sedentary behavior. Positive changes in means scores that had medium effect sizes were seen in PA behavior. Lastly, out of all variables there were three that showed changes in mean scores that were negative changes. They were BP systolic and BP diastolic percentiles and nutrition knowledge, yet all

three had large effect sizes. No effect size was noted for social support from friends for exercise and nutrition behavior.

Participants' BMI z-score decreased from .97 ($SD = .99$) pre-intervention to .86 ($SD = 1.01$) post-intervention, a decrease of 11.3% and demonstrated no effect size. While not statistically significant, this change represents a change in a positive direction. Further study with a larger sample size, a control group, and longer follow-up is warranted. Additionally, there was a change in the number of participants who were normal, overweight, and obese at baseline compared to the number who were normal, overweight, and obese after the SSLN intervention (Table 8). BMI percentile at baseline indicated 56.3% ($n = 9$) children were normal weight, 12.5% ($n = 2$) were overweight, and 31.3% were obese ($n = 5$). Post-intervention, the percentages changed as 62.5% ($n = 10$) of the children were normal weight, 6.3% ($n = 1$) were overweight, and 31.3% ($n = 5$) remained in the obese category. Although not statistically significant, the participant's BMI percentile decreased 4.1% from 74.98 ($SD = 24.25$) to 71.93 ($SD = 25.08$). While the participant's waist circumference decreased by 2.9% from 31.08 inches ($SD = 5.35$) to 30.18 inches ($SD = 5.39$), this change was not significant and had no effect size. The only negative change was seen in the adolescent's blood pressures. Average systolic percentile readings increased from 10.68 ($SD = 10.34$) to 23.67 ($SD = 18.95$) and also had a large effect size (Cohen's $d = -0.85$), and diastolic percentile readings increased from 25.47 ($SD = 19.04$) to 49.68 ($SD =$

21.42) with a large effect size (Cohen's $d = -1.19$). Since the blood pressures were reported in percentiles, the increase from pre-intervention to post-intervention is a negative finding.

Results showed positive trends in perceived confidence with a greater change in perceived confidence in eating compared to perceived confidence in exercise. Although not statistically significant, perceived confidence in eating increased 5.8% from 17.38 ($SD = 4.46$) to 18.38 ($SD = 3.98$), and had a small effect size (Cohen's $d = -.24$). Pre- and post-intervention scores for perceived confidence in exercise increased 4.7% from 19.88 ($SD = 4.43$) to 20.81 ($SD = 4.69$) and was also not statistically significant yet had a small effect size (Cohen's $d = -0.2$).

There were four different measures of social support. Social support by family for exercise increased from 23.75 ($SD = 13.52$) to 28.63 ($SD = 17.08$) and had a small effect size (Cohen's $d = -0.32$). Social support by friends for exercise also increased from 27.44 ($SD = 18.44$) to 28.81 ($SD = 19.09$) but did not have an effect size. Social support by family for eating decreased from 32.63 ($SD = 5.78$) to 30.69 ($SD = 4.8$) and had a small effect size (Cohen's $d = 0.37$). Social support by friends for eating also decreased from 28.56 ($SD = 3.18$) to 26.69 ($SD = 5.53$) and had a small effect size (Cohen's $d = .41$). None of the social support measures were statistically significant, however some had a small effect size as mentioned.

In addition to the BMI z-scores, outcome variables that were targeted in the SSLN intervention (nutrition and PA) had mostly positive changes pre- and post-intervention, and few were statistically significant. Nutrition behavior increased only slightly from 34.06 ($SD = 4.14$) to 34.31 ($SD = 5.08$), and was not statistically significant and had no effect size. Nutrition attitude increased from 3.0 ($SD = 1.16$) to 3.38 ($SD = .89$), and had a small effect size (Cohen's $d = -.37$) which was not statistically significant. Interestingly, nutrition knowledge was the only targeted variable that decreased after the SSLN intervention. Findings show that mean scores decreased from 2.25 ($SD = 1.0$) to 2.19 ($SD = 1.11$) and this finding was statistically significant ($p < .02$) with a large effect size (Cohen's $d = -.89$).

The change in PA behavior, from 8.19 ($SD = 2.86$) pre-intervention to 10 ($SD = 2.58$) post-intervention approached statistical significance ($p < .07$), and had a medium effect size (Cohen's $d = -.66$). There was a decrease in sedentary behaviors from 5.94 ($SD = 2.79$) to 4.94 ($SD = 2.77$), which had a small effect size (Cohen's $d = .36$) and was not statistically significant. It is important to note that for many variables there were extremely wide confidence intervals (CI).

Table 7

Preliminary Effects of SSLN

Variable	Pre-Intervention			Post-intervention			Cohen's <i>d</i>	95% CI	<i>t</i> -value	<i>p</i> -value
	Mean (<i>SD</i>)	Min	Max	Mean (<i>SD</i>)	Min	Max				
BMI	22.76 (5.34)	16.53	35.58	22.23 (5.18)	16.06	33.85	0.1	[-3.27, 4.33]	0.29	0.78
BMI z-score	0.97 (0.99)	-0.46	2.52	0.86 (1.01)	-0.63	2.43	0.12	[-0.61, .83]	0.32	0.75
BMI percent	74.98 (24.25)	32.34	99.41	71.93 (25.08)	26.53	99.23	0.12	[-14.75, 20.87]	0.35	0.73
Waist	31.08 (5.35)	24.88	43.1	30.18 (5.39)	24.2	40.3	0.17	[-2.98, 4.78]	0.48	0.64
Systolic percent	10.68 (10.34)	.60	31.1	23.67 (18.95)	.80	63.6	-0.85+++	[-24.01, -1.96]	-2.41	.02**
Diastolic percent	25.47 (19.04)	7.8	78.2	49.68 (21.42)	15.8	87.1	-1.19+++	[-38.85, -9.58]	-3.38	.002**
Confidence Eating	17.38 (4.46)	9	24	18.38 (3.98)	11	25	-0.24+	[-4.05, 2.05]	-0.67	0.51
Confidence Exercise	19.88 (4.43)	12	28	20.81 (4.69)	13	28	-0.2+	[-4.23, 2.36]	-0.58	0.57

