SELF-ESTEEM, SELF-EFFICACY, HOPE, HEALTH PROMOTING BEHAVIORS
AND INSULIN RESISTANCE IN OVERWEIGHT MEXICAN AMERICAN
ADOLESCENTS

by

Anne Rath Rentfro

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A Dissertation Submitted to the Faculty of the

COLLEGE OF NURSING

In Partial Fulfillment of the Requirements
For the Degree of

DOCTOR OF PHILOSOPHY

In the Graduate College

THE UNIVERSITY OF ARIZONA

2009
As members of the Dissertation Committee, we certify that we have read the dissertation prepared by Anne Rath Rentfro entitled “Self-Esteem, Self-Efficacy, Hope, Health Promoting Behaviors and Insulin Resistance in Overweight Mexican American Adolescents” and recommend that it be accepted as fulfilling the dissertation requirement for the Degree of Doctor of Philosophy.

Marylyn Morris McEwen, PhD, PHCNS-BC, FAAN  
Associate Professor  

Leslie Ritter, PhD, RN  
Associate Professor  

Carolyn Murdaugh, PhD, RN, FAAN  
Associate Dean for Research and Professor  

Melissa Spezia Faulkner, DSN, RN, FAAN  
Gladys E Sorensen Endowed Professor  

Final approval and acceptance of this dissertation is contingent upon the candidate’s submission of the final copies of the dissertation to the Graduate College. I hereby certify that I have read this dissertation prepared under my direction and recommend that it be accepted as fulfilling the dissertation requirement.

Dissertation Director: Marylyn Morris McEwen, PhD, PHCNS-BC, FAAN  
Associate Professor  

Date: October 29, 2009
STATEMENT BY AUTHOR

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SIGNED: Anne Rath Rentfro
ACKNOWLEDGMENTS

This process has been possible only with the support of others. My family has provided the environment to make this journey feasible. My husband Dan stood by me through all, easing obstacles along the way. Marylyn McEwen channeled my choices to design doctoral studies that provide a solid foundation for my plans to continue in an academic faculty role. Her guidance enriched my studies with accurate information and an invaluable perspective about border issues and vulnerable populations. My children, Mark and Elizabeth offered an energy source that always helped maintain my focus. Drs. Ritter, Murdaugh, and Faulkner have mentored and acted as models for my aspirations. My new found friends and fellow students have provided fine colleagues globally that I will surely call upon in the future. Faculty and staff at the University of Texas at Brownsville and Texas Southmost College supported a work environment that permitted my studies to occur. Faculty and staff of The University of Texas Houston School of Public Health–Brownsville Regional Campus have enriched the scholarly atmosphere on our campus and fostered my progress as a nurse scientist. Through the years graduate students that have worked with me have bolstered my stamina and kept me asking questions. A special thank you is extended not only to the participants of my dissertation study but to all people who take time out of their busy days to offer themselves to be studied. This project was supported by Award Numbers P20MD001091 and MD000170 P20 from the National Center on Minority Health & Health Disparities.

Finally, this is a wonderful opportunity to thank my mother who always encouraged each of her six children to expand their horizons and look for what is not readily apparent. It is also a time for me to honor the legacy of my father who took great pride in the achievements of his family. All of these gifts are there but for the grace of God.
DEDICATION

This marathon is dedicated to my husband Dan who knows firsthand what such a journey involves. With this process behind me, I dedicate the next winding road to him also.
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ABSTRACT

Insulin resistance (IR) and type 2 diabetes in Mexican American adolescents living along the United States (US)–Mexico border are linked to genetics, poverty, developmental characteristics, and psychological attributes. Understanding relationships among psychological attributes, health promoting behaviors (HPB) and IR markers addresses gaps in health promotion science that test relationships between lifestyle and biological outcomes.

Hendricks’ Perceptual Health Promotion Determinants Model provided theoretical underpinnings. The aims were to test the predictive ability of HPB and IR using psychological attributes (self–esteem, self–efficacy, and hope). Biological markers for IR included body mass index (BMI), waist circumference (WC), and Homeostasis Mathematical Assessment Model for Insulin Resistance (HOMA–IR).

Forty five Mexican American adolescents (62% female; 16.4 [±1.27] mean years) participated. The majority (60%) were obese (BMI ≥ 95th percentile) with 40% overweight (BMI ≥ 85th percentile), 45% with WC ≥ 95th percentile, and 76% with HOMA–IR ≥ 3.16.

With self–efficacy for physical activity, 38% ($R^2 = 0.3771$; $F = 8.27$, df = 3; $p < 0.002$) of variance in HPB was explained by hope. With self–efficacy for nutrition fats/sodium, 44% ($R^2 = 0.4382$; $F = 10.66$, df = 3; $p < .0001$) of variance in HPB was explained by self–efficacy for nutrition fats/sodium and hope. With self–efficacy for nutrition fruits/vegetables, 49% ($R^2 = 0.4894$; $F = 13.10$, df = 3; $p < .0001$) of variance in HPB was explained by self–efficacy for nutrition fruits/vegetables and hope.

Additionally, with IR reflected as WC, 21% ($R^2 = 0.2129$; $F = 2.71$, df = 4; $p = 0.0437$) of variance was explained by self–esteem and self–efficacy for physical activity. With IR reflected as HOMA–IR, 22% ($R^2 = 0.2214$; $F = 2.84$, df = 4; $p = 0.0364$) of variance was
explained by self-efficacy for physical activity and 23% ($R^2 = 0.2254$; $F = 2.91; \text{df} = 4; p = 0.0333$) of variance was explained by self-efficacy for nutrition fruits/vegetables. Evidence supports using hope and self-efficacy to test interventions to increase HPB and decrease IR in adolescents residing along the US–Mexico border region.
CHAPTER 1: INTRODUCTION

Chronic health problems such as obesity and type 2 diabetes often develop insidiously in youth requiring major lifestyle changes later in adulthood (Ogden, Carroll, McDowell, & Flegal, 2007; Ogden et al., 2006; Ogden, Yanovski, Carroll, & Flegal, 2007; Ogden, Carroll, & Flegal, 2008). The Surgeon General (2007) advocates health promotion and prevention strategies to approach the impending crisis of obesity-related disorders. Three focus areas of Healthy People 2010 (#5: Diabetes, #19: Nutrition and Overweight and #22: Physical Activity and Fitness) directly address this crisis. Although improvement was noted in 2005 at the time of Health People 2010 Midcourse Review for the objectives in these focus areas, lifestyle behaviors did not change enough to reach target with persistence of multiple disparities in the Hispanic population (U.S. Department of Health and Human Services, 2000).

Multiple factors including psychological attributes, health promoting behaviors (HPB) and biological factors influence an individual’s ability to make required lifestyle changes. Mitigation of the future impact of chronic disorders requires a shift in healthcare toward HPB in young populations rather than relying on lifestyle change in adulthood. Within the context of preventing type 2 diabetes, this shift requires determining relationships between psychological attributes that contribute to HPB and markers of obesity related disease such as insulin resistance (IR). This chapter provides an overview of type 2 diabetes with background information related to prevention of type 2 diabetes in Mexican American adolescents living in Texas (TX) along the United States (US)–Mexico border, concluding with the significance, purpose and specific aims of the proposed research.
Background and Significance of the Problem

Ethnicity, genetic background, poverty, and developmental characteristics predispose Mexican American adolescents living in TX along the US–Mexico border to increased risk for negative health outcomes, such as obesity and IR with subsequent type 2 diabetes. Because the Hispanic population is the fastest growing and largest minority group (15.1%) in the US (U. S. Census Bureau, 2008), these issues extend beyond the Mexican American individuals who live in TX along the US–Mexico border to the entire nation.

Ethnicity and Cost

Individuals of Hispanic descent are twice as likely as non-Hispanic white individuals to acquire type 2 diabetes (Hunt et al., 2005). Once considered rare, type 2 diabetes now comprises approximately 30% of all pediatric cases in the US (Duncan, 2006). Moreover, rates of type 2 diabetes are higher in the southern border regions of TX than most other areas of TX or the US, accounting for nearly half of all pediatric cases of diabetes in some areas of TX (Texas Diabetes Research Advisory Committee, 2002). Costs escalate as earlier disease onset with more severe complications produces longer more complicated disease durations (American Diabetes Association, 2008; Finkelstein, Ruhm, & Kosa, 2005). Finkelstein, Joshi, and Hise (2005), along with the American Diabetes Association (2003; 2008) claim that total cost of obesity alone without diabetes burden exceeds $174 billion each year for the US. Because childhood obesity and IR progress to early onset type 2 diabetes, disease burden to the nation is expected to escalate in the years to come (Marcovecchio, Mohn, & Chiarelli, 2005; Ogden et al., 2007; Ogden et al., 2006; Ogden et al., 2007).
Lower socioeconomic status and poverty are consistently associated with unsatisfactory health outcomes (Adler & Ostrove, 1999; Singh-Manoux, Adler, & Marmot, 2003). Over 45% of Hispanic children along the TX border live in poverty, compared to the state at 31.2% and the nation at 27.8% (American Community Survey, 2005; U.S. Census Bureau, 2003). As social advantage decreases, health outcomes deteriorate cumulatively (Bauman, Silver, & Stein, 2006). Bauman, Silver and Stein (2006) examined data from the 1994 and 1995 National Health Interview Survey Disability Supplement. These researchers determined that those children \( n = 57,553 \) who lived in poverty, with low parental education, and in single parent households were four times more likely to have poor health than those who did not have these risk factors (Bauman et al., 2006). Moreover, poverty and obesity have been consistently linked for all ages and ethnic groups (Franzini & Fernandez-Esquer, 2006; Miech et al., 2006; Trevino et al., 1999). However, researchers rarely combine behavior and biological markers within one study. Goodman, Daniels and Dolan (2007) examined both behavioral and biological factors using a longitudinal prospective design, to determine that IR was more pronounced in adolescents (12 – 19 years) of lower socioeconomic status than those in the higher socioeconomic status groups. Low parental education was also associated with worsening IR at lower socioeconomic status over time.

**Health Promoting Behaviors in Adolescence**

Transitions toward personal responsibility for health behavior occur in adolescence with adolescent characteristics of HPB differing from those of adults (Srof & Velsor-Friedrich, 2006). Adolescents move toward their adult identity as they redesign their relationships with family and friends as they take their place in adult society (Erikson, 1994; Erikson, 1998). Adolescents act
on health issues from this unique perspective. Theoretical frameworks for research about HPB in adolescents often base conceptual foundations within the context of Bandura’s (1977) social cognitive theory using such theories as Ajzen’s Theory of Planned Behavior (Villarruel, Gallegos, Cherry & Duran, 2003; Villarruel, Bishop, Simpson, Jemmott, & Fawcett, 2001; Villarruel, Cherry, Cabriales, Ronis, & Zhou, 2008) and Pender’s (2006) Health Promotion Model (Chen, James, & Wang, 2007; Esperat et al., 2007; Esperat, Feng, Zhang, & Owen, 2007; Hendricks, Murdaugh, & Pender, 2006; Shin, Yun, Pender, & Jang, 2005; Srof & Velsor-Friedrich, 2006; Villarruel et al., 2003; Wu & Pender, 2002). Intervention studies using these kinds of models include culturally relevant approaches (Villarruel, Gallegos, Cherry, & Duran, 2003).

Adolescent studies often focus on risk behaviors, with middle school aged adolescent samples predominating (Ebin et al., 2001; Nguyen-Rodriguez, Chou, Unger, & Spruijt-Metz, 2008; Whitesell, Mitchell, & Spicer, 2009). Risk behaviors are studied more often than HPB in adolescents and include alcohol use, substance abuse and sexual activity. Rew’s (2002) research about homeless adolescents addresses multiple risk behaviors and their consequences such as HIV (Human Immunodeficiency Virus). Furthermore, HPB associated with nutrition and physical activity to prevent overweight and obesity appear less frequently in adolescent samples than these kinds of studies in adults. Samples including older adolescents (15–19 years) (Gordon-Larsen, Harris, Ward, & Popkin, 2003; Villarruel et al., 2008) and Mexican American adolescents are lacking (Gordon-Larsen et al., 2003; Martyn et al., 2009; Mitchell, Borrell, Lassiter, & Formicola, 2007; Villarruel et al., 2003; Villarruel, Jemmott, Jemmott, & Eakin, 2006; Villarruel et al., 2008). Hispanic individuals are generally underrepresented in health
promotion studies involving adolescents (Bolland et al., 2007). Moreover, the Mexican American subgroup of Hispanic adolescents is also often not delineated (Ebin et al., 2001).

Health promoting behaviors in adolescence have been linked with the psychological attributes of self-esteem, self-efficacy and hope (Hendricks, 1998a; Hendricks, 1998b; Hendricks, Murdaugh, Tavakoli, & Hendricks, 2000; Hendricks et al., 2000; Hendricks & Hendricks, 2005; Klein-Hessling, Lohaus, & Ball, 2005; Tyc, Nuttbrock Allen, Klosky, & Ey, 2004); Snyder et al., 2006; Snyder, Ritschel, Rand, & Berg, 2006). Hendricks (2000), for example, reported that higher self-esteem, self-efficacy and hope scores were associated with HPB in a sample of over 1000 African American adolescents (mean age 13 years; 7th – 8th grade). This study, however, did not connect HPB to biological outcomes. Other studies, though, have linked behavioral factors with biological outcomes. For example, previously noted study conducted by Goodman, Daniels and Dolan (2007) demonstrated that parental education and socioeconomic status influenced the biological outcome of IR. Of the participants included in the analysis, 46% were non-Hispanic black individuals; however, Mexican American adolescents were not included (Goodman, Daniels, & Dolan, 2007). Of those studies reviewed, none explored relationships among self-esteem, self-efficacy, hope, HPB and biological outcomes in Mexican American adolescents.

**Biobehavioral Integration**

The increased likelihood that Mexican American adolescents living in TX along the US–Mexico border will develop type 2 diabetes provides the urgency to examine relationships among self-esteem, self-efficacy, hope, HPB and IR. Examining the relationships between HPB and the biological markers that indicate presence or absence of health connects behaviors to outcomes. A few adult studies have linked biological markers with lifestyle behaviors such as,
nutrition, physical activity, alcohol, and tobacco use (Zhu, St-Onge, Heshka, & Heymsfield, 2004). In these studies measures of body mass index (BMI), waist circumference (WC), and Homeostasis Mathematical Assessment of Insulin Resistance (HOMA–IR), calculated from fasting blood glucose and insulin levels, provide the biological markers of IR. Studies linking adolescent psychological attributes with HPB, however, have not typically included biological markers.

Few adolescent studies other than Goodman, Daniels and Dolan (2007), have explored linkages between socioeconomic status and IR in adolescence. Studies examining relationships between social factors and biological markers during adolescence, such as Goodman, Daniels and Dolan (2007), though, have not measured psychological attributes such as self-esteem, self-efficacy, and hope nor have they included Mexican American adolescents living in TX along the US–Mexico border (Hendricks, 1998b; Hendricks et al., 2000; Hendricks et al., 2001; D. L. Hendricks & Hendricks, 2005). Studies of psychological attributes; such as, self-esteem, self-efficacy, and hope inform health promotion research. Moreover, health promotion strategies that consider psychological attributes; such as, self-esteem, self-efficacy, hope and HPB along with biological markers, such as IR, are likely to be more effective (Haffner, 2006; Zhu et al., 2004).