103	SS Family Eating	32.63 (5.78)	23	48	30.69 (4.8)	23	39	0.37+	[-1.9, 5.78]	1.03	0.31
	SS Friend Eating	28.56 (3.18)	23	36	26.69 (5.53)	18	39	0.41+	[-1.39, 5.14]	1.18	0.25
	SS Family Exercise	23.75 (13.52)	10	57	28.63 (17.08)	13	80	-0.32+	[-15.99, 6.24]	-0.9	0.38
	SS Friend Exercise	27.44 (18.44)	10	80	28.81 (19.09)	11	80	-0.07	[-14.93, 12.18]	-0.21	0.84
	Nutrition Behavior	34.06 (4.14)	28	44	34.31 (5.08)	26	45	-.05	[-3.6, 3.1]	-.15	0.88
	Nutrition Knowledge	2.25 (1.0)	0	4	2.19 (1.11)	0	4	-0.89+++	[-1.81, -.19]	-2.51	0.02**
	Nutrition Attitude	3.0 (1.16)	1	5	3.38 (0.89)	2	5	-0.37+	[-1.12, .37]	-1.03	0.31
	PA Behavior	8.19 (2.86)	4	13	10 (2.58)	5	16	-0.66++	[-3.78, .15]	-1.88	.07†
	Sedentary Behavior	5.94 (2.79)	2	11	4.94 (2.77)	1	10	.36+	[-1.01, 3.01]	1.02	.32

Note. CI = confidence interval; LL = lower limit, UL = upper limit. †p < .10. **p < .05. ***p < .001. +++ Large effect size; ++ Medium effect size; + Small effect size; SS = Social Support; PA = physical activity

Table 8

BMI percentile (N = 16)

Weight Category	N (Percent)	
	Pre	Post
Normal weight (BMI < 85%)	9 (56.3)	10 (62.5)
Overweight (85% ≤ BMI < 95%)	2 (12.5)	1 (6.3)
Obese (BMI ≥ 95%)	5 (31.3)	5 (31.3)

Overall, the preliminary effects of the SSLN program on adolescent BMI z-scores, nutrition and PA behaviors showed mixed results, with changes in BP percentiles and nutrition knowledge being the only statistically significant differences. Therefore, caution must be taken in interpretation of the results due to the small sample size used in the study. Changes in nutrition knowledge, nutrition attitude and PA behaviors showed small-to-medium effect sizes, and indicate the potential for efficacy in a larger randomized trial (Cohen, Cohen, West, & Aiken, 2003; Bowen et al., 2009).

Specific Aim 3 – Explore the study relationships. The relationships of study variables were examined by evaluating the correlations between (a) acculturation (moderator) and perceived confidence and social support (e.g., mediators) and the outcome variables (BMI z-score, waist circumference, BP percentile, nutrition knowledge, attitude and behavior, and PA behaviors), and (b) perceived confidence and social support (mediators) and the outcome variables

(BMI z-score, waist circumference, BP percentile, nutrition knowledge, attitude and behavior, and PA behaviors). Results are displayed in Tables 9-10.

The first relationship examined was the correlation of acculturation level with the mediators and outcome variables in the SSLN model (Table 9). Most of the correlations were positive, yet none were statistically significant, therefore only direction and magnitude of the associations are discussed. The relationships among acculturation and the outcome variables were both positive and negative. As acculturation levels increased (e.g., adolescents adopt the cultural patterns of the dominant society; Satia-Abouta, et al., 2002), BMI z-score increased ($r = .10$), waist circumference increased ($r = .32$), BP systolic percentile increased ($r = .03$) and BP diastolic percentile increased ($r = .37$). As acculturation increased, both nutrition attitude increased ($r = .34$) and sedentary behaviors increased ($r = .26$). On the other hand, as acculturation increased, nutrition knowledge decreased ($r = -.36$), nutrition behavior decreased ($r = -.30$) and PA behavior decreased ($r = -.18$).

As acculturation level increased, participants perceived confidence in eating increased ($r = .08$) and perceived confidence in exercise increased ($r = .01$). Results also showed a positive association between acculturation and social support by family for eating ($r = .25$) and social support by friends for eating ($r = .070$). Similarly, acculturation was positively associated with social support by family for exercise ($r = .12$) and less positively associated with social support by

friends for exercise ($r = .01$). All of these increases were fairly weak and as mentioned, not statistically significant.

Table 9

Pearson Correlation Coefficients for Acculturation (Moderator) and Other Study

Variables

Variable ($n = 16$)	Pearson r	Significance
Perceived Confidence		
Eating	.08	$p < .76$
Exercise	.01	$p < .96$
Social Support		
Family Eating	.25	$p < .35$
Friend Eating	.07	$p < .80$
Family Exercise	.12	$p < .67$
Friend Exercise	.01	$p < .96$
Outcome Variables		
BMI z-score	.10	$p < .72$
Waist Circumference	.32	$p < .22$
Systolic Percentile	.03	$p < .92$
Diastolic Percentile	.37	$p < .16$
Nutrition Knowledge	-.36	$p < .17$
Nutrition Behavior	-.30	$p < .25$
Nutrition Attitude	.34	$p < .20$
PA Behavior	-.18	$p < .51$
Sedentary Behavior	.26	$p < .33$

The second set of correlations examined the relationship of the mediating variables with the outcome variables (Table 10). There were several statistically significant correlations.

Table 10

Correlations (Mediators and Outcome Variables)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Perceived Confidence														
1. Eating	1													
2. Exercise	.74**	1												
Social Support														
3. Family Eating	.11	.35	1											
4. Friend Eating	.58*	.70**	.17	1										
5. Family Exercise	.09	.42	.02	.57*	1									
6. Friend Exercise	-.13	.28	.45	.18	.64**	1								
Outcome Variables														
7. BMI z-score	-.29	-.44	-.17	-.27	.03	.08	1							
8. Waist	-.35	-.33	-.21	-.12	.25	.20	.87**	1						
9. Systolic Percentile	-.12	-.23	-.17	.13	-.08	-.002	.06	.10	1					
10. Diastolic Percentile	-.28	-.31	.10	.16	-.002	.04	.04	.18	.61*	1				
11. Nutrition	-.10	.04	.31	-.09	-.31	.08	-.21	-.36	-.13	-.25	1			
Knowledge														
12. Nutrition Attitude	.61*	.31	.25	.15	-.11	-.01	.002	-.02	-.29	-.16	-.17	1		
13. Nutrition Behavior	.62*	.66**	.37	.35	.10	.15	.04	-.14	-.54*	-	.21	.42	1	
										.57*				
14. PA Behavior	.13	.31	.26	.40	.67**	.56*	-.18	-.13	-.40	-.10	.12	-.02	.37	1
15. Sedentary Behavior	-.22	-.39	-.51*	-.06	.25	-.10	.24	.34	.25	.27	-.16	-.35	-.54*	.02

* $p < .05$; ** $p < .01$; *** $p < .001$.

Perceived confidence in eating was positively and strongly associated with nutrition attitude ($r = .61, p < .05$) and nutrition behavior ($r = .62, p < .05$). Perceived confidence in exercise was positively and strongly associated with nutrition behavior ($r = .66, p < .01$). Social support by family for eating was associated negatively with sedentary behavior ($r = -.51, p < .05$). Social support from family for exercise was correlated positively and strongly with PA behavior ($r = .67, p < .01$) while social support from friends for exercise correlated positively and moderately with PA behavior ($r = .56, p < .05$). These results suggest that as adolescents become more confident (greater self efficacy) in eating healthy, they have a more positive attitude about eating healthy and are able to engage more in healthy eating behaviors. Similarly, the adolescent who is more confident in being able to exercise demonstrates healthier eating behaviors suggesting there is a link between eating and exercise. Adolescents who receive social support from family and friends for exercise also are more physically active.