Definition of Terms

The following definitions will be used throughout this document:

- **Adolescence** is a term that depicts the developmental stage of individuals who are 11 to 20 years of age. Subgroups include early (11–14 years), middle (15–17 years), and late (18–20 years) adolescence, each consisting of a distinct developmental period with unique health concerns (Hockenberry & Wilson, 2006). The term “tween” (11–12 years) has been used to extend the lower age range to children as young as 11 years old.
(McKenna, Michaud, Murray, & Marks, 2005). For the purpose of this proposal, the term “adolescence” refers to the general developmental stage (11 – 20 years) and the term “adolescent” refers to the target adolescent age group of this study (15 – 19 years) unless otherwise specified.

- *Hispanic* is a general term that groups people of Spanish speaking countries. Sub–groups of Spanish speaking people are not delineated with this term and some groups who do not speak Spanish (Brazilians) are included. The US government uses the term Hispanic, and research often uses these government terms. The word Hispanic may appear in this documented for these reasons.

- *Latino* is a term used to refer to individuals whose country of origin is a Latin American country. In the proposed study, the term Latino is not used interchangeably with Hispanic.

- *Mexican American* is a term used for Americans who are of Mexican heritage. In this study, Mexican American was not used interchangeably with Hispanic and/or Latino. Whenever possible a more specific term is used for the country of origin. In this study the term Hispanic is used to report data from the literature that categorized participants as Hispanic; Latino was used to report data from the literature that categorized participants as Latino; and Mexican American was used to describe individuals who are Americans of Mexican descent.

- *Self–Esteem* refers to subjective belief about personal worth (Hendricks et al., 2001). Rosenberg’s definition of global self–esteem “the individual’s positive or negative attitude toward the self as a totality” is used for the purpose of this dissertation research (Rosenberg, Schooler, Schoenbach, & Rosenberg, 1995).
• **Self-Efficacy** refers to belief “in one’s capabilities to organize and execute the course of action required to manage prospective situations” (Bandura, 1999, p. 2). Self–efficacy for physical activity, self–efficacy for nutrition: fats and sodium and self–efficacy for nutrition fruits and vegetables were measured in this study. Self–efficacy for physical activity was defined as the sense of feeling able to participate in activities of a physical nature and measured with Pender’s Perceived Self-Efficacy Scale. Self-efficacy for nutrition was defined as the sense of feeling able to consume foods low in fat and sodium and choose fruits and vegetables, and measured with Perceived Self–Efficacy, Dietary Self–Efficacy: Lower Fat and Sodium, Fruit and Vegetable Self–Efficacy scales (Parcel, et al. 2005; Heatey & Thombs, 2004).

• **Hope** refers to a state “of being characterized by anticipation for a continued good state, an improved state, or a release from perceived entrapment. The anticipation may or may not be founded on concrete, real world evidence. Hope is an anticipation of a future which is good, based on mutuality (relationships with others), a sense of personal competence, coping ability, psychological well-being, purpose and meaning in life and a sense of ‘the possible’” (Miller & Powers, 1988).

• **Health Promoting Behaviors (HPB)** are defined as “behaviors motivated by the desire to increase well-being and actualize human health potential” (Pender et al., 2006, p. 7).

• **Insulin Resistance (IR)** is defined as a condition where insulin homeostasis is impaired. Insulin function at the cellular level may also be impaired with a corresponding rise in insulin levels in comparison to glucose levels. The condition is usually asymptomatic (Keskin, Kurtoglu, Kendirci, Atabek, & Yazici, 2005; Stern et al., 2005). Insulin resistance is identified by indicators that include markers such as HOMA–IR, BMI
percentile accounting for gender and age, and WC accounting for gender and age. The HOMA–IR measure is determined mathematically using fasting glucose and insulin values (Stern et al., 2005). The HOMA–IR uses a fasting glucose and insulin ratio divided by a constant (Fasting Insulin X Fasting Glucose/405) to derive a mathematical measure of IR that is based on readily available biomarkers (Keskin et al., 2005). The markers of IR used in this study were BMI percentile, WC percentile, and HOMA–IR.

Statement of Purpose and Research Aims

The purpose of this study was to determine the relationships among self–esteem, self–efficacy, hope, HPB and IR in Mexican–American adolescents living in TX along the US–Mexico border.

Aim 1: To test the predictive ability of self–esteem, self–efficacy and hope on HPB of Mexican American adolescents living in TX along the US–Mexico border.

Aim 2: To test the predictive ability of self–esteem, self–efficacy, hope, and HPB on IR in Mexican American adolescents living in TX along the US–Mexico border.

Nursing Significance of the Study

This study informs a program of research that aims to prevent obesity and type 2 diabetes in Mexican Americans living in TX along the US–Mexico border. Delineating relationships among self–esteem, self–efficacy, hope, HPB and markers of IR in Mexican American adolescents addresses the gap in health promotion science that connects psychological attributes and lifestyle behaviors with biological phenomenon. Information that connects behavioral and biological mechanisms of health will facilitate development of effective health promotion interventions targeted for particular populations.
Adult health behaviors emerge during adolescence. Adolescents generally experience health without routine health care system access (Quinn, Schoen, & Buatti, 2000; Schoen, Davis, K. Scott Collins, K., & et al., 1997; Schoen, Davis, DesRoches, & et al., 1998). From a traditional health systems perspective that relies on problem solving rather than health promotion, health services required during adolescence are negligible. However, according to reports sponsored by the Commonwealth Fund that explored health care issues for adolescents (5th – 12th grade) (Schoen et al., 1997; Schoen et al., 1998), 27% of Hispanic adolescent boys (5th – 12th grade) compared to 21% of adolescent boys of all other ethnicities, reported concern about their lack of access to a physician (Sandman, Simantov, & An, 2000; Schoen et al., 1998). A similar pattern was demonstrated for (5th – 12th grade) Hispanic adolescent girls in the same study (Schoen et al., 1997). In their summary of concerns for the future, Sandman’s group (2000) depicts a population of adolescents (5th – 12th grades) who enter adulthood without access to health care with limited ability to navigate the health care system and without healthcare insurance. These Commonwealth Fund reports (1997; 1998) provide evidence that Mexican American adolescents (5th – 12th grade) are more likely to experience barriers in accessing the health care system than white non-Hispanic youth.

The transition from adolescence to adulthood will likely include several years without regular contact with the health care system. This transition also includes a change from adolescence with regular health screenings in school environments to adulthood with limited resources for income, health insurance and health care (Sandman et al., 2000). When these individual reenter the primary healthcare system, they are young adults. With the increased risk of type 2 diabetes and the poverty along the US–Mexico border, these young adults who are of
Mexican American heritage living in TX along the US–Mexico border are likely to reenter the healthcare system with a chronic illness such as type 2 diabetes.

The Commonwealth Fund reports call for reaching out with novel health care approaches during adolescence. Approaches to facilitate adoption of HPB for adulthood are required (Sandman et al., 2000). The current healthcare system, with its problem oriented approach, is limited in its ability to address the health promotion needs of this population. Strategies are required that aim to promote health in this population during the time gap between when they leave high school and when they reenter the primary health care system. Nursing care during this time that focuses on health promotion may be a novel source of care to decrease use of resources for this population in the future. This study increased knowledge about psychological attributes, HPB and biological markers of IR in Mexican American adolescents to inform nursing science in the development of innovative health promotion strategies.

The study provides the foundation to build a future program of research designed to embrace the mission of the National Institute of Nursing Research (2007) and extends Hendricks’ (2002) work to another vulnerable adolescent population; that is, Mexican American adolescents who reside in the TX–Mexico border region. This research study encompassed several priority areas proposed in the National Institute of Nursing Institute’s strategic plan by:

- *Integrating the biobehavioral aspects of obesity prevention using health promotion strategies;*

- *Exploring HPB in Mexican American adolescents who live in TX along the US–Mexico border experiencing health disparities as a vulnerable population; and*
• Addressing the emerging health problem of obesity and obesity-related disorders
  with health promotion interventions that focus on wellness (National Institutes
  of Nursing Research, 2007).

Summary

This chapter presents an overview of the issues for Mexican American adolescents living in TX at the US–Mexico border regarding prevention of obesity and type 2 diabetes. The significance of the burden to society, the impact of poverty, the importance of developing HPB in adolescents and connection between behavior and biological markers were highlighted. The aims of the study were delineated. The impact of the increased prevalence of obesity on type 2 diabetes in children was described in regard to cost, ethnicity, and geographical location. The role that poverty and ethnicity play in adolescent health disparities was described. Linkages between HPB and psychological attributes were highlighted. The connection between lifestyle patterns and the biological outcome was emphasized. Terms were defined, research aims were delineated, and the significance of the study to nursing was delineated.
CHAPTER 2: THEORETICAL FRAMEWORK AND LITERATURE REVIEW

This chapter provides an overview of the theoretical framework and context for the study including factors related to life at the TX–Mexico border, adolescence, and the connection between poverty and health. The perceptual characteristics of self-esteem, self-efficacy, and hope are described. Health promoting behaviors that promote healthy nutrition and physical activity are emphasized. Insulin resistance is presented with a focus on specific methods of measurement, including body mass index (BMI) percentile, Waist Circumference (WC) percentile, and Homeostasis Mathematical Assessment Model for Insulin Resistance (HOMA–IR). These major concepts are described with examples from the literature to support the research design and methodology.

Theoretical Framework

The original HPHD Model depicted in Figure 1 provided the theoretical foundation to address the study aims. The conceptual framework for this study depicted in Figure 2 was an adaptation of the HPHD Model (Hendricks, 1998b). First described in 1992, the HPHD Model has been used to delineate factors influencing HPB during adolescence in a variety of settings (Hendricks, 1998b). Early studies tested the HPHD Model’s theoretical statements and the relationships among the major components of the model: cognitive development, self-esteem, self-efficacy, hope and HPB (Hendricks, 1998a; Hendricks, 1998b; Hendricks et al., 2000; Hendricks et al., 2001). The attribute of cognitive development was not strongly linked to either self-esteem \( (r = 0.038) \) or self-efficacy \( (r = 0.116) \) as hypothesized; therefore this attribute was eliminated from the model (Hendricks, 1998b; Smith Hendricks, 1992).

Findings from these early studies demonstrate how the attributes of self-esteem, self-efficacy and hope increase the likelihood that adolescents (11 – 20 years) will report engaging in
HPB. For example, in Hendricks’ initial study of 1036 rural adolescents (11 – 15 years), self-esteem, self-efficacy, and hope as depicted in the HPHD Model were strongly associated with HPB and explained 23% of the variance (Smith Hendricks, 1992). Another study using the HPHD Model, examined the relationship between hope and HPB in 168 student-athletes (mean = 20; 18 – 26 years). In this study, Denisha Hendricks (2005) demonstrated that hope and self-efficacy were significantly associated with HPB and explained 18.1% of the variance.
FIGURE 1. The Hendricks Perceptual Health Determinants (HPHD) Model
FIGURE 2. Adaptation of the Hendricks Perceptual Health Determinants (HPHD) Model
The concepts of self-esteem, self-efficacy and hope have consistently produced strong relationships with HPB (Arbona & Power, 2003; Klein-Hessling et al., 2005; Norwood, 2000; Wilson, Syme, Boyce, Battistich, & Selvin, 2005). Arbona and Power (2003) reported higher self-esteem scores for 434 Mexican American adolescents (mean = 13.6 years; range = 13 – 19 years) who listed fewer risky behaviors than those with lower self-esteem scores. Self-efficacy was determined to be a dominant predictor of positive health-related behavior in a group of 345 fourth grade students (mean = 10.5 years) (Klein-Hessling et al., 2005). Hope was significantly associated ($p < 0.05$) with risk behavior and perception of neighborhood disorder in a study ($n = 369$) that included ethnically diverse (36% Hispanic) sample of adolescents (middle school) from low socioeconomic backgrounds (Wilson et al., 2005). Furthermore, in Norwood’s (2000) analyses of college students ($n = 97$), levels of hope were associated with motivation to exercise, a concept similar to the physical activity component of Hendricks’ concept of HPB.

Deterioration of HPB such as physical activity and healthy food choices during adolescence is associated with increased BMI, a marker of IR (Atherson & Metcalf, 2005; Forshee, Anderson, & Storey, 2004). Although psychological attributes, such as self-efficacy, self-esteem and hope have been associated with health promotion, and HPB has been linked to markers of IR, the relationship of the psychological attributes of self-esteem, self-efficacy and hope to the biological marker IR as the distal outcome have not been addressed.

Hendricks views the attributes of self-esteem, self-efficacy and hope as instrumental to health promotion (Hendricks, 1998b). The HPHD Model (1998b) provides evidence for relationships among these concepts. Findings from Hendricks’ work support using the HPHD Model to explore health behavior choices in prevention research. The concept of hope from the
perspective of the HPHD Model is of particular interest in the population of Mexican American adolescents living in TX along the US–Mexico border where poverty and future outlook may impact diabetes health disparity (Mahat, Scoloveno, & Whalen, 2002; Wilson et al., 2005). Therefore, this study explored the concepts of self–esteem, self–efficacy and hope in this adolescent population. The adapted HPHD Model (Figure 2) provided the framework to study of the ability of self–esteem, self–efficacy and hope to predict HPB and IR in Mexican American adolescents living in the TX–Mexico border region (Hendricks, 1998b).

Literature Review

Demographic and Descriptive Information

Texas–Mexico Border

Adolescents living in TX along the US–Mexico border bridge two cultures and two languages (Edelman & Mandle, 2006). Cities on both sides of the US–Mexico border are linked culturally and economically forming a distinct region. Historical, socio–cultural and economic conditions of this region influence risk exposure for adolescents living in the TX–Mexico border region. The Mexican American population living along the US–Mexico border exhibits different characteristics from the Mexican American or Hispanic population living elsewhere in the US. Characteristics of populations residing along the border more closely resemble those of other US–Mexico border counties than they resemble those characteristic from the interiors of their own state. For example, percentages of Hispanic families, predominantly (80%) Mexican American, in most border counties of TX {Cameron County–86%} and Arizona {Santa Cruz County–81%} are more similar to each other than to percentages of the respective state {TX–36%; Arizona–29%} (United States Census Bureau, 2004). Moreover, family structure, poverty
level, and educational attainment are similar in border counties compared to counties in the center of the respective state (United States Census Bureau, 2004). The diverse Hispanic population in the US consists of Hispanics of Puerto Rican, Spanish, Central American as well as those of Mexican American heritage. Mexican Americans comprise approximately 65% of the US Hispanic population; whereas, along the TX–Mexico border in Cameron County, TX, 80% of the Hispanic population list themselves as Mexican American (United States Census Bureau, 2004).

The percentage of families living below the poverty level in most border counties of TX (Cameron County–35%) also resembles that of Arizona border counties (Santa Cruz County–21%) with more poverty than at the state level (TX–14%; AZ–11%) (United States Census Bureau, 2004). Furthermore, economic interaction along the border generates complex binational relationships with dual language and cultural exchange (Ruiz-Beltran & Kamau, 2001). Lack of resources, citizenship and documentation amplify health disparities in this region. Health disparity widens as language and culture limit access to health care, reduce utilization and restrict infrastructure growth (Smith, et al., 2005). In fact approximately 45% of the population along the US–Mexico border speaks Spanish and 20% speak English with difficulty according (Anderson, 2003). Along the border in TX, many Hispanic families prefer speaking Spanish at home. However, use of both English and Spanish occur in public settings with Spanish viewed as a vital skill for communication socially and in business (Mejias & Anderson, 1988).

Substandard housing accompanies the endemic poverty problem in the region. Hundreds of colonias are home to thousands of people near the TX–Mexico border. In Spanish the word colonia is comparable to the word neighborhood in English. Along the TX–Mexico border, these
unincorporated settlements of land often lack water, sewers, electricity, paved streets and safe sanitary housing. Over two thousand communities of over 350,000 individuals live in colonias in TX, more than any other state (Burke, 2001).