All other associations of the proposed mediators (perceived confidence and social support) with outcome variables (BMI z-score, waist circumference, BP percentiles) were not significant and much smaller than the associations that were statistically significant, and some were positive and some were negative. There were no statistically significant correlations with the proposed mediators and nutrition knowledge. In sum, results show that perceived confidence in eating

and/or exercise only associated with nutrition outcomes and social support from family and friends for eating and/or exercise only associated with PA outcomes. A discussion of these associations is provided in the next Chapter.

Chapter 5

DISCUSSION

The primary aim of this pilot study was to test a theory-based, healthy eating and activity program. *Salud con Sabor Latino para los Niños* (SSLN) was adapted for 6th, 7th and 8th grade Hispanic adolescents using CBPR methodology. Recruitment, retention and attrition, participant satisfaction, and intervention fidelity were examined to determine the feasibility and acceptability of the program. The preliminary effects of the SSLN intervention on mediating variables (e.g., perceived confidence and peer and parent social support) and outcome variables (e.g., BMI z-score, waist circumference, BP percent, nutrition attitude, behavior and knowledge, and PA behaviors) were examined. The relationships of the moderator (e.g., acculturation) and mediators with all other study variables were also examined. This chapter provides interpretations of the findings from the SSLN study and discussion of how findings relate to previous theoretical and empirical literature. Additionally, theoretical considerations, strengths, and limitations of the study and implications for future research and practice are offered.

Summary of Findings

Seventeen boys and girls from the 6th, 7th and 8th grade enrolled in the SSLN study. Data analysis was conducted on only program completers who were nine girls and six boys ($n = 16$). In order to determine race and ethnicity of the sample population, participants were asked to (a) respond yes or no to “Hispanic or Latino” to indicate race, and (b) check a box indicating ethnicity category (White, Black or African American, American Indian or Alaska Native, Asian, Native Hawaiian or Other Pacific Islander and Other). One participant checked yes to “Hispanic or Latino,” and also checked yes to “Asian” and had a mean acculturation score of 3.08, indicating more English than Spanish acculturation. Another participant checked no to “Hispanic or Latino” and “Other” for ethnicity category and had a mean acculturation score of 3.75. A third participant checked yes to “Hispanic or Latino” and yes to “American Indian or Alaska Native” and had a mean acculturation score of 3.66. These responses to race and ethnicity were confusing and the associated acculturation scores for all three participants were higher than the group average (2.97). While it is possible the participants represent ethnicities other than Hispanic because the acculturation levels are more towards English than Spanish, the possibility of participants checking boxes that do not apply cannot be ruled out. This situation points to the limitations of self-report data collection in adolescents. Self-report was used to obtain race/ethnicity information because it is the most common method used (Kazdan, 2003). Additionally, the categories for race and ethnicity used in SSLN were selected

based on national census data standards and may not have been the easiest for adolescents in the study's age group to understand. The confusing results may indicate a different data collection process (e.g., individual versus group) or form should be considered.

Feasibility and Acceptability. The results of recruitment and retention strategies, participant satisfaction and the observations of intervention fidelity indicate that the SSLN program was feasible and acceptable. A key factor in making the SSLN program feasible and acceptable was the application of CBPR methodology to the study. As the SSLN program start date approached, the frequency of meetings and communication focusing on recruitment increased. The support from GGCC leadership to allow for GGCC staff to devote so much time to the study was critical. Without this support, commitment and allocation of resources, it may not be practical to offer the program in other settings (Kim et al., 2005).

Recruitment. Recruitment was successful due to the strength of the community partnership with GGCC, as word of mouth proved to be the best recruitment strategy. GGCC staff who had worked at GGCC for some time, were firmly embedded in the local community, and had well-established personal relationships with parents who were already attending classes at the community center (e.g., aerobics) and knew many parents on a first name basis. These connections not only facilitated recruitment but enhanced the trust, mutual respect

and communication between researcher, GGCC research team, participants and participant's parents, all of which are critical in CBPR (Minkler & Wallerstein, 2003; O'Fallen & Dearry, 2002). The parent information meeting, an idea suggested by the GGCC research team based on past experience, was essential for recruiting participants. Such active recruitment strategy involving direct contact with potential participants has been shown to be more effective in Latino populations compared to non Latino populations (Yancey, Ortega & Kumanyika, 2006). Even though recruiting from the GGCC afterschool recreation program was a part of the strategy early on, the five participants that came from the GGCC afterschool recreation program were late to start in the SSLN program.

Establishing earlier contact with the recreation program leader and eligible adolescents may have helped prevent the delay in the start of the SSLN intervention. Once a child from the recreation program expressed interest, five showed up for the program, suggesting that peer influence, as reported in other studies, may have played a role in promoting interest (Drews et al., 2009).

Unfortunately, recruitment from the Boys and Girls Club was not as successful. A reason for this could be that earlier contact was necessary to develop a stronger relationship and a better process for obtaining buy in from the program leader and help in disseminating the SSLN program information to potential participants at the Boys and Girls Club. Another reason could have been that transportation prohibited many adolescents from traveling from the Boys and Girls Club to

GGCC. The club is approximately five miles away and the program leader had reported that the club could provide a van for transport if there were over ten adolescents participating in the SSLN program. Although it was not feasible to obtain informed consent at the Boys and Girls Club, the alternative strategy of sending home the consents may have been implemented too late to have positive results. The use of a variety of approaches to recruitment is frequently reported in the literature as contributing to the success of the recruitment (Elder et al., 2008; Raynor et al, 2008). Adding other strategies to recruitment to the SSLN program may have produced greater numbers of interested adolescents.

Although the sample size ($n = 16$) failed to meet the projected sample size required for sufficient power analysis, having only sixteen participants was key to having a manageable classroom and to promoting active learning (e.g., hands-on and physically-active activities). While no studies on community-based interventions with middle school-age children reported the ideal sample size for effective learning, a sample size of 20 or more has been recommended for research in comparative psychotherapy outcome studies based on criteria for acceptability, feasibility, statistical power and cost (Kraemer, 1981). The participants in the SSLN study represented a homogeneous group of adolescents recruited from the local community and reflected the number of participants consistent with other small pilot studies aimed at improving dietary and PA behaviors among ethnic minorities (Stolley & Fitzgibbon, 1997).

Retention and attrition. A 94 percent retention rate in a small 8-week pilot study is a very positive result. Attrition (number of sessions attended by program completers) was 88.1%, with almost half (44%) of the participants attending every session. SSLN sessions were missed for normal reasons such as illness, after school sports, concerts and vacations. One reason for the high retention rate was the trusted relationships that had been established between the investigator, the GGCC research team, and the participants and their parents. Similar results were reported by Guzman et al. (2009), who achieved retention rates of 59% to 67% in 12-month study, due to building and maintaining strong relationships between a consistent study team and 123 Latino parent-child dyads. While verbal reminders, weekly phone calls and texts, and raffles prizes were all well accepted, we learned that when the participants and the instructors were having so much fun in the PA or nutrition activity during the last 30 minutes of class, the participants would forget about the raffle prizes that were raffled at the end of each class. This occurred on two occasions, suggesting that raffle prizes may not have been essential to retain the adolescents in the program after initial engagement was established. While the lack of time, transportation and caring for other children have been reported as barriers to Latino participation in other research studies, these factors were not apparent in the retention and attrition rates of the SSLN study (Keller, Gonzales & Fleuriet, 2005).

The environment played a role in the feasibility and acceptability of the SSLN program. GGCC's afterschool recreation program not only provided opportunities for recruitment but made it easier for adolescents to attend the SSLN program. Offering the SSLN program at GGCC where parents were familiar with the center and having a safe place to drop their child off may have contributed to the high retention rates. As reported in other studies, children are more likely to attend an obesity prevention programs if location and time are convenient for parents (Barlow & Ohlemeyer, 2006) and safety is assured (Stolley & Fitzgibbon, 1997; Dwyer et al., 2006).

Acceptability. The SSLN program was well received by participants who reported high satisfaction with almost every aspect of the program. On the HEES survey, participants ranked nutrition and PA activities similarly high. This balance of program content is important as research shows intervention programs for middle school-age children that include both diet and PA components are efficacious (Seo & Sa, 2010). Alternating nutrition activities with PA activities was an acceptable method to teaching both healthy nutrition and PA and provided an equal intervention dose of both. Adapting the program to be culturally responsive was effective particularly in the nutrition activities where the participants had fun making things that reinforced their Hispanic culture (e.g., Healthy nachos). Although the participants reported they enjoyed all aspects of the program, it was clear that some participants enjoyed the PA part more, some

enjoyed the nutrition part more and others were more attentive in the classroom part. This diversity in program content appeared to be an aspect acceptable to all participants. Open ended questions in the HEES survey provided positive information on the acceptability of both the nutrition / cooking activities and the PA. Focus groups are a strategy used frequently in feasibility studies, to collect qualitative data on the acceptability of a new program (Mckee et al., 2010). Future SSLN programs may consider implementing focus groups as a means to collect information on targeted aspects of the culturally adapted intervention that reflect values, beliefs and preferences of the Hispanic culture. In one study of 9- to 13-year-olds, focus groups were used to identify characteristics unique to the community that would help target an intervention to increase physical activity (Bryant et al, 2010). Results from the focus groups indicated that the adolescents placed no or little value to health benefits from exercise and considered barriers to be lack of time, transportation, and finances which were then addressed when creating the intervention. Understanding values and priorities of potential research subjects and applying this knowledge to the design of a community-based research study for healthy eating and activity may help to design more effective studies for specific populations.

The context in which adolescents learn about healthy behaviors are key factors in determining their acceptability to an intervention. As it became evident that the participants were more engaged with active learning activities, the CBPR

approach allowed for adjustments in the program to match the participant's needs and make the program more enjoyable. Other studies have reported that middle school-age children learn "by doing" (Lytle & Achterberg, 1995; Contento et al., 2007). In open-ended questions, SSLN participants reported the "cooking", the "activity", and "when we did the soda thing" as their favorite activities. These findings are also consistent with studies that show experiential learning as a way to persuade adolescents that healthy food can taste good. For example, the Martin Luther King Junior Middle School offers a program called "Edible Schoolyard", where students participate in hands-on organic gardening and cooking, with the intent to have children eat more healthy foods (Martin Luther King Junior Middle School [MLKJMS], 2005). When the SSLN instructor brought asparagus to class, the participants initially rejected it but after tasting it, several learned they liked it. Similar results were shown to be effective in the FitNit-Project HEALTH, a healthy eating program for low-income minority adolescents in Washington D.C. (HSC Foundation [HSC], 2007).

The HEES survey collected information on the learning environment, however it did not collect information on whether an afterschool program was the best method for delivering the healthy eating and activity intervention. A drawback from being an afterschool program was that instructors reported and the investigator observed the participants to be "wound up" and full of energy which made the classroom part of the intervention challenging. In CBPR fashion, this

situation was discussed during debriefing meetings, and the team concluded that the participants may have preferred less classroom time, which might have been too much like school, and more “doing time.” While many activities were adapted to be more interactive, a balance between delivering nutrition and PA content (lecture) and physical activity had to be achieved. Challenges to afterschool programs such as school schedules (dismissal times) and transportation have been reported by other studies (Beckham, Bradley & Washburn, 2005), yet studies reporting issues related to adolescent behaviors in afterschool programs do not exist. Considerations for alternative and creative ways to deliver the SSLN classroom content should be considered.

Cultural adaptation to the theory based curriculum was effective in supporting the acceptability of the SSLN program. Investigator and instructor observations showed that the participants were more engaged when culturally relevant topics or vocabulary were used. Cultural adaptation of the curriculum, intervention delivery, participant workbook, nutrition and PA activities were key to acceptability of the program. Chatterjee and colleagues (2005) reported that community-based organizations were ideal for intervention studies because their close connection to families promotes culturally appropriate interventions that may have a substantial influence on future health behaviors.

Fidelity Delivery of the Intervention. Observations about the fidelity delivery of the intervention support the feasibility and acceptability of the SSLN

program. Deviations from delivering the intervention were kept to a minimum, yet in true CBPR fashion, the delivery of the intervention was adjusted as the SSLN program was delivered due to the iterative process of evaluating what worked well and what did not.

One challenge to providing the intervention was delivering all content within the allotted time. The 30-minute classroom session was inadequate to cover the content in depth and this may have affected learning outcomes (e.g., nutrition knowledge). Since participants reported they disliked writing in the workbook the most, adapting the program and use of the workbook may be necessary. Cultural adaptation of the workbook, however, was effective as the participants enjoyed reading from the workbook and the colorful pictures, many of which represented their Hispanic heritage. Therefore, discarding the workbook would not be advised, yet opportunities to better integrate workbook activities into the classroom curriculum should be explored. Research has shown that media and other “visual” stimuli impact behavior in middle school-age children (White, 2000). Even though the participants disliked writing in the workbook, it is possible that the workbooks positively influenced the participant’s attitudes toward healthy eating and exercise. Extending sessions to 90 minutes could be an acceptable strategy for future programs. The appropriate length of obesity prevention programs for middle school-age children is difficult to determine (Stice, Shaw & Marti, 2006). Many studies have reported short-term school-based

interventions ranging from 4 to 12 weeks are efficacious (Shaya, Flores, Gbarayor & Wang, 2008). Although many sessions went over time, participants reported on the HEES satisfaction survey that they wanted more time for each session and did not want the program to end after 8 weeks. It is quite possible that there were too many activities per session which also impacted the ability to complete the workbook activities. Data from the SSLN program suggests that behavior change took place and potentially extending the program beyond 8 weeks may show greater improvement in outcomes and still be acceptable by the participants.