In 2001, it was estimated that $40 million would be required to correct substandard housing in the colonias of Cameron County at the southernmost tip of TX (Cisneros, 2001). Partnerships with the banking industry and community development foundations have improved services and offered affordable alternatives to colonias for housing. Young, unskilled, Hispanic residents of colonias often work for very low wages as farm or migrant laborers (Cisneros, 2001).

Characteristics of the border region require a unique perspective of acculturation. Education, socioeconomic status, language use, food and social preferences contribute to the cultural environment. Dimensions of acculturation in this population will exhibit different characteristics from acculturation of Mexican American populations in regions farther from the border (Lara, Gamboa, Kahramanian, Morales, & Hayes Bautista, 2005). Acculturation within the context of the TX–Mexico border region differs from acculturation elsewhere when bicultural characteristics of this region are considered. Integration of the two cultures is likely to occur rather than either assimilation or separation as described by Lara (2005). For example, adolescents may become bilingual and bicultural rather than assimilating to or separating from the US culture.

Mexican American individuals residing at the TX–Mexico border live within a unique cultural, linguistic, economic and binational environment (Gibson et al., 2003). This cultural and economic environment along with genetic predisposition contribute to the prevalence of illnesses
such as type 2 diabetes and augment disparities associated with this population (Goodarzi et al., 2005; Guizar-Mendoza et al., 2005; Hanis et al., 1996; Hunt et al., 2005).

Adolescence

Adolescent development occurs rapidly with changes in multiple physical, psychosocial changes and social processes that are possibly more extreme than those at any other life transition (Hockenberry & Wilson, 2006). Subgroups of adolescence include early (11 – 14 years), middle (15 – 17 years), and late (18 – 20 years) adolescence, each consisting of distinct developmental tasks with unique health concerns (Hockenberry & Wilson, 2006). During adolescence, immense psychological, social and physical changes occur. Although adolescents (11 – 20 years) use abstract reasoning, their experience base may cloud judgment abilities (Hockenberry & Wilson, 2006). Adolescents’ psychosocial development centers on identity, autonomy and achievement. Adolescents (11 – 20 years) may experience peer values that conflict with adult views. Adolescents (11 – 20 years) continually make choices that impact preventable health problems (U.S. Department of Health and Human Services, 2007). These characteristics influence relative risk, access to resources and health status for adolescents that contribute to their status as a vulnerable population.

Social status limits access to resources during adolescence (Schoen et al., 1997; Schoen et al., 1998). For example, adolescents (11 – 20 years) depend on adults for health insurance and consent for treatment (Quinn et al., 2000). Individual resources for health services are lacking during adolescence. Young people may also be unaware of risks or available choices. Likewise, individual and population risk for adverse events rises during adolescence potentially resulting in
health status deterioration (Hendricks et al., 2000). Finally, avoiding future health problems depends on HPB developed during adolescence.

Society views adolescents (11 – 20 years) as incapable of full responsibility for their livelihood; therefore, their social status and social capital limit their ability to function independently within the community (Edelman & Mandle, 2006). For example, adolescents (11 – 18 years) remain dependent on their families for health care unless legally categorized as emancipated minors. Adolescents, therefore, lack full economic and legal responsibility for most decisions about their health (Edelman & Mandle, 2006). Mexican American adolescents residing along the TX–Mexico border experience extremes in these access limitations, because of their minority status, poverty, and paltry health care options in medically underserved areas (Gibson et al., 2003).

Marketing strategy aimed at adolescents (11 – 20 years) however, recognizes this groups’ independence, responsibility, and purchase power. Strong messages to the adolescent population aim to capture adolescents’ (11 – 20 years) expenditures. Furthermore, messages for peer conformity during adolescence become particularly disconcerting for bicultural Mexican American individuals separating them from their families and associating them with same age individuals who may hold different cultural and ethnic values with one culture ascribing to values that contradict the other (Edelman & Mandle, 2006).

Current research supports a positive view of adolescence; however, this developmental stage involves extremely complex interactions among biologic, cognitive, sociological and social processes. Individuals may be at the healthiest point in their lives during adolescence; but, crucial health concerns requiring availability and access to care occur (Quinn et al., 2000;
For example, motor vehicle accidents, suicide, unwanted pregnancy, and sexually transmitted diseases present typical kinds of major problems faced during adolescence (Irwin, Burg, & Uhler Cart, 2002). Other risks, such as obesity and type 2 diabetes particularly concern the Mexican American adolescent (Irwin, Igra, Eyre, & Millstein, 1997; Irwin & Duncan, 2002; Irwin, 2004a; The Writing Group for the SEARCH for Diabetes in Youth Study Group, 2007).

Adolescents (12 – 19 years) comprise approximately 7% of the US population; however, the adolescent (12 – 19 years) population at the TX–Mexico border is slightly higher {TX – 8%; Cameron County, TX – 8%} (United States Census Bureau, 2004). Many of these adolescents (12 – 19 years) live in single parent households with females as the head of the household (Fields, 2004; United States Census Bureau, 2004). For example, 86% of the households that fall below the poverty level in Cameron County at the TX–Mexico border have a female head of household as compared to 36% for TX and 15% nationally (United States Census Bureau, 2004).

Of these poor households in Cameron County, 65% provide that home for children under 18 years old as compared to 42% for the state and 38% nationally (United States Census Bureau, 2004). Even without the role that poverty plays, adolescents (11 – 20 years), a subset of the pediatric population, exhibit characteristics of a vulnerable population. Developmentally adolescents (11 – 20 years) may perceive themselves as invincible with societal pressure to engage in high risk behavior (Irwin et al., 1997). Therefore, adolescent populations (11 – 20 years) remain a vulnerable population even without the cumulative effects of poverty or ethnic minority status.
Poverty and Health

Researchers generally use the concept of poverty along the continuum of socioeconomic status when conducting studies of health disparity (Adler & Ostrove, 1999). Lack of health insurance with limited financial resources contributes to health disparity; however, providing universal health insurance or infusing dollars into a poor community does not necessarily alleviate health problems related to poverty. Evans and Kelly (2004) hypothesize that economic affiliation improves an individual’s outlook about their social status. In his work with social order in primates, Sapolsky (2005) provided evidence for stress related hormonal changes with ranking behaviors, where primates who had lower status in the group developed hormonal changes. For example, when lower ranked primates were marginalized from the group they became more hostile, developed elevated cortisol levels and became more overweight (Sapolsky, 2005). Human rankings may produce similar patterns of marginalization with metabolic disorders such as diabetes (Wilkinson, 1999). According to Wilkinson (1999) the psychological sense of feeling poor plays a role as important as lack of resources. Individuals are more likely to feel poor when they are bombarded with messages that they are deprived (Serr, 2004).

Lower social status occurs as an antecedent to poor health rather than its consequence (Brown, Estrada, Hazarika, & Bastida, 2005). In their report about diabetes and the labor market in south TX along the US–Mexico border, Brown et al., (2005) demonstrate how costs to the person with diabetes extend beyond their own labor productivity to that of the community. Some theorists hypothesize that ill health in the indigent population results from poor health behaviors such as smoking and sedentary lifestyles. Marmot et al., (2001) refutes this commonly held belief with data from the Whitehall studies where the socio economic gradient reflected health
disparities. The study sample consisted of civil service employees in Great Britain with health access and controls in place for lifestyle. Increased morbidity of a variety of health problems correlated with lower socioeconomic status even with health behaviors held constant (Wilkinson, 1999).

Serr’s (2004) qualitative study sharing the lived experiences of 10 homeless men offers the rich context that is pertinent to this gradient view of social status. The people’s voice as experts is a theme in this work called “Voices from the Bottom.” Furthermore, Adler’s (2000) work contributes with development of the concept of subjective social status using a systematic design and objective validated socio economic measures. Studies by Goodman et al. (2001; 2003) expand this concept of subjective social status to ethnically diverse and adolescent (7th–12th grade) samples. Adler hypothesizes that a one dimensional self anchoring indicator could predict ill-health (Adler & Ostrove, 1999; Adler et al., 2000; Adler & Newman, 2002). Psychological, sociological and macroeconomic factors play a role in view of poverty and disease along the TX–Mexico border.

Ethnic status, poverty, genetic background, type 2 diabetes, and developmental characteristics predispose the Mexican-American adolescent living in TX on the border to increased risk for negative health outcomes. These demographic characteristics provide support to identify Mexican American adolescents residing along the US–Mexico border as a vulnerable population.

*Perceptual Characteristics*

Adolescents (11–20 years) make health choices using strategies acquired within the context of their environment. Acquired perceptual characteristics associated with HPB during
adolescence include self–esteem, self–efficacy and hope (Callaghan, 2006; Callaghan, 2003; Callaghan, 2005; De Bourdeaudhuij et al., 2005; Hendricks, 1998b; Hendricks et al., 2001; Hendricks et al., 2005; Hendricks et al., 2006; Klein-Hessling et al., 2005; Luszczynska, Gutiérez-Doña, & Schwarzer, 2005; Magaletta & Oliver, 1999; McDonald et al., 2005; Nelson & Gordon-Larsen, 2006; Pender, Bar-Or, Wilk, & Mitchell, 2002; Plunkett, Abarca-Mortensen, Behnke, & Sands, 2007; Schmitz, 2006; Yarcheski, Mahon, Yarcheski, & Cannella, 2004).

Yarcheski (2004) conducted a meta–analysis to explore the strength of predictors commonly used in research with health promotion during adolescence. Of 37 studies reviewed, eight predictors were identified as candidates promoting positive health practices. Self–esteem, self–efficacy and hope were among the strongest predictors (Yarcheski et al., 2004). Clearly psychological attributes, particularly self–esteem, self–efficacy and hope, have been demonstrated to be strong predictors of HPB in adolescents.

Self–Esteem

Most definitions of self–esteem include subjective beliefs about personal worth (Hendrickset al., 2001). Coopersmith (1981) provides one definition that includes a sense of personal judgments of value or the attitudes that individuals hold of their self–worth. One of the most widely accepted definitions of self–esteem was proposed by Rosenberg (1978) where self–esteem is expressed as a global positive or negative attitude of one’s self. Rosenberg (1978) views self–esteem as a global attitude that indicates psychological well being. The literature also supports the view that assessment of global self–esteem does not necessarily reflect behavior (Rosenberg, 1989). Although self–esteem is not considered a predictor of specific health actions, the attributes of self–esteem are stable and may be maintained into adulthood (Kawash, 1982).
Self-esteem is a fundamental human attribute that addresses the ability of the human being to promote their sense of self-worth through coping mechanisms (Rosenberg et al., 1995). When humans are prevented from bolstering their self-esteem, well-being suffers (Rosenberg et al., 1995). With the wide use of the Rosenberg Self-Esteem Scale, the concept of self-esteem during adolescence has maintained prominence in the field of social psychology (Rosenberg et al., 1995).

The concept of self-esteem has both cognitive and affective components. The elements of self-confidence and self-deprecation combine to form the concept of self-esteem. Self-acceptance or self-respect forms a central focus for self-esteem. Gender differences in self-esteem have been noted with higher self-esteem commonly identified in males and decreasing self-esteem in females as they enter adolescence (Hendricks et al., 2001).

During adolescence peer and social norms influence self-esteem with a corresponding response to their environment. Mastery of developmental tasks such as autonomy and identity formation facilitates health transition to adulthood. Ethnic identity and commitment to a particular ethnic group is a developmental task of adolescence for transition to adulthood (Padilla, 1995). Commitment to one’s ethnic identity was found to be significantly associated with self-esteem in 196 Mexican American college students using a 4-item scale (Phinney & Alipuria, 1990); however, when a more complex sense of cultural identity is captured, these associations are less clear (Padilla, 1995). The importance of ethnic identity to the individual seems to affect the relationship between ethnicity and self-esteem.

Across culture and gender, abilities that were valued promoted self-esteem (Guinn, Vincent, Semper, & Jorgensen, 2000; Hendrickset al., 2000). Social and psychological
experiences within an ethnic group influence self-esteem. Studies reveal mixed results indicating that self-esteem may be influenced by a variety of factors including environment, culture and social support (Mahat et al., 2002; Schmitz, 2006; Swaim & Wayman, 2004). Regardless of the antecedents to self-esteem, the direct relationship to HPB remains (Arbona & Power, 2003; Hendricks, 1998a; Hendricks, 1998b; Swaim & Wayman, 2004).

Self-esteem, a characteristic which promotes positive behavior is generally viewed in adolescent studies (11 – 20 years) as global self-esteem rather than self-esteem garnered from past accomplishments (Rosenberg et al., 1995). Self-esteem directly kindles HPB decreasing the likelihood of health–risk behavior (Hendricks et al., 2001; Riesch, Anderson, & Krueger, 2006; Torres & Fernández, 1995). In a study of 100 adolescents (12 – 17 years) from Spain, Torres (1995) used multiple regression to explore the relationships between an overall measure of self-esteem and health behavior. The Rosenberg self-esteem measure included subscales of responsibility, emotional stability, and sociability. The health behavior scale addressed nutrition, personal health, mental health and social aspects of health (Torres & Fernández, 1995). Self-esteem accounted for almost 40% of the variance in mental health behavior and 25% of the variance in total health behavior scores (Torres & Fernández, 1995). Self-esteem was not significantly associated with nutrition health behavior (Torres & Fernández, 1995). Self-esteem from the perspective of these researchers becomes particularly valuable when mental health and social aspects of HPB are considered together (Torres & Fernández, 1995). Nelson and Gordon-Larsen (2006) investigated relationships among self-esteem and HPB in almost 12,000 adolescents (11% Hispanic) using data from a national longitudinal study (mean age = 15). Cluster analysis of these data revealed patterns with HPBs associated with higher self-esteem.
In this dissertation study, self-esteem was defined as, “the individual’s positive or negative attitude toward the self as a totality”. The Rosenberg Self-Esteem Scale (Rosenberg, 1989) was used to measure the concept of self-esteem. Empirical referents for the value of measuring self-esteem using the Rosenberg Self-Esteem Scale have been widely reported in the literature with numerous studies of adolescents using the scale (Brennan & Bosson, 1998; Hagborg, 1993; Rosenberg et al., 1995).

Self-Efficacy

The concept of self-efficacy refers to the subjective sense that problems or new tasks can be accomplished. The primary focus of the concept of self-efficacy links cognitions to actual behavior (Possel, Baldus, Horn, Groen, & Hautzinger, 2005). Self-efficacy and adolescents’ ability to regulate their own behavior is a prominent component of Bandura’s (1977) Social Cognitive Theory. In Social Cognitive Theory successful goal setting and performance depends on the belief that one is capable of performing the specific skill (agency). Confidence in ability is based on a delineated skill and has been referred to as self-efficacy (Bandura, 1977). A sense of capability generates a positive outlook and increased effort to succeed. Whereas, a sense of inability results in the likelihood that the individual will view the task as impossible or difficult, thus negatively affecting performance (Bandura, 1977). As adolescents feel more capable they learn self-regulation skills. Continuous self-regulation enhances performance or without success, establishes performance barriers. Adolescents’ perception of capability or self-efficacy influences their perception of capability and their future performance (Bandura, 1977; Bandura, 1999). Individuals with high self-efficacy are likely to persevere to master the task; whereas,
those with low self-efficacy are likely to avoid or abandon the task altogether (Bandura, 1999; Vieno, Santinello, Pastore, & Perkins, 2007).