There were advantages to having multiple instructors as each assumed responsibility for delivering parts of the curriculum. For example, having two instructors in the classroom helped with classroom civility and unplanned instructor absences. By having a Hispanic and non-Hispanic instructor lead the classroom component, diversity in teaching methods and expertise in cultural content was ensured. While two promotoras were initially trained to teach the nutrition component, we found that this approach was not feasible and contributed to the intensive use of personnel resources. Therefore, delivering the program with fewer trained staff should be considered. One reason for the success of the SSLN program, however, was the commitment by GGCC to learn the program so that they could replicate it in the future and by training more GGCC staff in delivering the intervention, sustainability was enhanced. Personnel also are part of the expense for an intervention program. While costs were not considered in the

SSLN program, training costs, rewards and incentives and staff compensation when delivering the intervention should be considered in future programs.

Adaptation in feasibility studies focuses on changing program contents or procedures to be appropriate for new situations (Bowen, et al., 2009, p. 453).

While there were deviations to both content and delivery, these were kept to a minimum such that critical components of the intervention were kept intact.

Unforeseen circumstances such as GGCC changing the availability of the gymnasium for SSLN PA activities, created changes in scheduling. Adaptations of nutrition and PA activities were made to create more “active learning” experiences. Adding additional content to classroom sessions enhanced parts of the SSLN curriculum. Because CBPR research is a cyclical and iterative process, and was so integral to the SSLN study, curriculum changes enhanced acceptability and delivery of the intervention. On the other hand, deviations to the study that included lessons not being covered completely or workbook activities not completed due to time limits may have weakened the intervention. For example, the PA Diary was not discussed in Session #3. Since the Diary reinforced self monitoring of PA activities, this may have been a factor in the lack of interest by the participants to monitor their steps and record on the pedometer logs (PAPL) which were distributed during Session #3. The participants, received copies of the PAPL form to take home and this form listed the differences between moderate and vigorous activity, which was the same content covered in

the PA diary in the workbook. Further measurement in process evaluation can inform researchers on how continuous improvements during the delivery of the SSLN intervention impact program goals (Minkler & Wallerstein, 2003).

Observations of the delivery of the SSLN program and instructor feedback showed difficulty in determining whether the participants enjoyed committing to and verbally expressing their diet and PA goals. In the literature, setting goals, self monitoring and problem solving are key to motivating adolescents to change behaviors, yet in the SSLN program, the participants were reluctant to share their goals which could have been seen as a weakness to the study (Davis, Davis, Northington, Moll, & Kolar, 2002; Grey et al., 2004; Kamath et al., 2008). In the Hispanic culture, not sharing personal attributes outwardly is a common cultural practice (Comas-Diaz, 1997) and could have explained the shyness in sharing goals verbally. Perhaps, having students describe goals one on one with group facilitators would be a possible strategy for the future. Discussion of goals could be performed during the collection of anthropometric measurements and discussed confidentially with the adolescent as well.

Lastly, an assessment of the data collection process contributes to the overall feasibility of measuring an intervention. While efforts were made to reduce respondent burden, the participants were observed to be bored and on occasion appeared to just check boxes without reading the question. Lessons learned from pre-intervention data collection were implemented in post-

intervention data collection to limit this behavior (e.g., the GGCC research team monitored the room while the participants were completing the surveys). Little research exists on data collection processes in middle school-age children, yet in this study, very few data were missing indicating successful strategies were employed. As mentioned previously, the accuracy with which the participants used to complete the surveys may be in question, a situation common to self-report measures in any study. Individually interviewing students for data collection would address the issue of quality of the data but adds additional expense and is resource intense. Another alternative would be to read the questions aloud and have the students complete one at a time. In a study where self-report measures were read by teachers of 3rd- and 4th-grade students, there was no indication that this method improved the accuracy of the measures results (Robinson, 1999). The total number of surveys and the time required to complete them should be considered when collecting data from middle school-age children.

Preliminary Effects of SSLN. Preliminary effects of the 8-week SSLN intervention showed mixed results in most of the variables measured indicating the intervention warrants further investigation to determine its efficacy on improving participants eating and PA behaviors. After the SSLN intervention, mean scores decreased in the anticipated direction for BMI, BMI z-score, BMI percentile, waist measurement, and sedentary behaviors and mean scores increased for perceived confidence, social support from family and friends for

exercise, nutrition behavior, nutrition attitude and PA behavior, although all changes were not statistically significant. In contrast, changes that were not anticipated were the decrease in mean scores for social support from family and friends for eating, which were also not statistically significant. Outcome variables that significantly changed and were unanticipated, were the decrease in nutrition knowledge and the increase in BP percentile mean scores.

In the literature, it is frequently reported that BMI does not change in short-term obesity prevention / intervention programs (Summerbell et al., 2005). Similar to the reported literature, the SSLN study did not show a significant change in anthropometric measures in the 8-week time frame. There was, however, a trend in that mean scores for BMI, BMI z-scores, and BMI percentiles all decreased. Without statistical significance and a substantial effect size, any conclusion that the participants lost weight as a result of the intervention is purely speculative. Despite the short intervention, one child went from overweight to normal which indicates the need for further testing on whether the intervention impacts healthy behaviors. We know that in this age group, many adolescents are developing and maturing at different stages, so incorporating Tanner stage assessments in future studies that test a predictive model for SSLN may be beneficial in identifying confounding factors related to adolescent pubertal development (Bradlee, Singer, Qureshi & Moore, 2010). Although BMI reductions were not statistically significant, future research using a larger sample

may provide information on whether this effect represents a Type I error where significant results occur by chance rather than as a result of the intervention (Kazdan, 2003). An increase in BP percentile is expected as research suggests blood pressure increases with age (NHLBI, 2004), yet the increases seen in this study appear to be higher than expected. Measurement error is a plausible explanation due to the noise level in the room at the time the measurements were taken. Instrument variability using the adult cuff and the child's cuff could also have been a factor. While efforts were taken to select the correct blood pressure cuff size, some adolescents were in between the adult or child cuff size. Despite the increases in BP percentile observed in the study, the BP findings did not indicate any of the participants had blood pressure percentiles outside of the normal range. Using automated blood pressure monitors which have been shown to be valid in infants and children should be considered in future studies (Park & Menard, 1987).