Self-efficacy has been viewed as a resource for adaptation during adolescence (Vieno et al., 2007). Compared to self-esteem, self-efficacy consists of a prospective and performance orientation. Self-esteem, conversely, comprises internalized emotional tone (Vieno et al., 2007). Perceived self-efficacy appears in the literature as a tool to understand behavior change. Self-efficacy in adolescence influences school performance friendships, career and vocational choices (Pajares & Urdan, 2006). As dependence on parents decreases in adolescence, peer interactions increasingly influence social experiences and self-concept. Adolescents (11 – 20 years), therefore, rely on peers and judge their own self-efficacy (Pajares & Urdan, 2006). Inexperience of their friends may promote negative experiences and lower self-efficacy (Pajares & Urdan, 2006). Strengthening self-efficacy during adolescence better prepares the individual for adulthood (Pajares & Urdan, 2006).

The beneficial impact of strong self-efficacy is universal from one culture to another (Oettingen, 1997). Developing strategies to strengthen self-efficacy in Mexican American adolescents, therefore, will prepare them for a more resilient adulthood. Oettingen (1997) explains how self-efficacy in collectivist cultures such as the Mexican American culture, differs from self-efficacy in individualist cultures. Agency and goal setting are present but set at the group level in collectivist cultures. Therefore, Mexican American adolescents with strong self-efficacy will be better prepared to progress toward realizing the collectivist goals aiming toward improving wellbeing of their in-group rather than toward individualist self-actualization goals (Oettingen, 1997).
Self-efficacy, particularly in nursing research, reflects specific behavioral competency such as self-efficacy for breast-feeding or physical activity. For example, Callaghan (2003) analyzed data from a study of 256 adolescents (14 – 19 years) using a measure of self-efficacy specific for physical activity. Findings from that study reported relationships between self-efficacy and physical activity. That is, individuals with high self-efficacy scores also reported higher levels of physical activity. Reliability coefficients were not reported.

According to Luszczynska, Gutierrez-Dona and Schwarzer (2005), Bandura intended domain specific self-efficacy. However, a broader conceptualization of general self-efficacy has occasionally been used with adolescents (11 – 20 years). Typically, self-efficacy is considered parallel to the behavior or performance of interest. For example, a person may feel broadly capable, but when asked about how capable they are at solving math problems they may feel as if they have low self-efficacy for that activity. Alternatively, a person may have high self-efficacy for mathematics but not feel capable to resist smoking a cigarette.

Components that contribute to self-efficacy include self-regulatory activities that involve acquiring new behavior as well as reinforcing or inhibiting existing behavior (Irwin et al., 1997). Positive self-esteem has been associated with higher general self-efficacy (Luszczynska & Gutiérez-Doña, 2005; Luszczynska & Scholz, 2005). However, without behavior change and a specific domain of efficacy, some researchers consider self-esteem and general self-efficacy as synonymous concepts (Stanley & Murphy, 1997). A psychometric comparison of self-esteem to general self-efficacy determined that general self-efficacy scales were poor indicators of behavior and that they actually measured self-esteem (Stanley & Murphy, 1997).
As self-efficacy increases, individuals attempt more difficult challenges. From the perspective of HPB, the adolescent (11 – 20 years) with high self-efficacy is more likely to take action. According to Bandura (1999) who developed the foundation to support self-efficacy theory, change in HPB requires self-efficacy. Domain specific self-efficacy provides a foundation to support relationships between health and a sense of competence concerning the behavior needed to maintain health in a specific area such as physical activity or nutrition. Self-efficacy establishes personal competence for use in health promotion to address specific domains of physical activity and nutrition. Self-efficacy for physical activity and nutrition is a concept that is particularly well suited for use in research about HPB.

This study measured self-efficacy for physical activity and nutrition. Empirical relationships between self-efficacy and behavior are evident in the theoretical foundations of research with HPB during adolescence (Becker, Stuifbergen, Oh, & Hall, 1993; Callaghan, 2006; Dishman et al., 2005). Becker, Stuifbergen, Oh, and Hall (1993) reported psychometric properties of a health self-efficacy instrument that included self-efficacy in the domains of physical activity, nutrition, interpersonal relations and stress management. A psychometric pilot of the instrument included undergraduate students, but there is no evidence to support the psychometric adequacy for use in Mexican American adolescents. One issue that arises with instrumentation to measure domain specific self-efficacy is that the specific nature limits the wide use thus limiting ability to establish reliability of their psychometric properties. In this study, Pender’s Perceived Self-Efficacy [Self-Regulatory Efficacy] (Adolescent Version was used to measure self-efficacy for physical activity (Robbins, Pis, Pender, & Kazanis, 2004); whereas, Parcel’s (1995) Dietary Self-Efficacy for Low Fat and Sodium and Heatey and
Thombs’ (2004) Fruit and Vegetable Consumption Self–Efficacy Scale were used to measure self–efficacy for nutrition. For the purpose of this study self–efficacy was defined as “beliefs in one’s capabilities to organize and execute the course of action required to manage prospective situations” (Bandura, 1999, p. 2).

Hope

Hope as a nursing concept generally addresses coping mechanisms related to illness threats rather than health promotion. The term hope, used widely in nursing, historically appears in psychology, sociology, theology and philosophy literature (Clark, 2003). Components of hope include expectancy and anticipation. Recurring themes for possible antecedents include: interconnectedness, action, sense of self–worth; self–regulatory processes; conviction/determination; and goals.

The presence of hope empowers individuals and energizes them. Hope has been associated with goal setting and making choices (Morse & Doberneck, 1995; Snyder, 2002; Snyder et al., 2006). Achievement results in the expectation of future successes and positive thinking prevails. This overall sense of self–worth and success contributes to expectations for future improvement. Continued perceived improvement is integrally connected to HPB (Dufault & Martocchio, 1985). Hope has been demonstrated to have an impact on health outcomes, but most nursing literature focuses on illness states, such as chronic illness, death and dying. However, it is evident that the concept of hope stems from a human interpersonal perspective that corresponds to health promotion (Parse, 1999; Snyder et al., 2006).

The theoretical link between hope, exercise adherence, exercise commitment, exercise self–motivation, and fitness improvement has been explored (Norwood, 2000). Differences in
self-motivation have been compared to exercise scores among the high-, medium-, and low-hope groups (Norwood, 2000). In Norwood’s (2000) study significant differences occurred among hope groups in regard to self-motivation to exercise (Ng, Yau, Chan, Chan, & Ho, 2005; Norwood, 2000). In addition, Ng (2005) found that hope was positively correlated with daily function (0.72; \( p < 0.01 \)) and spirituality (0.76; \( p < 0.01 \)), while negatively correlated with physical distress (-.30; \( p < .01 \)) in a sample of over 600 Chinese individuals (Ng et al., 2005). These findings offer more evidence that hope is a universal concept and remains stable from one culture to another.

The concept of hope in nursing is often explored in the context of chronic disorders and terminal illness even when applied to the pediatric populations; however, consideration of the hope concept for prevention interventions for healthy adolescents (11 – 20 years) is warranted. Concept clarification should also address whether alteration of concept characteristics occurs in the adolescent population. Hendricks’ (2000) study of 1036 rural adolescents (11 – 16 years) explored the level of hope as a construct in a predictive health promotion model. Hope in this model was considered anticipation of a positive future outcome. Qualitative findings from Turner (2005) and from Raleigh and Boehm (1994) describe the concept of hope during adolescence. The hopeful individual transcends beyond unpleasant stressful situations toward a higher level wellness. For the purposes of this dissertation research, Hope was conceptualized using Miller’s (1988) definition.

‘Hope is a state of being characterized by anticipation for a continued good state, an improved state, or a release from perceived entrapment. The anticipation may or may not be founded on concrete, real world evidence. Hope is an anticipation of a future which is good, based on mutuality (relationships with others), a sense of personal competence, coping ability, psychological well-being, purpose and meaning in life and a sense of ‘the possible’ ’(1988).
Hope was measured with the most recent version of the Adolescent Hope Scale, an adaptation of the Miller Hope Scale (Hendricks et al., 2005).

**Health Promoting Behaviors**

Health promoting behaviors were defined as those “activities motivated by the desire to increase well-being” (Pender, 2006, p. 7). Use of health promotion behaviors complements the stabilizing tendency of disease prevention which is directed toward early detection. Rather than stabilization and avoidance of disease, health promotion behaviors develop the tension necessary to increase human potential (Pender et al., 2006). Health promotion behaviors use approach rather than avoidance motivated strategies (Pender et al., 2006). Effective health promotion interventions consider a population’s diversity with interventions targeted toward fostering choices that promote healthy behaviors (Kreuter & Wray, 2003; Kreuter, Lukwago, Bucholtz, Clark, & Sanders Thompson, 2003; Kreuter et al., 2005).

Health promoting behaviors, specifically physical activity and nutrition habits, developed in adolescence persist into adulthood according to most experts (Irwin, 2004a; Whitaker, Wright, Pepe, Seidel, & Dietz, 1997). Physical activity, nutrition, social support, life appreciation, health responsibility, and stress management comprise concepts in models used in health promotion for adolescents (11 – 20 years). Physical activity and nutrition are recognized as health behaviors associated with IR (Goodman, Dolan, Morrison, & Daniels, 2005; Goodman, Daniels, & Dolan, 2007; Lee, Okumura, Davis, Herman, & Gurney, 2006). There is a paucity of research that has investigated physical activity and nutrition HPBs, as well as, social support, life appreciation, health responsibility, stress management and their association with IR in the Mexican American adolescent population (11 – 20 years) (Edwards & Lopez, 2006; Schwimmer, Burwinkle, &
Varni, 2003). Although adopting healthy behavior is recognized as one of the best approaches to avoid obesity and disorders associated with obesity and type 2 diabetes, such as IR, strategies to promote HPB have not been addressed adequately or in a systematic manner (Ogilvie et al., 2007).

Pender’s Theory of Health Promotion represents a multidimensional view of HPB (Pender et al., 2006). Insulin resistance, antecedents, and consequences of IR are linked to concepts within the model. The major constructs in Pender’s Health Promotion Model include: Individual Characteristics and Experiences; Behavioral-Specific Factors; and Behavioral Outcome (Figure 3). The major concepts in Pender’s Health Promotion Model are linked to contextual issues influencing IR in the Mexican American adolescent. For example, the demographic and socio cultural factors of socioeconomic status relate to the poverty this population endures. Multiple concepts within the Individual Characteristics and Experiences construct were considered in data collected in this sample of Mexican American adolescents who reside at the TX–Mexico Border.
FIGURE 3. Pender's Health Promotion Model (Revised) (Pender et al., 2006; Ronis et al., 2006).
Pender’s Health Promotion Model was designed to explain HPB and provided the basis for the Hendricks’ Perceptual Health Promotion Determinants (HPHD) Model that was used as a framework in this proposed study. Therefore, the HPHD Model is ideal to use as a framework to explore HPBs that are associated with IR in Mexican American adolescents (Pender et al., 2006; Ronis et al., 2006). Two constructs of HPB in Pender’s model, Individual Characteristics and Behavior Specific Factors (Interpersonal and Situational Influences) correspond directly to the specific aims of this current study. Individual characteristics in this study include: age, developmental stage, ethnicity, socio–economic status, family history, and acculturation. Pender’s Revised Health Promotion Model, delineating a direct relationship between modifying factors and behavior, provides the underpinnings for the variable of HPB in Hendricks HPHD Model. Understanding how IR is associated with the determinants of HPB in the Mexican American adolescent is required to design effective interventions to prevent obesity and diseases associated with obesity, such as type 2 diabetes (Pender et al., 2006; Robbins, Gretebeck, Kazanis, & Pender, 2006).

Addressing prevention of obesity and IR and adverse health consequences requires a broad approach that includes promoting healthy behaviors. The most promising approaches use models that address intrapersonal, social, and physical environmental factors (Garson & Engelhard, 2007; U.S. Department of Health and Human Services, 2007). Research in the area of obesity prevention in children and adolescents (11 – 20 years) varies in terms of design, target population, theoretical foundation and outcome measures making comparisons difficult (Summerbell et al., 2006). A model such as Pender’s Health Promotion Model provides a broad perspective to examine how HPB and IR are associated in the Mexican American adolescent
living along the TX–Mexico border. The HPHD Model that provides the framework for this study is derived from Pender’s model and incorporates the necessary intrapersonal factors of self-esteem, self-efficacy and hope.

**Health Promoting Behaviors: Physical Activity**

Research about the relationships between biological markers of IR and the HPB of physical activity is lacking in the Mexican American adolescent (Goran, Bergman, Cruz, & Watanabe, 2002; Haffner et al., 1996; Kobaissi et al., 2004). Studies demonstrating the relationship between physical activity and IR have been limited in adolescents (Grey et al., 2004; Kasa-Vubu, Lee, Rosenthal, Singer, & Halter, 2005). Nevertheless, one study by Nelson et al., (2006) reported data about physical activity patterns and risk behavior in adolescents (mean age = 15 years) from the National Longitudinal Study of Adolescent Health. Nelson concluded that in this sample of 11,957 adolescents (11% Hispanic) participation in physical activity was associated with favorable risk profiles (Nelson & Gordon-Larsen, 2006). Furthermore, studies about physical activity during adolescence generally focus only on overweight or obese individuals. For example, in a 16 week randomized clinical trial, 22 overweight Hispanic adolescent males (mean age = 15 years) who participated in resistance training were compared to a group of overweight Hispanic adolescent males who did not exercise (Shaibi et al., 2006). The treatment group improved in strength and insulin sensitivity while accounting for total fat mass and total lean tissue mass changes.

One of the few randomized controlled trials of promoting behavior change in adolescents (mean age = 12.1 years) focused on multiple behaviors related to physical activity and nutrition (Prochaska & Sallis, 2004). A three group design of 138 adolescents (46 per group) was carried
out over three months (Prochaska & Sallis, 2004). In this study, the physical activity treatment was more effective than nutrition. Effectiveness of the intervention was demonstrated in the male group but not in the female group (Prochaska & Sallis, 2004).

Kang (2002) evaluated the impact of various dosages of lifestyle and exercise treatments on markers of IR (insulin, blood pressure and lipid levels) in a sample of obese 13 to 16 year old adolescents. In this sample of 80 adolescents, participants with the worst baseline values demonstrated the most IR marker improvement from the physical activity intervention, particularly high intensity exercise (Kang et al., 2002). This study sample did not include Hispanic adolescents.

Specific type, duration, frequency, or intensity of physical activity have not have not been shown to be more effective than others (Kang et al., 2002). Studies vary in the length of time for the bouts of physical activity (Kang et al., 2002). Duration of the intervention in most studies is too short to provide adequate support for improvement (Kang et al., 2002). Furthermore, results seem to fluctuate depending upon the degree of IR at baseline for the subjects (Kang et al., 2002). For the Mexican American adolescent living along the TX–Mexico border, the association between physical activity behavior and IR provides an important aspect of health promotion behavior that should be explored. In this dissertation study self–efficacy for physical activity was defined as the sense of feeling able to participate in activities of a physical nature and measured with Pender’s Perceived Self–Efficacy Scale.

Health Promoting Behaviors: Nutrition

A statewide surveillance system has been used in TX to measure the nutrition and physical activity health behaviors and prevalence of overweight and obesity (Hoelscher et al.,
(2004). These surveillance studies confirm the increasing prevalence of overweight Mexican American adolescents (Hoelscher et al., 2004). In addition, health promotion behavior related to nutrition was reported. Food frequencies were used in this study to indicate adolescents’ health promotion behaviors related to nutrition.

Nutritional evaluations in adolescents (11 – 20 years), fraught with comparison difficulties, contain multiple age groups with assessment techniques that vary from study to study. Studies may also use inadequate 24 hour recall and food frequency measures of nutritional intake (Janssen, Katzmarzyk, Boyce, King, & Pickett, 2004). For example, errors in food frequency measures occur when food lists exclude specific foods, such as ethnic food choices (Ishihara et al., 2005). Food serving comparisons create difficulty, particularly if reported in grams rather than servings per day (Munoz, Krebs-Smith, Ballard-Barbash, & Cleveland, 1997). These types of measures do not incorporate the choices made during adolescence and the motivation behind those choices. For Mexican American adolescents living at the TX–Mexico border comprehensive food lists need to incorporate the unique cross cultural aspects to the dietary choices. Alternative approaches to nutritional evaluation would include measurement of biological markers such as central obesity or biological markers that indicate levels of certain nutrients that are more costly and time consuming to perform.

Specific nutritional approaches to healthy lifestyle management during adolescence have not been supported with evidence (Irwin, 2004b). Strategies encouraging healthy nutrition in the adolescent population (11 – 20 years) include ecological approaches such as removing carbonated beverage and candy machines from schools. For adolescents, inexpensive healthy foods are less available; societies have not developed effective nutrition interventions; and
healthy food intake is low (Curbing the obesity epidemic, 2006; Janssen, Boyce, Simpson, & Pickett, 2006). Moreover, according to the World Health Organization (2004) policy makers focus on maternal child health and women, who make the decisions about household food, rather than on adolescents’ decisions.

Nutrition studies frequently consider associations of overweight with sedentary behavior such as television viewing; however, such (Atherson & Metcalf, 2005) studies are less likely to include nutritional health promotion behavior in their models (Atherson & Metcalf, 2005; Croll et al., 2006; Epstein, Roemmich, Paluch, & Raynor, 2005a; Epstein, Roemmich, Paluch, & Raynor, 2005b; Janssen et al., 2006). Epstein (2005a; 2005b) concluded that energy intake and sedentary behaviors co–vary. When sedentary behavior decreases, energy intake decreases; therefore, influencing nutritional intake. The interaction of physical activity (accounting for dietary intake) and health behavior make study design extremely complex (Epstein, Roemmich, Paluch, & Raynor, 2005a; Epstein, Roemmich, Paluch, & Raynor, 2005a). Furthermore, associations between nutritional health promotion behavior and IR in the Mexican American adolescent population have not been systematically explored (Hannon, Rao, & Arslanian, 2005). Efficacy of HPB involving physical activity, nutrition choice, and psycho social parameters are unknown in the Mexican American adolescent (Summerbell et al., 2006).

**Insulin Resistance**

Insulin resistance (IR), defined as a condition where insulin effectiveness is impaired, occurs when cells of the body become resistant to the effects of insulin. That is, the normal response to a given amount of insulin is reduced. When cells are resistant to insulin, expected glucose response diminishes requiring more insulin to maintain glucose homeostasis. As a result,
higher levels of insulin are needed in order for insulin to be effective (Sherwood, 2004). Insulin resistance is identified by indicators that include biological markers; such as body mass index (BMI) percentile, waist circumference (WC) and HOMA–IR.

Numerous biological markers are associated with IR and disease risk. For example, Kang (2002) compared lipoprotein particles in 80 obese adolescents with abdominal fatness, cardiovascular fitness, and markers of the IR. Over half (54%) of these obese adolescents (13 – 16 years) had elevated lipoprotein particles suggesting an association with future cardiovascular disease (Kang et al., 2002). Similar findings were reported by Bacha, Saad, Gugor and Arslanian (2006); however, neither study reported risk for type 2 diabetes. Likewise, Faulkner et al. (2006) reported links with lipids and homocysteine, another cardiovascular risk factor in 117 adolescents with type 1 diabetes, with type 2 diabetes, and without diabetes. Although lipid profiles did not vary significantly among groups, links between lipid values and glycosylated hemoglobin were reported in those adolescents with type 1 diabetes. These findings indicate a need for early and more sensitive indicators of cardiovascular disease and type 2 diabetes in the adolescent population.

Recently, inflammatory processes and oxidative stress have been implicated in the development of IR in children (Kapiotis et al., 2006). Researchers have explored associations between IR and inflammatory markers such as C–reactive protein, TNF–α, and IL–6 (Bonora, 2006; Garcia-Lorda, Bullo, Balanza, & Salas-Salvado, 2006; Ho, Davy, Hickey, & Melby, 2005; Kapiotis et al., 2006; Vozarova et al., 2001). Although some studies have explored these associations in adolescents, Mexican American adolescents have been underrepresented (Balagopal, George, Yarandi, Funanage, & Bayne, 2005; Nassis et al., 2005; Valle et al., 2005).
Insulin resistance is considered a precursor to type 2 diabetes and is commonly found in obese individuals (Bacha et al., 2006; Baranowski et al., 2006). Overweight and obesity influence IR and often precede development of type 2 diabetes in adults. Weight loss in individuals who are pre-diabetic decreases their chance of developing type 2 diabetes (Norris et al., 2006). Excess weight, specifically weight derived from visceral adipose tissue, contributes to IR (Hirschler, Aranda, Calcagno, Maccalini, & Jadzinsky, 2005; Lee, Bacha, Gungor, & Arslanian, 2006). Although elevated BMI is observed frequently in individuals with visceral adiposity, IR is more strongly associated with measures of visceral obesity, such as WC than with BMI in adults (Lee et al., 2006; Li, Ford, McGuire, & Mokdad, 2007). Such relationships in adolescents (11 – 20 years) are present, but thought to be confounded by pubertal hormones. Furthermore, in adolescents WC values are not as well established as standardized indicators of IR (Butte et al., 2005; Cruz et al., 2005; Hirschler, Aranda, Oneto, Gonzalez, & Jadzinsky, 2002 Dec; Hirschler et al., 2005; Moreno, Sarria, Fleta, Marcos, & Bueno, 2005). Pregnancy is also associated with a shift in hormonal balance with IR occurring late in pregnancy with resolution at the time of delivery in normal individuals (Ryan, 2003). In the first trimester, insulin sensitivity increases with IR highest in late in the third trimester (Ryan, 2003).

Most studies of IR in adolescents (11 – 20 years) explore associations of IR with cardiovascular disease (Butte et al., 2005; Cruz et al., 2005; Hirschler et al., 2002 Dec; Hirschler et al., 2005; Moreno et al., 2005). Few studies in adolescents have explored associations of IR to the development of type 2 diabetes (Goodman, Daniels, Meigs, & Dolan, 2007; Goodman, Daniels, & Dolan, 2007). Moreover, Mexican American adolescents are underrepresented in the few studies that have been conducted. In one study of the development of obesity, the
associations of obesity, puberty, race, and IR were measured at baseline and 10 years later (Klein et al., 2004). Racial differences in IR were demonstrated in this longitudinal study, with 7 black adolescents developing type 2 diabetes over the 10 year period (Klein et al., 2004). Type 2 diabetes did not occur in any white female adolescents during the 10 year period, but no Mexican American adolescents were included in the sample (Klein et al., 2004). These data provide support for the association between adolescent obesity, IR and impaired glucose tolerance in some ethnic groups. Such longitudinal studies, however, have not been conducted in Mexican American adolescent populations; even though, higher rates of obesity and type 2 diabetes are reported in this group than in White or non-Hispanic Black samples (Drobac, Brickman, Smith, & Binns, 2004).

Studies have determined IR using numerous markers making study comparison difficult (Borch-Johnsen, 2007). One biological marker, acanthosis nigricans (AN) has been used widely for screening (Drobac, Brickman, Smith, & Binns, 2004; Hardin, 2006). This skin hyperpigmentation is associated with hyperinsulinemia and is thought to indicate future type 2 diabetes (Jones & Ficca, 2007). Although not recommended by CDC, mass screening is mandated without funding in several school districts in TX counties at the US–Mexico border (Jones & Ficca, 2007). This skin hyperpigmentation has also been associated with a mutation in fibroblast growth factor receptor 3 (Castro-Feijoo et al., 2008) providing support for a genetic predisposition (Burke, Duggiral, Hale, Blangero, & Stern, 2000).

Mexican American adolescents are at higher risk than non Hispanic white adolescents for AN (Burke, Duggiral, Hale, Blangero, & Stern, 2000). In their study of 160 obese adolescents, Guran, Turan, Akcay and Bereket, (2008) reported higher HOMA–IR values for those with AN
than those without. Measurement of AN is difficult to quantify, requires training, and relies on monitoring of interrater reliability and continuous practice (Burke, Hale, Hazuda, & Stern, 1999). Rentfro (2006) found elevated HOMA–IR in 27% of 325 Mexican American high school students. Those with AN were two times more likely to have IR than those without AN. Those adolescents who were overweight (≥85<sup>th</sup> < BMI percentile ≥ 95<sup>th</sup>) were 1.5 times more likely to have elevated HOMA–IR (≥3.16) than those of normal weight. Those who were obese (BMI percentile ≥ 95<sup>th</sup>) were 2.5 times more likely to have elevated HOMA–IR (≥3.16); however, those with WC (≥75<sup>th</sup> percentile) were almost 10 times more likely to have IR. Shaibi and Goran (2008) identified IR in 39.4% of their sample of 61 obese adolescents without a statistically significant association between IR and AN. Furthermore, other less stigmatizing tools are preferable than using skin anomaly for screening during adolescence when body image predominates developmentally (Edelman & Mandel, 2006). Therefore AN, although associated with IR, may not be the best marker to use to screen Mexican American adolescents.

Studies that link IR with disease outcomes tend to use cross–sectional rather than prospective designs, address adult populations, and lack Mexican American adolescent representation (Ferrannini et al., 2007). A limited number of studies, however, have explored IR in the Hispanic adolescent population. In one study of premature adrenarche and adrenal gland puberty in Hispanic adolescents, Ibanez, DiMartino-Nardi, Potau and Saenger (2000), demonstrated that increased incidence of premature adrenarche contributes to IR with development of type 2 diabetes. Alvarez, Vieira, and Moura, da Veiga (2006) and Vuguin, Grinstein, Freeman, Saenger and Dimartino (2006) explored associations of overweight with IR.
in female adolescents; however, no Mexican American adolescents were included and measures of central obesity (i.e., WC) were not reported.

*Homeostasis Assessment Model for Insulin Resistance (HOMA–IR)*

Homeostasis Assessment Model for Insulin Resistance (HOMA–IR) is a mathematical derivation of IR based on direct measures of glucose and insulin at a single point in time (Keskin et al., 2005; Matthews et al., 1985). Difficulty in measurement arises from the fact that glucose homeostasis is a dynamic process. Calculating an IR level in the fasting state excludes the influence of insulin in the fed state when glucose rises. Because of the intricate metabolic regulatory factors of glucose and insulin, determination of IR is complex. Insulin resistance values are determined best by euglycemic clamp methods, the standard for all IR measurement (Stern et al., 2005).

Clamp procedures require intravenous infusion of insulin and glucose with repeated laboratory measurements. The expense and technical intricacies associated with this complex method, albeit the gold standard, prohibit use for identification of IR in most settings. Therefore alternative laboratory estimates of IR, such as the HOMA–IR have been advocated. The HOMA–IR is a method of determining IR, commonly employed by epidemiologic studies, that uses a fasting glucose and insulin ratio divided by a constant (Fasting Insulin x Fasting Glucose/405) to derive a mathematical measure of IR that is based on readily available biomarkers (Keskin et al., 2005, Stern et al., 2005).

In normal adolescents where pancreatic function may be considered adequate, a single point measure of glucose and insulin provides data to calculate accurate values of IR without subjecting the adolescent to complicated procedures involved with insulin clamp methods.
Clamp techniques and HOMA–IR values correlate and have been applied in epidemiologic studies within children and ethnic populations (Keskin et al., 2005; Skrha et al., 2004; Stern et al., 2005). Because invasive techniques (e.g., venipuncture) are used sparingly in adolescents, adolescents, particularly Mexican American adolescents, may not be included in studies using HOMA–IR, which may partially explain underrepresentation of these groups generally in research (Edelman & Mandle, 2006; Hockenberry & Wilson, 2006).

Health providers prefer the use of clinical indicators, in particular BMI percentile, to assess obesity and IR in children and adolescents because of its standardization in practice (Centers for Disease Control and Prevention, 2004). Standard markers of IR in adolescents, however, have not been identified. Waist circumference an accepted marker of IR in adults is considered less accurate a measure of IR in children and adolescents (Hirschler et al., 2005; Lee et al., 2006).

**Body Mass Index (BMI) Percentile**

The use of BMI percentile to determine overweight and obesity has been accepted and supported with national standards in children and adolescents (Centers for Disease Control and Prevention, 2004). Body Mass Index values in children and adolescents are reported in percentile for age and gender. Cutoff points for overweight and obesity are widely used (Centers for Disease Control and Prevention, 2004). Adolescents with BMI $\geq$ 85\(^{th}\) and $<95^{th}$ percentile are considered *at risk* and likely to become overweight adults (Barlow, 2007; Centers for Disease Control and Prevention, 2004). Adolescents with BMI values $\geq 95^{th}$ percentile are considered *overweight* (Barlow et al., 2007; Centers for Disease Control and Prevention, 2004).
In 2007, the American Academy of Pediatrics’ Expert Committee (Barlow et al., 2007) proposed revision of these cutoff points to address childhood obesity prevention, assessment and treatment. This Committee’s deliberations resulted in recommendations to maintain the current cutoff points for BMI percentile but revise the nomenclature for categories to better reflect adult definitions and to provide a more clear representation of the child weight status (Barlow et al., 2007). The Committee (2007) advocated the term overweight for BMI $> 85^{\text{th}}$ and $< 95^{\text{th}}$ percentile and the term obesity to delineate BMI $> 95^{\text{th}}$ percentile. These revised terms more clearly denote the clinical status of the child; connect directly to the adult definitions and better indicate the seriousness of the associated health risk (Barlow et al., 2007). Issues regarding stigmatization related to labeling a child as overweight or obese should be handled at the time of diagnosis in the same manner as any disorder that carries stigma (Barlow et al., 2007). Review of research publications during this time of flux must consider these recommendations when interpreting reported data.

Using national BMI data, Ogden’s research group (2006; 2008) determined that Mexican American adolescents are significantly more likely to be overweight than non-Hispanic white adolescents. Furthermore, adolescents of all subgroups were more likely to be overweight than children (Ogden et al., 2006; Ogden et al., 2008). Overweight and obesity are generally associated with IR; however, the association is stronger with measures of visceral/central obesity than BMI (Bacha, Saad, Gungor, & Arslanian, 2006; Hirschler, Aranda, Calcagno, Maccalini & Jadzinsky, 2002).
Waist Circumference (WC)

Although obesity and IR often occur together, abdominal fat rather than obesity alone has been specifically implicated in progression toward disease (Bacha, Saad, Gungor, Janosky, & Arslanian, 2003; Bacha et al., 2006; Bouchard et al., 2004; Panagiotakos, Pitsavos, Yannakoula, Chrysohoou, & Stefanadis, 2005); however, as mentioned previously WC is not an accepted indicator in adolescents (Cruz et al., 2005). Some studies have suggested that visceral obesity would provide useful information in children and adolescents as well (Butte et al., 2005; Hirschler et al., 2005; Janssen et al., 2005; Moreno et al., 2005).

Even in non-obese individuals with normal glucose levels, abdominal fat is associated with IR (Janssen et al., 2005). In a five year longitudinal study in adults, Karter et al. (2005) demonstrated that baseline WC rather than BMI predicted deterioration in insulin sensitivity. These authors recommend using WC in addition to calculated BMI to identify adults at–risk for IR (Karter et al., 2005). Because of the relationships among central obesity, visceral adipose tissue, inflammatory markers and IR, measures of central obesity and adiposity; such as WC, rather than BMI, have begun to be featured more prominently in the obesity literature. Studies in adolescents generally use BMI percentile as a standard measure for overweight rather than WC or body fat measures. Studies that explore associations between biological markers (BMI, WC, and HOMA–IR) are needed in Mexican American adolescents.