Perceived confidence in both eating and exercise increased after the SSLN intervention and both had a small effect size. The theory supporting the SSLN intervention suggests that perceived confidence would improve nutrition and PA behaviors and our findings showed that nutrition behavior, nutrition attitude and PA behaviors did improve, yet these changes were not statistically significant. Similar improvements in confidence have been reported in other studies using SCT as a model for behavior change in adolescents (Evans et al., 2006;

Ambrosino et al., 2008). Interestingly, the participants entered the program with a moderately high level of self-confidence. We also know from social cognitive theory, the higher an adolescent's self-efficacy, the greater the chances are that one will change a health behavior (Bandura 2004). Although no predictor analysis was done, exploration of the relationships between these variables (discussed below) indicates future research testing these relationships in a larger sample would be advantageous. It was clear that the participants enjoyed the attention given to them throughout the SSLN program and this could have "boosted their confidence". During the last session, a sense of pride was observed in each participant as their names were read out loud and certificates were given out. Most all were eager to take home pictures of themselves, their drawings and other work that they had performed throughout the 8 week program, such as the food pyramid posters.

Frequently reported in the literature is the importance of social support to adolescent eating and activity behaviors (Beets, Vogel, Forlaw, Pitetti, & Cardinal, 2006; Dowda, Dishman, Pfeiffer, & Pate, 2007; Steinberg & Morris, 2001). In the SSLN study, findings showed that social support from family and friends for eating decreased after the intervention and although not statistically significant, these decreases had a small effect size and warrant further study. There are several plausible explanations for this unanticipated finding. First of all, parts of the curriculum addressing eating out and eating at special occasions

where family in particular, have influence on eating behaviors, was delivered at the end of the program giving participants limited opportunity to think about the issue and apply the behavioral skills. As shown in other studies, adolescents do not always have control over what parents bring home from the grocery store and therefore support in eating healthy is undermined by availability of healthy foods at home and parental behaviors surrounding nutrition (Neumark-Sztainer, Story, Hannan, Tharp & Rex, 2003). Strengthening the parent component of the SSLN intervention may increase family social support (Zabinski et al., 2006). Closer evaluation using focus groups may inform how social support from friends for eating compared with social support from family for eating and why both decreased during this pilot study.

Mean scores in social support from family and friends for exercise increased post-intervention. Physical exercise was an important component to the SSLN program, and what we observed was that as the participants began to know one another, they appeared to thrive on peer support. Forming teams and competing against one another during the PA activities may explain the increase in social support from friends. Other studies have shown similar findings. For example, Gately et al. (2000) found that integrating a strong social component into PA at a health camp was effective in increasing PA participation in middle school-age adolescents. It is unclear why social support from families for exercise increased by 17% post-intervention (small effect size), as there was little parent

involvement during the program, except that three of the participant's mothers were participating in aerobics class at GGCC and may have encouraged their children to be more active knowing the SSLN program was all about healthy eating and activity. Another explanation is that the parents used the SSLN program as an opportunity to get their children to be more active, although this would need to be validated with parent feedback in future studies. Consistent with social cognitive theory, other studies suggest adolescents are more likely to adopt parental expectations and goals when the parent-child relationship is more nurturing and supportive which may have been the case in the SSLN study (Grusec & Goodnow, 1994). Since parental involvement was minimal in the study, expectations that social support would change during the program were low, yet we saw social support from parents for exercise increase (and decrease for healthier eating).

The mean score for nutrition knowledge decreased after the SSLN intervention and the decrease was significant ($p < .02$), and had a very large effect size (Cohen's $d = -.89$). These findings suggest the intervention may not have been effective in delivering information to improve nutrition knowledge. The large effect size is important as half of the SSLN curriculum was about nutrition knowledge (e.g., food pyramid, food labels, and portion control). Few studies in middle school-age children have measured nutrition knowledge. One study found that following a 9-week healthy eating and exercise program, children improved

their knowledge of which foods were the healthiest (Ward-Begnoche et al., 2009), yet another found that less than one fifth (17.8%) correctly identified which foods require five or more servings a day (Zapata et. al., 2008). An explanation for the decrease in nutrition knowledge scores may have been related to the difficulty in covering all content in depth, using the activities in the workbook to reinforce key messages about nutrition, and problems with the measurement (SPAN instrument). While the participants enjoyed the nutrition activities, more focus on nutrient contents of foods may have strengthened this part of the intervention. Another explanation is that the instructors needed more training on delivering important nutrition information particularly for this age group. The GGCC instructors had taught nutrition in the adult SSL program at GGCC, yet applying different teaching strategies for adolescents may have been more affective. Lastly, the decrease in nutrition knowledge could have been related to the fact that most of the nutrition knowledge classroom sessions were offered in the last half of the SSLN program and this did not give the participants enough time to assimilate the learning. We know from SCT that learning must be simplified, repeated often and have significant aspects made highly salient for behavior change to occur in adolescents (Bandura, 1986, p.60). Adjusting the order of the curriculum such that these topics are presented earlier and repeated often may have increased the knowledge and behavior outcomes in this short 8 week pilot study. While all of these reasons may have been a factor in the decrease in mean scores for nutrition

knowledge, a more realistic explanation is that the participants just selected a good answer (the questions were multiple choice), yet failed to select the correct answer, pointing to the possibility of problems with the measurement. Since multiple explanations are plausible, closer evaluation of research studies that demonstrate effective nutrition education for middle school-age adolescents should be done.

One of the most interesting and positive results from the study was the increase in PA behaviors which were close to being significant ($p < .07$) and had a medium effect size (Cohen's $d = -.66$). Research in adult literature has demonstrated that an increase in PA behaviors reduces the risk of cardiovascular disease and diabetes even without weight loss (McMurray, Bangdiwala, Harrell & Amorin, 2008; Jago et al., 2004). Evidence suggests regular exercising can control weight and improve the body's ability to use insulin, increase high density lipoprotein (HDL) cholesterol, moderate stress and lower blood pressure, all risk factors that contribute to CVD and diabetes (Jago et al., 2004; McMurray et al., 2008). In children, PA is thought to protect mostly against the development of CVD (Martin et al., 2007a). In the Dance for Health intervention, a culturally adapted health curriculum for Hispanic and African American adolescents, aerobic dance and health education combined produced favorable changes in BMI, heart rate, timed mile run and attitudes toward PA (Flores, 1995). While the BMI changes in the Dance for Health study were not statistically significant,

cardiovascular risk factors improved. In the SSLN study, the fact that PA behaviors increased is a promising positive finding and warrants further examination. Interestingly, during the SSLN study, observations of the adolescents participating in PA activities showed heavier participants to opt out or complain of a pain or discomfort in order to get permission to sit out the activity. Although the SSLN program had no inclusion or exclusion criteria related to weight, developing a range of PA activities based on one's capabilities may have made the PA part of the program more appealing. The literature suggests that social functioning, favorable self-esteem and body image are psychosocial correlates of PA in Latino children (Allison et al., 2005; Guinn, Semper & Jorgensen, 1997). In the SSLN study, as participants "bonded" with each other, group PA activities were better received which might indicate there was a certain amount of social functioning occurring. It was during these activities however, that some participants opted out. Further research is warranted and may help to explain the observations in the SSLN study as they relate to specific correlates of PA.