Markers such as BMI and WC are used to screen people at risk for type 2 diabetes. Using BMI delineates mass using two dimensions, length and width; however, the body is a three dimensional entity. Using WC, rather than BMI, accounts for the third dimension of depth. Moreover, fat tissue differs in its metabolic activity depending upon its location in the body.
Visceral fat which is found near the waistline behaves differently from subcutaneous fat (Cruz, Bergman, & Goran, 2002; Fantuzzi & Mazzone, 2007). This measure in adolescents has been hindered by lack of standardization and the idea that the dynamic metabolic changes during puberty interfere with distribution of body fat and increase IR as the individual progresses from Tanner stage I to V (Cruz et al., 2005).

Behavior and Insulin Resistance

Adolescence is a critical time for obesity to develop, because overweight may be enhanced by the normally occurring IR during adolescence (Krebs, Jacobson, & American Academy of Pediatrics Committee on Nutrition, 2003). Moreover, female adolescents, who reach sexual maturation early, are at higher risk for overweight in adulthood than those who mature normally (Krebs et al., 2003). Sedentary lifestyles and high fat intake are more common today than in previous generations. Whereas one in five obese children (age 4 years) will become obese adults; four out of five obese adolescents will remain obese as adults (Krebs et al., 2003). Furthermore, successful treatment approaches for adolescent obesity are limited (Hannon et al., 2005; Krebs et al., 2003). Relationships with other high risk behaviors may complicate prevention strategies. Some researchers have indicated that behavioral issues such as family mealtime, help to develop self–regulation abilities (Catalano, Berglund, Lonczak, & Hawkins, 2004; Turner Henson, 2005). Behavioral factors known to contribute to obesity include sedentary lifestyles; limited school physical education, competitive sports, and advertising (American Academy of Pediatrics, 2003; American Academy of Pediatrics, 2001; Brownson, Boehmer, & Luke, 2005; Child Health Alert, 2004; Wake, Hesketh, & Waters, 2003).
A limited number of randomized clinical trials have been used to evaluate the complex issues that contribute to behaviors that decrease IR (Atherson & Metcalf, 2005; Epstein, Roemmich, Paluch, & Raynor, 2005a; Epstein, Roemmich, Paluch, & Raynor, 2005b; Nelson & Gordon-Larsen, 2006; Robbins et al., 2006). In one of the randomized controlled trials of promoting behavior change in adolescents, Prochaska and Sallis (2004) focused on multiple behaviors related to physical activity and nutrition using a three group (46 per group) design (Prochaska & Sallis, 2004) of 138 adolescents (mean age 12 years) conducted over three months. In this study, the physical activity treatment was more effective than nutrition. Using accelerometry measures and three-day dietary recalls, the intervention was effective for males, but not females (Prochaska & Sallis, 2004).

The most promising health promotion approaches use influences of intrapersonal, social, and physical environmental factors. According to Jenum (2006) researchers should use mediators of behavior change combined with participatory approaches, rather than behavior modification strategies, to establish ownership that sustains behavioral change. Health promotion research with adolescents is varied regarding design, target population, theoretical foundation and outcome measures, making comparison of findings difficult. Strategies for health promotion in adolescents range from behavior modification techniques to participatory community interventions to promote changes in diet and activity.

Unless obesity can be prevented or treated effectively in the adolescent population, obesity rates and their consequences will continue to escalate. Current treatment strategies have been ineffective, and prevention strategies have not been successfully implemented. Research
exploring relationships among self–esteem, self–efficacy, hope, HPB and IR as a precursor to type 2 diabetes in Mexican American adolescents is urgently needed.

Summary

In summary, Chapter 2 presented the broad conceptual perspective for this study including a description of the theoretical framework, the HPHD Model. The conceptual basis, including demographics, descriptive information, the TX–Mexico border region context, adolescence, poverty and health was provided. The perceptual characteristics of self–esteem, self–efficacy, hope as depicted in the HPHD Model were presented. Another major concept of the HPHD Model, HPB, was examined with a particular focus on physical activity and nutrition. Linkages among the behavioral concepts and IR were explored. Concept and the literature review presented in this chapter provided a foundation for the study methodology that will be described in Chapter 3.
CHAPTER 3: METHODOLOGY

This chapter describes the design, sampling plan, sample size, power analyses, setting, data collection plan, variables, measures and instruments used to address the specific study aims.

Research Aims

The two specific aims for this proposed study were:

Aim 1: To test the predictive ability of self–esteem, self–efficacy, and hope on HPB of Mexican American adolescents living in TX along the US–Mexico border.

Aim 2: To test the predictive ability of self–esteem, self–efficacy, hope, and HPB on IR in Mexican American adolescents living in TX along the US–Mexico border.

The study focuses on relationships among self–esteem, self–efficacy, hope, HPB and IR in Mexican–American adolescents living in TX along the US–Mexico border.

Design

A cross–sectional descriptive design using correlation and multiple regression was used to test the study aims. This design permits inferences to be explored regarding the predictive ability of the selected variables in the sample population. Data were collected prospectively from 45 adolescent volunteer participants between January 31, 2009 and July 17, 2009.

Sampling

The target population consisted of Mexican American adolescents (ages 15 to 19 years old), a vulnerable population related to their ethnic and socio-demographic characteristics.

Protection of human subjects was granted by three institutions: The University of Arizona’s Human Subjects Protection Program Institutional Review Board (IRB), The University of Texas Health Science Center–Houston Committee for the Protection of Human Subject (CPHS), and The University of Texas at Brownsville and Texas Southmost College IRB. Human subjects’
protection was required from the University of Arizona as this is the investigator’s degree granting institution. The sample was drawn from an existing cohort study conducted by The University of Texas Health Science Center–Houston and the surrounding neighborhoods, therefore, requiring human subjects’ approval from that institution. Funding for the study was received from The University of Texas at Brownsville and Texas Southmost College requiring human subjects’ approval from that institution as well.

**Inclusion and Exclusion Criteria**

Criteria for inclusion were:

1. Mexican American ethnicity;
2. Able to read and write in English;
3. 15 to 19 years of age;
4. Willingness to participate in the study; and
5. Gender and age adjusted BMI > 85th percentile.

Individuals were excluded from the study if they:

1. Self-reported pregnant at the time that data were collected; and/or
2. BMI < 85th percentile.

**Sample Size**

The sample was drawn from the Cameron County Hispanic Cohort (CCHC), described below and the surrounding community. It is estimated that there are 818 adolescents between the ages of 12 and 20 years of age in the households that have been enumerated as part of the CCHC (See Table 1). With 473 adolescents between the ages of 15 and 19 in the CCHC households, and an anticipated response rate of 20%, it was expected that an adequate sample of adolescents
(15–19 years) would be feasible to obtain. However, recruitment was also extended to the community at large to facilitate efficient study enrollment.

<table>
<thead>
<tr>
<th>Age</th>
<th>#</th>
<th>Stage</th>
<th>Total for each adolescent stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>129</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>124</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>128</td>
<td>Early</td>
<td>381</td>
</tr>
<tr>
<td>15</td>
<td>120</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>110</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>93</td>
<td>Middle</td>
<td>323</td>
</tr>
<tr>
<td>18</td>
<td>75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>2</td>
<td>Late</td>
<td>114</td>
</tr>
<tr>
<td>12–20</td>
<td></td>
<td></td>
<td>Total 818</td>
</tr>
</tbody>
</table>

**Power Analysis**

A sample of 45 adolescents was recruited. For the correlations, a power of 79% was generated for a sample size of 45, $\alpha$ of 0.05 for a moderate effect size of 0.40 (Lipsey, 1990). Regression analyses with multiple predictors and multiple outcome variables were also used. For Aim 1 (3 predictors), a power of 95.3% was attained with a sample size of 45 by Cohen’s criteria of detecting an $R^2$ of 0.30 and an F-test with significance set at 0.05 (Field, 2005). For Aim 2 (4 predictors), a power of 93.1% was attained with a sample size of 45, detecting an $R^2$ of 0.30 with 4 independent variables and an F-test with significance set at 0.05. The power analysis tables were generated using Power Analysis and Sample Size (PASS) software (Hintze, 2004).

**The Setting: Cameron County Hispanic Cohort (CCHC)**

The CCHC consists of a cohort of Hispanic individuals from households in Cameron County, TX along the US–Mexico border. The CCHC was formed with funding from the National Institute of Health (NIH) Center for Minority Health and Health Disparities.
Enumeration of the household included a list of individuals with their current age. Contact information for the households that contained the names of individuals who meet the inclusion criteria for the proposed study was obtained from the CCHC data base. The cohort consisted of data from over 2000 households at the time the contact information was received. Study site authorization was obtained from the Dean of the regional campus where the cohort study takes place (Appendix A). After obtaining permission to access the cohort data, parents of potential participants were identified from the CCHC database and CCHC staff invited parents permit their adolescent child to participate based on the inclusion criteria. If the parent of the potential participant expressed interest, they were referred to the investigator.

**Recruitment and Sampling Frame**

Potential participants were identified from the CCHC and also from the surrounding community. The potential response rate was calculated using the anticipated number of adolescents between that were 15 to 19 years old in the CCHC. The anticipated response rate was calculated from the potential participants, the number of adolescents (15 – 19 years) currently listed in the CCHC database (~800). After all IRB approvals (Appendix B) were obtained and with the anticipated response rate of 20% based on prior studies, an initial wave of invitation letters were sent to 200 households with adolescents (15–19 years) with an expectation that 40 (equal number of male and female) adolescents would respond (Appendix C). This initial strategy resulted in 11 participants enrolling in the study. Because of this initial low response rate of 6%, all households (approximately 400) with adolescents between the age of 15 and 19 years were approached by telephone and recruitment was extended to the community at large to reach the sample size of 45.
The CCHC study staff made contact with potential participants by telephone within 2 weeks of mailing the letter. The CCHC study staff provided the investigator’s contact information and if the potential participant agreed, the CCHC staff submitted their contact information to the investigator. The investigator explained the study to each potential participant as delineated in the study protocol (Appendix D). Once the participant agreed to participate, a signed written consent with accompanying signed written permission of his/her parent or guardian (for participants under < age 18) was obtained (Appendix E). Enrollment occurred only after the consent process was completed with all signatures on the consent documents.

Data Collection

The Clinical Research Unit (CRU), a satellite clinic of UTHSC–H Center for Clinical and Translational Sciences (CCTS), funded through the NIH Clinical and Translational Science Award program, was used as the data collection site. This satellite CRU, located in Brownsville, TX and operated by UTHSC–H School of Public Health (SPH)–Brownsville Regional Campus, adheres to NIH protocols for safe specimen handling and best practices for clinical research. After the completion of the consent process, the participant was enrolled in the study and data were collected according to study protocol at the CRU (Appendix D).

Variables and Measures

Data were collected using ten questionnaires and three biological markers. Tables 2 and 3 delineate the variables and measures used in data collection and their links to each aim. The HPHD Model (Figure 1) provided the theoretical framework for this study (Hendricks, 1998b). Hendricks’ (1992) model was originally tested in a sample of African American adolescents (n = 1036). This current dissertation research extended the model to another population, Mexican
American adolescents, (Aim 1) then added biological markers (BMI percentile, WC, and HOMA–IR) to measure the outcome, IR (Aim 2). The two previously delineated study aims provided the means to determine the ability to predict the outcomes of interest. Relationships among predictors (self–esteem, self–efficacy, hope) and their ability to predict the outcome variable HPB were determined for Aim 1. The ability of the predictors (self–esteem, self–efficacy, hope and HPB) to predict IR was determined for Aim 2.
### TABLE 2. Summary of Data Analysis: Aim 1 – One Scheduled Data Collection Event

**Aim 1:** To test the predictive ability of self-esteem, self-efficacy, and hope on HPB of Mexican American adolescents living in TX along the US–Mexico border.

<table>
<thead>
<tr>
<th>DATA ANALYSIS</th>
<th>VARIABLE</th>
<th>STUDY MEASURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performed power analysis to determine sample size. Placed study variables into</td>
<td>self–esteem</td>
<td>Rosenberg Self–Esteem Scale – 10 items</td>
</tr>
<tr>
<td>Hendricks (1998b) theoretical model.</td>
<td></td>
<td>Physical Activity – 8 Items</td>
</tr>
<tr>
<td>Cronbach’s $\alpha$</td>
<td>self–efficacy</td>
<td>Nutrition: Fat and Sodium 9 – items</td>
</tr>
<tr>
<td>Correlation matrix for multicollinearity ($&lt;.65$)</td>
<td>physical activity &amp;</td>
<td>Nutrition: Fruit and Vegetable 15 –</td>
</tr>
<tr>
<td>Determined direction &amp; strength of relationships</td>
<td>nutrition self–efficacy</td>
<td>items</td>
</tr>
<tr>
<td>Significance level = 0.05. Performed multiple regression for the variance</td>
<td>Hope</td>
<td>Adolescent Hope Scale – 13 items</td>
</tr>
<tr>
<td>explained with self–esteem, self–efficacy &amp; hope as predictor variables &amp;</td>
<td></td>
<td>(Abbreviated Miller Hope Scale for</td>
</tr>
<tr>
<td>HPB total score as the outcome.</td>
<td></td>
<td>Adolescents)</td>
</tr>
<tr>
<td>Used demographic &amp; descriptive information to characterize the sample.</td>
<td></td>
<td>Revised Adolescent Lifestyle Profile</td>
</tr>
<tr>
<td>Report participation rate.</td>
<td></td>
<td>(ALP) Total Score – 22 items</td>
</tr>
<tr>
<td>Evaluate &amp; report decisions about missing data.</td>
<td></td>
<td>17 items</td>
</tr>
</tbody>
</table>

### TABLE 3. Summary of Data Analysis: Aim 2 – One Scheduled Data Collection Event

**Aim 2:** To test the predictive ability of self–esteem, self–efficacy, hope and HPB on IR in Mexican American adolescents living in TX along the US–Mexico border.

<table>
<thead>
<tr>
<th>DATA ANALYSIS</th>
<th>VARIABLE</th>
<th>STUDY MEASURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Used the same sample as above; HPB was added as a predictor variable in a newly</td>
<td>IR</td>
<td>Biological Markers of IR:</td>
</tr>
<tr>
<td>formed model which was examined to explain variance with the more objective</td>
<td></td>
<td>BMI percentile, WC percentile &amp;</td>
</tr>
<tr>
<td>measures of health promotion, the markers of IR; Multiple regression was</td>
<td></td>
<td>HOMA–IR</td>
</tr>
<tr>
<td>performed. Each of the outcome variables (BMI percentile, WC percentile, and</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HOMA–IR) was regressed on the predictor variables of self–esteem, self–eficacy,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>hope and HPB.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Insulin Resistance**

Measures of, HOMA–IR, WC and BMI percentile provided the biological markers of IR in this study.

*Homeostasis Model Assessment for Insulin Resistance (HOMA–IR)*

One IR measure (HOMA–IR) was determined by mathematical estimation. The calculation of HOMA–IR is based on fasting glucose and fasting at a single point in time. Participants were instructed to fast for 10 hours before the data collection appointment (nothing to eat or drink except water) according to Study Protocol (Appendix D). After the 10 hour fast, 12ml of blood was withdrawn for glucose and insulin. The investigator, who is a Registered Nurse, a trained phlebotomist, or another Registered Nurse drew blood for glucose and insulin using the study protocol (Appendix D). Specimens (12 ml) were maintained on ice and stored for measurement of glucose and insulin. After the specimen was obtained, each participant received a snack consisting of juice and crackers (70 grams carbohydrate; 5 grams protein). The time, date, number of hours fasting, and venipuncture site was recorded on the Laboratory Specimen Recording Form (Appendix F). Specimen vials were labeled with the participant’s study number. Laboratory values were reported to the participants on the Results Reporting Form. Abnormal values were identified on the Results Reporting Form and participants were encouraged to follow-up with their primary provider for abnormalities (Appendix G).

Two tubes (coated with EDTA which binds calcium ions to block coagulation) of blood (10 ml each) were prepared for this study. Specimens were prepared for analysis and transported on ice to the laboratory and freezer (-80°C) in adherence with the study protocol. The 10 ml tubes were centrifuged at -4°C. From this tube, aliquots of plasma were prepared for
determination of glucose and insulin levels. Remaining plasma aliquots were placed in storage at -80˚C for future laboratory tests as funding becomes available. Glucose was determined from plasma assayed using the RxL Gluco-STAT analyzer. Insulin levels were determined using an enzyme-linked immunosorbent assay (ELISA) kit from Mercodia (Uppsala, Sweden). All samples were run in duplicate using several controls and standards. This ELISA has less than 0.01% cross-reactivity with C-peptide and proinsulin. The insulin reference values for this adolescent sample were determined as designated by the laboratory kit used to conduct the insulin analysis. Insulin resistance was determined using the HOMA–IR \[\frac{\text{glucose (mg/dl)}}{18} \times \frac{\text{insulin (mg/dl)}}{405}\] calculation (Keskin et al., 2005; Matthews et al., 1985). The HOMA–IR values were analyzed as a continuous variable. Phlebotomy data were recorded on the Laboratory Specimen Recording Form by the person who drew the blood as stipulated in the study protocol (Appendix D).

**Waist Circumference (WC)**

Measurements of WC were obtained according to study protocol and recorded on the Anthropometric Recording Form (Appendix H). Measures of WC were also recorded on the Results Reporting Form and reported to the participants and their parents according to the Study Protocol (Appendix D). Abnormal values were identified on the Results Reporting Form and participants were encouraged to follow-up with their primary provider as outlined in the Study Protocol (Appendix D). Because HOMA–IR results were not available until the end of the data collection period, all results when available were reported by mail to each minor participant’s parent or guardian and each participant who was 18 or 19 years of age.
The WC was considered a measure of central obesity (visceral adiposity) and one marker of IR for this study. Values for WC were determined with participants in a standing position, breathing normally. A non-stretching tape measure was placed at the level of the umbilicus using both hands. Measurements were recorded to the nearest 0.2 cm. on the Anthropometric Recording Form (Appendix H). Cutoff points for adolescent WC measures have not been established, but de Ferranti et al. (2004) used National Health and Nutrition Examination Survey (NHANES) III data to specify that WC values in adolescents ≥ 75th percentile for age should be considered abnormal. Fernandez et al. (2004) also used NHANES III data cut points to estimate WC and central obesity specifically for Mexican American adolescents. Therefore, for this study WC ≥ 75th was considered abnormal (Fernandez et al., 2004).

**Body Mass Index (BMI) Percentile**

Body mass index percentile derived from height and weight provided the measure used in adolescents as marker of IR. The BMI percentile accounted for age and gender. Measurements of height and weight were obtained according to study protocol and recorded on the Anthropometric Recording Form (Appendix H). Height and weight were also recorded on the Results Reporting Form (Appendix G) and reported to the participants according to the Study Protocol (Appendix D). Abnormal values were identified on the Results Reporting Form (Appendix G) and participants were encouraged to follow-up with their primary provider as outlined in the Study Protocol (Appendix B).

Determination of BMI percentile was calculated by dividing weight in kilograms by height in square meters (kg/m²) using study protocol. A Tanita portable electronic scale (BWB–800S) was used to measure weight, which was recorded to the nearest kilogram. The scale was
set to zero before each weight was obtained. Participants removed heavy outer clothing their shoes and stepped onto the platform with both feet. Their weight was determined while they stood motionless with feet slightly apart and with weight equally distributed on both feet. To determine height, participants stood tall on the platform, held their breath, and looked straight ahead while they were measured with a portable stadiometer (PE–AIM–101). A vertical bar had increments of centimeters/millimeters (cm/mm) and feet/inches. Height and weight were recorded on the Anthropometric Recording Form (Appendix H). Weights were recorded to the nearest 0.1 kg. Heights were recorded to the nearest 0.2 cm. Height and weight were also be recorded on the Results Reporting Form (Appendix G) and reported to the participants as outlined in the Study Protocol (Appendix D). Centers for Disease Control and Prevention (CDC) criteria were used to report BMI values by percentile for age (Centers for Disease Control and Prevention, 2004). Categories recommended by CDC were used to characterize the sample. Participants were identified as overweight with a BMI $> 85^{\text{th}}$ but $< 95^{\text{th}}$ percentile (Barlow et al., 2007). Participants were considered obese with BMI $\geq 95^{\text{th}}$ percentile (Barlow et al., 2007). The BMI percentiles for age were analyzed as a continuous variable in the regression analysis. Calculation of BMI percentiles for age was performed using the SAS program provided by CDC and accessed from the CDC website (Centers for Disease Control and Prevention, 2004).

**Study Instruments**

*Demographic and Descriptive Information Questionnaire*

Demographic and Descriptive Information was collected to characterize and describe the sample (Appendix I). Each participant was asked to respond in writing to a set of 18 questions to obtain the demographic characteristics were used describe this sample. These questions derived
from Hendricks (1992) model, included information such as age, gender, ethnicity, living situation and acculturation.

In addition, participants were asked to respond to a two item visual analog instrument that measures subjective social status, which is described below. Individuals were asked to identify how they rank themselves in regard to their social status. This self appraisal of perceived socioeconomic status according to Sapolsky (2005) measures socioeconomic status comparable to accepted objective measures; such as, education, income, occupation and residence. The MacArthur Scale of Subjective Social Status–Youth Version was used for this study (Appendix I). Using this instrument, the adolescents (11 – 20 years) placed themselves on a ladder compared to others in society (Goodman et al., 2001). The instrument, a self–anchoring graphic representation of two ladders, forms the measure of subjective social status (Adler et al., 2000; Goodman et al., 2001). For the first ladder, participants indicated subjective social status within society, and for the second ladder participants indicated their position of status within their school environment. Evaluation of reliability was conducted within a large national cohort study of adolescents (mean age = 14.4 years; n = 10,843). A random sub-sample (n = 184) of this larger sample received the instrument two months later. With a 62% participation rate (n = 115) both ladders had a tow month test–retest reliability of greater than 0.80 for adolescents over 15 years of age (Goodman et al., 2001). Although this instrument was used in studies with adolescents (11 – 20 years) and with Hispanic adults, reliability for use in Mexican American adolescents is not available from studies before this dissertation research (Goodman et al., 2001; Ostrove et al., 2000).
Acculturation (Appendix I) was measured using the Revised Brief Acculturation Rating Scale for Mexican Americans (ARSMA II) scale which consists of 12 items (Bauman, 2005; Cuellar, Harris, & Jasso, 1990; Cuellar, Arnold, & Maldonado, 1995). This multidimensional scale is particularly effective for use with Mexican American adolescents living in TX along the US–Mexico border, because scoring reflects the idea that adoption of mainstream culture is separate from retaining cultural practices. In other words, the two cultural perspectives can be independent of each other. The scale classifies acculturation based on both language and interpersonal relationships. For example the individual may adopt the new language of English while maintaining Mexican cultural traditions. The participant was asked to complete this scale by reading each item and responding in writing to the 12 item Likert type scale. The participant was asked to check a box located under the phrases that extended from “not at all” to “almost always.”

An α coefficient of 0.80 and a split-half coefficient of 0.81 in a sample of 112 adolescents (12 – 19 years; 92% Hispanic) was reported for the ARSMA-II scale (Bauman, 2005). This study was conducted in the southwestern US near the border of Mexico and examined the reliability and validity of the instrument. The Brief ARSMAII Scale was expected to provide a reliable measure of acculturation for this current study in a sample of Mexican American adolescents living in TX along the US–Mexico border.

Six instruments were used to measure the study variables (Appendix I). The Rosenberg Self–Esteem Scale was used to measure global self–esteem (Rosenberg et al., 1995). Self–efficacy was measured with three instruments (Appendix I): Pender’s Perceived Self–Efficacy [Self–Regulatory Efficacy] (Adolescent Version) was used to measure self–efficacy for physical
activity (Pender, Bar-Or, Wilk, & Mitchell, 2002). The Dietary Self–Efficacy for Lower Fat and Sodium items from a longer instrument used in the Coordinated Approach to Cardiovascular Health (CATCH) study, the Health Behavior Questionnaire (Parcel et al., 1995) and the Fruit–Vegetable Consumption Self–Efficacy Scale were used to measure self–efficacy for nutrition (Heatey & Thombs, 2004). The Adolescent Hope Scale was used to measure hope (Hendricks et al., 2005). The Adolescent Lifestyle Profile (ALP) was used to measure HPB (Hendricks et al., 2006). Documentation for use of the instruments that required authors’ permission is located in Appendix J.

**Rosenberg Self–Esteem Scale**

Self–esteem was measured with the 10 item Rosenberg Self–Esteem Scale (Rosenberg, 1989), which has been used widely in adolescent (11 – 20 years) studies (Bamaca, Umanta-Taylor, Shin, & Alfaro, 2005; Caldwell, Silverman, Lefforge, & Silver, 2004; Christopher et al., 1993; Fulkerson, Strauss, Neumark-Sztainer, Story, & Boutelle, 2007; Khanlou, 2004; Mechanic & Hansell, 1989; Ozmen et al., 2007). Furthermore, studies using this instrument have included Mexican American adolescent (11 – 20 years) participants (Guinn et al., 2002; Porter & Washington, 1993; Stewart & Power, 2002). This scale is a 4–point Likert type instrument with response categories ranging from strongly agree to strongly disagree that participants circled. Total scores are obtained by scoring items with ‘0’ for ‘strongly disagree’ and ‘3’ as ‘strongly agree’ on five items. The other five items are scored with a reverse valence. Scores range from 0 to 30 with scores from 15 to 25 considered normal and scores less than 15 considered low self–esteem. Reliability and validity of this scale has been demonstrated in multiple settings that included adolescents (11 – 20 years) with Cronbach’s α values ranging from 0.74 to 0.80
(Hagborg, 1993; McCarthy, Ellis, & Cole, 2003; Rosenberg & Pearlin, 1978). In addition, Silber and Tipett (1965) reported a 2-week test-retest coefficient of 0.85. Caldwell, Silverman, Lefforge, and Silver (2004) reported a Cronbach’s $\alpha$ of 0.74 in their sample of 58 Mexican American adolescents (11 – 17 years) from southern California. Moreover, Guinn & Vincent (2002) reported a similar Cronbach’s $\alpha$ of 0.77 in their study conducted along the TX–Mexico border with a sample of Mexican American (14 – 18 years) adolescents ($n = 472$). Based on this long history of strong internal consistency, the Rosenberg Self–Esteem Scale was expected to provide a reliable measure of self–esteem for this study in a sample of Mexican American adolescents living in TX along the US–Mexico border.

**Self–Efficacy Instruments**

Self–efficacy for physical activity and self–efficacy for nutrition were measured using three instruments. The first instrument, Pender’s Eight Item Perceived Self–Efficacy [Self–Regulatory Efficacy] (Adolescent Version), measured self–efficacy for physical activity using (Garcia et al., 1995). This instrument was used measure participants’ belief about how capable they are of exercising. The instrument consisted of a 5–point Likert type scale with check boxes for the participant to indicate the response that indicates “how true each sentence is about you”. Choices ranged from “Not true at all” to “Very true”. The participant was asked to read the sentences about physical activity, which was defined as “being active enough to breathe fast, get sweaty, or have your heart beat fast.” Total score was obtained from the items which were scored by calculating the total score with $1 = “Not true at all”$ to $5 = “Very true.”$ Possible scores ranged from eight to 40. Support for the reliability of this instrument was derived from adolescent samples ($5^{th} – 8^{th}$ grade) with test-retest reliability after five to seven days of 0.77 and a
Cronbach’s $\alpha$ of 0.87 (Garcia et al., 1995). Although studies including Mexican American adolescents have not been prominent in the literature, this instrument is derived from the Pender’s Health Promotion Model (2006), which is foundational to the HPHD Model that provided the framework for this current study (Hendricks, 1998b).

Self–efficacy for nutrition was measured using the two remaining self–efficacy instruments for healthy food consumption, the Dietary Self–Efficacy for Lower Fat and Sodium (Parcel et al., 1995) and the Fruit and Vegetable Consumption Self–Efficacy Scale (Heatey & Thombs, 2004). The Dietary Self–Efficacy for Lower Fat and Sodium items have been used in the CATCH large school based study that has demonstrated effectiveness in multiple settings (Edmundson et al., 1996; Hoelscher, Evans, Parcel, & Kelder, 2002; Luepker et al., 1996; Parcel et al., 1995). To complete the Dietary Self–Efficacy for Lower Fat and Sodium items, participants were asked to circle one of two colorful pictures to indicate which food they will choose in a given situation. The participants were instructed that there are no incorrect answers. There were nine different situations each with two choices from which to select. The low fat and low sodium items received a score of one; whereas the high fat and high sodium items received a score of two. Possible scores ranged from nine to 18. Parcel (1995) reported a test-retest reliability of 0.63 and a Cronbach’s $\alpha$ of 0.84 for the Dietary Self–Efficacy for Lower Fat and Sodium items. Long and Stevens (2004) reported a Cronbach’s $\alpha$ of 0.85 for these items in their study of adolescents (12 – 16 years) with Hispanic adolescents representing 41% of the sample ($n = 121$). The Dietary Self–Efficacy for Lower Fat and Sodium items were expected to provide a reliable measure of nutrition self–efficacy for this sample of Mexican American adolescents living in TX along the US–Mexico border.
The Fruit and Vegetable Consumption Self–Efficacy Scale is a 4–point Likert type instrument designed specifically for adolescents (11 – 20 years). The responses for each of the 15 items range from 1 = “strongly disagree” to 4 = “strongly agree” with a possible range of 15 to 45. In their article describing the development of this instrument, Heatey and Thombs (2004) reported a Cronbach’s $\alpha$ of 0.76. This instrument was also used by Long and Stevens (2004) with a reported Cronbach’s $\alpha$ in their sample of 0.90 (40% Hispanic; $n = 121$). The Fruit and Vegetable Consumption Self–Efficacy Scale was expected to provide a reliable measure of nutrition Self–Efficacy for nutrition for this sample of Mexican American adolescents living in TX along the US–Mexico border.

Adolescent Hope Scale

The Adolescent Hope Scale was used to measure hope. The Adolescent Hope scale is 4–point Likert type scale with 13 items. The response anchors range from 1 = “disagree a lot” to 4 = “agree a lot” with a possible range in scores from 13 to 52 and higher values indicating a higher level of hope. Participants were asked to read each item and circle the number that best indicates their personal feeling about the statement. Hendricks (2005) reported a reading level of grade 3.3.

The Adolescent Hope Scale is a reduced item version of the 40 item Miller Hope Scale that has been proposed by Hendricks (2005). In a sample of African American adolescents ($7^{th} – 8^{th}$ grade; $n = 1004$), Hendricks et al. (2005) calculated a Cronbach’s $\alpha$ of 0.93 for the entire scale. Recommended changes included elimination of items that did not affect the instrument’s psychometric properties for their sample. The revised shorter version of the Miller Hope Scale, the Adolescent Hope Scale contains 13 items. Although there has been no documented use of
this refined version of the Miller Hope Scale with Mexican American adolescents, adult studies that use the Miller Hope Scale have included Mexican American adults (2003). In Kopelowicz’s (2003) study of 72 adult participants, 55 participants (59.8%) described themselves as Mexican American. An adaptation of the Miller Hope Scale was used; however, internal consistency measures of reliability were not reported. The Adolescent Hope Scale was expected to provide a reliable measure of Hope for this sample of Mexican American adolescents living in TX along the US–Mexico border.