Relationships Among Study Variables.

Acculturation and Study Variables. Correlations were performed on the relationships between study variables based upon the original SSLN model. Exploration of the relationships among study variables will provide useful

information for future model testing. Due to the small sample size, findings must be interpreted with caution.

First, the relationships of the moderator (e.g., acculturation) and all other study variables were examined. Acculturation has been shown to be a significant factor in changing children's dietary and PA behaviors (Stevens, 2010; Diaz et al., 2009). In the SSLN study, correlations among acculturation and study variables were found to not be statistically significant. The direction and magnitude of the associations, however, resemble findings in the literature. The negative association of acculturation with nutrition knowledge was unanticipated. As acculturation level increased (e.g., the adolescent was more acculturated into the western environment), the participant's nutrition knowledge decreased. This finding is difficult to interpret and may be related to the factors previously mentioned about measuring nutrition knowledge (e.g., difficulty in covering all content in depth, including workbook activities and problems with measurement). In studies with Hispanic adults, limited English proficiency was identified as a barrier to receiving nutritional information (Heiss et al., 2011). Other studies suggest there may be a relationship between Hispanics acculturating into US mainstream culture and their exposure to less nutrition-based messaging found in English-language television (Abbatangelo-Gray et al., 2008). In the SSLN study, even though participants had to speak and write English, they showed a preference for Spanish language indicating less acculturation which could account

for the negative association with nutrition knowledge. Whether or not literacy or exposure to nutrition-based messaging (e.g., television programs) plays a role in how Hispanic adolescents acquire nutrition knowledge is unknown. There is clearly a need to improve nutrition knowledge among Hispanic populations and providing more nutrition education in Spanish for those less acculturated may be advantageous to promoting healthy eating behaviors. Future research should examine further the relationship between acculturation and nutrition knowledge in Hispanics.

Acculturation was also negatively associated with nutrition behavior and PA behavior, an anticipated finding well supported in the literature (Benavides-Vaello, 2005; Unger et al., 2004; Ayala et al., 2008). As poor eating habits and decreased PA are behaviors adopted by first, second and third generation Hispanic children, strategies to prevent such behaviors must be put into place. While determination of which generation was most reflective in the SSLN sample was not done, many of the participants reported parents spoke Spanish more often than English at home. Not surprisingly, as acculturation increased, sedentary behavior increased. Many studies have shown that as acculturation levels increase, adolescents play more video games, and watch more television than those less acculturated (Liu et al., 2009; Unger et al., 2004; Lara et al., 2005). Although the data suggested a moderate association between these relationships, further testing is warranted due to the small sample size.

As acculturation increased, nutrition attitude increased, which may indicate that as adolescents become more acculturated they have more positive attitudes about eating healthy, yet their nutrition behaviors do not reflect this. A plausible explanation could be the dynamic changes and developmental phases a middle school-age adolescent goes through. As theorized in the model, the SSLN participants had high levels of self confidence which may have contributed to positive attitudes about nutrition, yet the association with acculturation is less known.

Findings from the SSLN study show that as acculturation increased, social support from family and friends for both eating and exercise increased. There is little research on acculturation and social support, yet what we know about the Hispanic population is that more emphasis is placed on interdependence and less on the development of individuality (Martin & McCaughtry, 2008). We also know that acculturation is a bidimensional process and while individuals may learn and or adopt certain aspects of a dominant culture, they also retain aspects of their culture of origin (Ayala et al., 2008). Since attachment to the nuclear and extended family is a cultural aspect highly valued by Hispanics, social support may prevail through potentially multiple levels of acculturation (Frenn et al., 2005). Further research on social support and the relationship to acculturation levels may provide information on subtle differences that are culturally specific to this population.

Lastly, relationships between acculturation and the overweight / obesity variables were examined. All of these relationships were positive and relatively small, with the stronger association being among acculturation and waist circumference and BP diastolic percentile. Again not surprisingly, as acculturation increased BMI z-scores increased, a finding that resembles a phenomenon well established in obesity research in Hispanic adolescents (Unger et al., 2004; Gordon-Larsen et al., 2003), however, the other relationships warrant further testing in a larger sample.

Self-efficacy, Social Support and Study Outcome Variables. The second set of relationships examined in the SSLN feasibility study was that of perceived confidence and social support (mediators) and the outcome variables (BMI z-score, waist circumference, BP percentile, nutrition knowledge, attitude and behavior, and PA behaviors). In this analysis, perceived confidence in eating was strongly associated with nutrition attitude and nutrition behavior and perceived confidence in exercise was strongly associated with nutrition behavior. All three relationships were statistically significant. As theorized and supported by the literature, adolescents with a degree of self efficacy are not only able to initiate and change health behaviors, but they are also able to control decisions related to making behavior choices (Evans et al., 2006, Bandura, 2004). Likewise, adolescents who are able to regulate and reinforce newly acquired behaviors improve their self-efficacy (Cole et al., 2006). As suggested by the positive

relationships between perceived confidence and nutrition attitude and behavior, participants in the SSLN study were confident of their attitudes toward eating and dietary choices, and this confidence translated into healthy eating behaviors. Perceived confidence in exercise was strongly and positively associated with nutrition behavior suggesting that as the participants beliefs in exercise increased, they had a corresponding belief in their ability to eat healthful foods. As the participants in the SSLN program developed greater confidence (e.g., self efficacy) they had a more positive attitude towards eating healthy, eating breakfast and trying new foods.

Social support from family for eating was strongly and negatively associated with participant sedentary behaviors. This relationship was statistically significant and suggests that families of participants in the SSLN both encourage healthy eating behaviors while discouraging sedentary activities. Parents are influential role models for healthy eating and activity. In Hispanic households, where parents limit adolescents TV viewing time and time playing video games, the chance that the parent also monitors the nutritional intake of their child is highly possible. Examining this association in future studies may be beneficial as this relationship has not been examined in the literature.

Social support from family and friends for exercise strongly and positively correlated with PA behavior, a finding found extensively in the literature on adolescents (Lown & Braunschweig, 2008, Prochaska et al., 2002). Research has

demonstrated that in girls, parental modeling of PA in early adolescence helps them to establish healthy PA patterns (Davison & Jago, 2009) and in both boys and girls in 5th grade, social support, health beliefs and self-efficacy for PA was found to positively correlate with intent for PA (Saunders, Pate, & Felton, 1997). Although other studies have shown that Hispanic middle school-age children perceive less social support for PA than whites, attention should be given to encourage Hispanic families to be more supportive of PA (Grieser et al., 2008).

Although not significant, weak positive associations were found between social support from family and friends for exercise and BMI z-score and waist circumference. Since the SSLN model suggests social support should reduce BMI z-score and waist circumference in adolescents, this relationship should be tested in future studies with a larger sample. Contrary to the theory and other research, the findings that suggest a negative correlation between social support variables and nutrition and PA Behavior is somewhat puzzling and should be tested in a larger sample.

In sum, exploration of the relationships between study variables suggest mixed support for the SSLN model. The strongest support for acculturation as a moderator is seen in the relationship between acculturation and nutrition and PA behaviors. As supported in the literature, increased acculturation negatively influences nutrition and PA behaviors in adolescents (Benavides-Vaello, 2005). Weaker is the influence of acculturation on anthropometric measures which may

be mediated by self-efficacy and social support. Given these findings, including acculturation as a moderator in the SSLN model may not be necessary for future testing of model constructs. SSLN findings suggest there is some mediation from perceived confidence in eating on nutrition attitudes and behaviors, and some mediation from social support from family for eating on the child's sedentary behaviors, yet why other relationships among mediator and outcome variables did not occur is less understood. Additionally, there were strong correlations among the different mediating variables that were not part of the study's aims. For example, perceived confidence (eating and exercise) associated with social support from friends for eating, which may suggest friendship among Hispanic adolescents is key to developing a strong sense of self efficacy. This needs to be further tested in a causal model to determine the influence of the interaction of mediators on healthy eating and activity in Hispanic youth. Findings from the SSLN study indicate the community setting, which includes the location and the strong relationships between GGCC staff and people in the community, was a key factor in the retention and success of the program, however these influences were not addressed explicitly in the SSLN model. Therefore, the model can be enhanced by further evaluating relationships between the two mediators (self-efficacy and social support), relationships between environmental factors and the two mediators and environmental factors and health behavior outcomes. Further testing of causal inferences should then follow.

Summary

Strengths. The strengths of the SSLN intervention were the (a) cultural adaptation of the healthy eating and activity curriculum, (b) the community involvement and (c) the application of the CBPR methodology to the study design, delivery and evaluation.

Limitations. As with all feasibility studies, there were limitations in the study which included, (a) the small sample size that limits generalizability of findings, (b) limited efficacy testing due to the quasi-experimental design, small convenience sample, limited statistical power and the short duration of the intervention, (c) location and timing of the SSLN intervention may have excluded other adolescents, (d) use of self-reports as a primary assessment of behavior change (Killeen & Robinson, 1989), (e) use of multiple surveys may have added to participant burden, (f) use of multiple instructors increased resources, time, and costs which may limit the ability to replicate the program in another setting (Bowen et al., 2009), and (g) investigator bias (which was limited by using the GGCC staff as SSLN instructors) may have influenced how the participants responded to the SSLN intervention.

Conclusion

The SSLN is one of the few obesity prevention/intervention feasibility studies designed for and tested in 6th, 7th and 8th grade Hispanic adolescents. The SSLN intervention was shown to be feasible and acceptable however, preliminary

findings showed mixed results for improving key indices of obesity-related health risks in Hispanic adolescents. The SSLN study was designed as CBPR. Consistent with other obesity prevention and intervention programs, using CBPR methodology enhanced all aspects of the SSLN study including the design, recruitment, retention, data collection, cultural adaptation of curriculum and formative evaluation that allowed for adjustments to the program. High levels of sustained community engagement and human capital investment were required for the study to be successful. In order to sustain community partnerships, translation of results from the study back to the community has begun. The rationale for CBPR as the future focus for addressing childhood obesity among ethnic minority populations is strong.

Based on the findings from the SSLN feasibility study, several changes should be considered to improve the intervention. These include; (a) increasing the session times or the overall length of the program, (b) limiting the number of instructors and increasing intensity of instructor training, (c) integrating workbook activities into lecture / discussion such that engagement from participants is increased.

Implications for Future Research and Practice

In research, feasibility studies are relied on to produce a set of findings that help determine whether an intervention should be recommended for future efficacy testing (Bowen et al., 2009). The positive outcomes related to feasibility

and acceptability indicate the SSLN program is a viable culturally appropriate eating, PA and behavior change skills intervention for Hispanic adolescents.

While the primary aim in this study was to test feasibility and acceptability of the intervention, methods such as using a larger sample to increase power should be considered in future studies testing the predictive ability of the model.

Relationships that need further study are the relationships between (a) perceived confidence (self efficacy) and nutrition knowledge, (b) self efficacy and PA behaviors, (c) social support from family for eating and adolescent sedentary behaviors, and (d) social support for exercise and changes in weight (BMI z-score). Other implications for further research include environmental determinants affecting healthy behaviors in Hispanic adolescents that were not tested in the study and include safety, accessibility and transportation. While it is unknown whether the interventions in this study will produce lasting changes in body weight and health behaviors, the SSLN intervention can be considered a feasible intervention addressing an area of research that necessitates closer attention.

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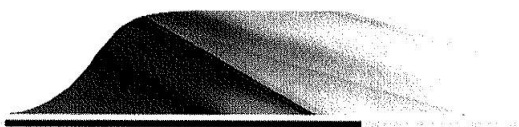
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APPENDIX A

INSTITUTIONAL REVIEW BOARD APPROVAL



Office of Research Integrity and Assurance

To: Bonnie Gance-Cleveland
NHI

From: Mark Roosa, Chair *SM*
Soc Beh IRB

Date: 10/20/2010

Committee Action: Expedited Approval

Approval Date: 10/20/2010

Review Type: Expedited F4 F7

IRB Protocol #: 1010005563

Study Title: Salud con Sabor Latino para los Ninos: A Feasibility Study

Expiration Date: 10/19/2011

The above-referenced protocol was approved following expedited review by the Institutional Review Board.

It is the Principal Investigator's responsibility to obtain review and continued approval before the expiration date. You may not continue any research activity beyond the expiration date without approval by the Institutional Review Board.

Adverse Reactions: If any untoward incidents or severe reactions should develop as a result of this study, you are required to notify the Soc Beh IRB immediately. If necessary a member of the IRB will be assigned to look into the matter. If the problem is serious, approval may be withdrawn pending IRB review.

Amendments: If you wish to change any aspect of this study, such as the procedures, the consent forms, or the investigators, please communicate your requested changes to the Soc Beh IRB. The new procedure is not to be initiated until the IRB approval has been given.

Please retain a copy of this letter with your approved protocol.