*Adolescent Lifestyle Profile (ALP)*

Health Promoting Behaviors were measured with the Adolescent Lifestyle Profile (ALP), a 44 item instrument set with a fifth grade reading level (Hendricks et al., 2006; Walker, Sechrist, & Pender, 1987). The 4–point Likert type scale used a response format that ranges from 1 = “Never” to 4 = “Always” and a possible score of 44 to 176. Participants were instructed to read the items and to think carefully about each one before responding. They were asked to circle their responses indicating the frequency that the behavior occurs.

The ALP with its seven subscales has been tested in numerous adolescent (11 – 20 years) samples with documented reliability and validity. For example, a Cronbach’s α of 0.92 was reported for one study of 207 adolescents (6th – 8th grade) (Hendricks et al., 2006). A pilot test of this instrument in a sample of 22 adolescents (3 Hispanic) was also reported (Hendricks et al., 2006).

Although the ALP has not been used in studies involving Mexican American adolescents, the adult version from which the ALP was derived, The Health-Promoting Lifestyle Profile has been translated into Spanish (Walker, Kerr, Pender, & Sechrist, 1990). Walker et al. (1990)
described translation of the instrument including back translation using a dialect familiar to people of Mexican descent from areas in TX. Three independent translators determined that the meaning of the original instrument remained intact with translation. This Spanish equivalent of the adult form of the ALP was psychometrically evaluated in a group of 485 Hispanic individuals who were predominantly (87.6%) of Mexican American descent (Walker et al., 1990). Internal consistency reliability was demonstrated with Cronbach’s $\alpha$ of 0.93 and a 2–week test–retest reliability coefficient of 0.86. The subscale $\alpha$ coefficients ranged from 0.70 to 0.87 (Walker et al., 1990). Walker’s group (1990) concluded that the adult version of the ALP was culturally relevant for Mexican American adults.

Walker’s (1990) analysis of adult scale with a Mexican American adult sample provides evidence that the ALP, which was derived from this scale, is culturally relevant for Mexican American adolescents living in TX along the US–Mexico border. The ALP was expected to provide a reliable measure of HPB for this study of Mexican American adolescents living in TX along the US–Mexico border.

Data Management and Analysis

A data code book was developed prior to data collection. The code book included variable coding, ongoing notes about how data were cleaned and the rationale for decisions about coding, data entry, cleaning data, handling missing data and recoding or manipulating variables. The investigator took full responsibility for data management. The investigator maintained approvals, permissions, informed consent, parental permission forms, data, source records; records of adverse events and unanticipated problems. These records will be maintained for three
years after study completion (December 2012). Original consent documents are stored in the College of Nursing at the University of Arizona.

Confidentiality of participants’ information was assured by the investigator. Data were secured in a locked cabinet in the investigator’s locked office. Computerized datasets were stored with password protection during data analyses. When analyses were completed, datasets were copied to compact diskettes and maintained in locked cabinet in the investigator’s locked office. Source data files will be destroyed by shredding no sooner than three years after the study finishes (after December 2012). Participants identifying information remained confidential during recruitment, data collection, data management, analysis, and will remain confidential after the study ends. The link between participants’ identifying information and the data was destroyed after data analysis.

Source records were checked with each participant before the participant left the clinic. For any items left blank, participants were asked to confirm that they intended not to respond to these items. Participants were given the opportunity to complete the item or identify that the item was intentionally left blank. No cases were eliminated from the data base because of missing values.

Data were entered on an ongoing basis as soon after data collection as possible usually within 24 hours. Double entry was used with reconciliation to review discrepancies for accuracy. Data management decisions were made based on this reconciliation. Frequency tables, histograms and scatter diagrams were used to examine data for patterns and outliers, skewness and homoscedasticity. Data were explored to identify outliers to determine their physiologic plausibility and their potential influence on the results. Reviewing the data with this information
was random and revealed no pattern of missingness; no systematic patterns of missingness were identified.

Data were used to address the study aims only after the data set was cleaned and finalized for analyses. Demographic data were used to describe sample characteristics; such as, gender, ethnicity, age, and response to questions about family situations. Participants completed a 123 item instrument that included six established scales: Rosenberg Self–Esteem, Perceived Self–Efficacy [Self Regulatory Efficacy] (Adolescent Version, Dietary Self–Efficacy for Lower Fat & Sodium, Fruit & Vegetable Consumption Self–Efficacy Scale, Adolescent Hope Scale and Adolescent Lifestyle Profile (Appendix I).

Internal consistency reliability was assessed in this sample using Cronbach’s $\alpha$ coefficient for inter-item correlation for the instruments. A coefficient $\alpha > 0.80$ was set as the acceptable point for internal consistency based on the lack of previous use of most of these instruments populations similar to the Mexican American adolescent living in the US–Mexico border region. Assumptions of normality, homogeneity, and independence were assessed. Decisions were made about how to handle the data if reliability coefficients are less than the criterion and reported with the results.

Analyses were planned to respond the following two study aims:

Aim 1: To test the predictive ability of self–esteem, self–efficacy, and hope on HPB of Mexican American adolescents living in TX along the US-Mexico border.

Aim 2: To test the predictive ability of self–esteem, self–efficacy, hope and HPB on IR in Mexican American adolescents living in TX along the US-Mexico border.
Analyses included correlations and multiple regression analyses with multiple predictor variables and multiple outcome variables. Correlations were used to identify the direction of associations. Measures of central tendency were determined for all interval and ordinal data using mean and standard deviation for interval data and median and range for ordinal data. Results were assessed for outliers and values that were physiologically impossible, for example, a glucose level of 0 mg/dl, or 30 cm tall. Categorical data, frequencies and percentages were assessed for plausibility; for example, if the age of a participant is entered as 95 years old (Roberts, Anthony, Madigan, & Chen, 1997). Using these techniques, the final data set was established and subsequently used for all analyses.

The level of significance for hypotheses testing was set at 0.05. Pearson’s product moment correlation was used to assess relationships among the behavioral attributes of self-esteem, self-efficacy, hope and HPB. As outlined by Chaterrjee and Hati (2004), the following assumptions underlying multiple regression were examined: level of measurement, linearity, normality, homoscedasticity and multicollinearity. The continuous measurements of all variables, both the predictor and the outcome variables, were at the ordinal level of measurement forming continuous measures and acceptable for use in regression analyses. Scatterplots were examined for linearity and homoscedasticity. The relationships between the predictor variables and the outcome variables in the sample appear linear and the variance appeared to be constant. Histograms and standard residuals were examined visually for normality against a normal curve and observations that might unduly influence the regression results. Multicollinearity was evaluated with a correlation matrix (Table 4). Using Field’s (2005) criteria of 0.80 for identifying multicollinearity, there were no highly correlated variables in the models. Correlations were also
used to examine relationships and to lend support for construct validity of the measures. Several multiple regression equations were explored to determine the ability of self-esteem, self-efficacy, and hope to predict HPB. Regression was also used to assess the ability of the predictors (self-esteem, self-efficacy, hope and HPB) to predict IR (BMI percentile, WC percentile, and HOMA–IR).

Data were analyzed using SAS for Windows SAS (SAS 9.1.3 Service Pack 4). Data management and analyses require statistical support and knowledge of the programs used for computerized analyses. The investigator has a working knowledge of SAS programming for central tendencies, correlations and regression analyses. The investigator also completed a biostatistics course (PH 1615 Applied Linear Regression) during Summer Session 2008 offered by UTHSC–H, SPH.
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Self–Esteem</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self–Efficacy–Physical Activity</td>
<td>0.38</td>
<td>1.00</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self–Efficacy–Nutrition: Fats and Sodium</td>
<td>NS</td>
<td>NS</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Self–Efficacy–Nutrition: Fruits and Vegetables</td>
<td>0.37</td>
<td>0.48</td>
<td>NS</td>
<td>1.00</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Hope</td>
<td>0.69</td>
<td>0.44</td>
<td>-0.01</td>
<td>0.48</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health Promoting Behaviors</td>
<td>0.38</td>
<td>0.29</td>
<td>NS</td>
<td>0.25</td>
<td>0.58</td>
<td>0.61</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>WC</td>
<td>-0.01</td>
<td>-0.16</td>
<td>-0.15</td>
<td>-0.27</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HOMA–IR</td>
<td>-0.21</td>
<td>-0.47</td>
<td>0.17</td>
<td>-0.44</td>
<td>-0.26</td>
<td>-0.17</td>
<td>0.35</td>
<td>0.34</td>
<td>1.00</td>
</tr>
</tbody>
</table>

NS = non significant; all other correlations listed are significant \( p < .05 \);
BMI = Body Mass Index
WC = Waist Circumference
BMI and WC reported in percentile accounting for gender and age
HOMA–IR = Homeostasis Assessment Model for Insulin Resistance
Summary

In this chapter the descriptive correlational design, predictor variables, and proximal and distal outcome variables were described. The predictor variables were self-esteem, self-efficacy, and hope. HPB was the outcome variable for Aim 1 and subsequently used as a predictor variable for Aim 2. Insulin resistance was the outcome variable for Aim 2. Each variable with corresponding measurement and reliability was delineated, including the demographic information (age, gender, ethnicity, grade in school, grades, living situation, birth order, subjective social status), (MacArthur Scale of Subjective Social Status–Youth Version), and acculturation (Brief ARSMAII); the behavioral variables (Rosenberg Self-Esteem Scale, Perceived Self-Efficacy [Self-Regulatory Efficacy] [Adolescent Version], Dietary Self-Efficacy for Lower Fat and Sodium, Fruit and Vegetable Consumption Self-Efficacy Scale, Hopefulness Scale, and the Adolescent Lifestyle Profile); and the outcome variables for Aim 2 that indicated IR (BMI percentile, WC percentile, HOMA–IR).

Protection of human subjects, recruitment of participants, and data collection procedures were addressed. Proposed sample size (n = 45) determination using power analyses was outlined. Inclusion and exclusion criteria were delineated along with an analysis of availability of potential participants to establish the feasibility of an adequate sample size. The plan for sampling and data collection including forms and instruments was outlined.

This study delineates the ability of behavioral attributes such as, self-esteem, self-efficacy, hope, and HPB to predict IR in Mexican American adolescents. This investigator’s future program of research will incorporate these behavioral attributes into effective health
promotion strategies in Mexican–American adolescents living in TX along the US–Mexico border.
CHAPTER 4: RESULTS

The purpose of this study was to determine the relationships among self–esteem, self–efficacy, hope, HPB and insulin resistance (IR) in Mexican–American adolescents living in TX along the US–Mexico border. The specific aims were:

Aim 1: To test the predictive ability of self–esteem, self–efficacy, and hope on HPB of Mexican American adolescents living in TX along the US-Mexico border.

Aim 2: To test the predictive ability of self–esteem, self–efficacy, hope and HPB on IR in Mexican American adolescents living in TX along the US–Mexico border.

Data were analyzed by descriptive, correlative, regression and path analyses. A review of the data as described in the data management section revealed no patterns within missing values and no outliers that were physiologically implausible. With this information reviewed, it was determined that outliers and missing values occurred randomly without any systematic patterns.

Each participant’s source documents were reviewed for missing data at the end of the data collection session. If an item was not completed by the end of the data collection session, the participant was asked to complete the item or identify that the item was intentionally left blank. Several items on one instrument (Dietary Self–Efficacy for Lower Fat and Sodium) were left blank with the reason given that the participant did not eat either of the foods, therefore, could not respond. The items from this instrument remained missing without imputing data. One other item was left blank and when the source document was reviewed, the participant stated that he/she intended to leave that item on the Adolescent Hope Scale blank and chose not to respond to that particular item. A value for a missing item in the Adolescent Hope Scale was imputed.
The mean of the responses of the remaining 44 participants was calculated and imputed for the value of the missing item. No cases were eliminated from the data base.

A non-random convenience sample of 45 individuals was recruited. Initially the Cameron County Hispanic Cohort (CCHC) was used for recruitment. Letters with follow-up phone calls to 200 potential participants resulted in only 11 participants for a response rate of 6%. When this initial recruitment strategy generated only limited enrollment, recruitment was expanded to include the general population. Church youth groups, summer interns and high school students were recruited. These participants shared information by word of mouth which expanded recruitment further.

Of the 54 individuals who provided consent with parental permission, nine adolescents were not eligible after screening for eligibility to participate because of BMI (BMI < 85th percentile). These nine adolescents, who consented to participate, but were not eligible, did not complete the study. Of the inclusion and exclusion criteria, BMI percentile > 85th percentile was the only reason for eliminating any consenting individuals during the screening process. During screening, all participants identified themselves as Mexican American, which was an inclusion criterion. No one who consented was excluded because of ethnicity. Furthermore, each participant self selected the ethnicity of Mexican American, which was an item on the demographic instrument. In addition the screening process did not identify any pregnant females. The inclusion criteria of overweight, ethnicity and non pregnant status were clearly stipulated in the recruitment flyer. The consent and permission forms also clearly indicated that the participants would be asked if they were pregnant. Therefore, if a pregnant female consented to participate, they were aware that they would be asked that question. If the participant was under
18 years old, the parental permission form also clearly indicated that the participant would be asked this question and would not be eligible if they were pregnant. These elements were purposefully included to assist with self selection of the sample. These strategies for non pregnant self selection during recruitment and consent process were implemented successfully as described.

Sociodemographic Data and Sample Characteristics

Participants resided in homes in five different zip codes of one of the poorest regions in the US. The annual individual income adjusted for age ranged from $21,700 to $26,500 within these zip codes with most participants coming from census tracts designated by US Housing and Urban Development as areas qualified for low income housing.

Living arrangements for these adolescents varied. Over half of the adolescents lived with two parents (64%), 16% lived with a step father, and 36% lived in single parent homes with their mother. No participants lived only with their father in a single parent home. Maternal grandmothers lived in 10% of the homes. Although the study took place in a county with one of the highest adolescent pregnancy rates, none of the participants were married or had children of their own.

Table 5 displays frequencies and percentages of the sample for the gender, age and grade. This sample consisted of 45 adolescents with more females (62%) than males (38%) males. The ages of the participants ranged from 15 to 19 years (mean = 16.4 ± 1.27). Most of the participants were classified in the younger two ages and were less than 16 years old (57.78%). Most participants were in 8th through 10th grade (51.11%). Only 8.9% (n = 4) were attending college.
TABLE 5. Characteristics of the Sample

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Females</td>
<td>28</td>
<td>62.22</td>
</tr>
<tr>
<td>Males</td>
<td>17</td>
<td>37.78</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
</tr>
<tr>
<td>16</td>
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<tr>
<td>17</td>
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<tr>
<td>18</td>
</tr>
<tr>
<td>19</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
</tr>
<tr>
<td>9</td>
</tr>
<tr>
<td>10</td>
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<td>11</td>
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<tr>
<td>12</td>
</tr>
<tr>
<td>13</td>
</tr>
<tr>
<td>14</td>
</tr>
</tbody>
</table>

The ranges, means, and standard deviations of the sample for age (16.4 ± 1.27), grade (10.76 ± 1.37), years of education (11.49 ± 1.48), subjective social status and acculturation are presented together in Table 6. Even though poverty is rampant in the region, these adolescents ranked their subjective social status a bit higher (on a scale of 10) than the midpoint with a mean of 5.82 ± 1.30) when they compared themselves to other adolescents nationally. Moreover, their ranking of subjective social status tended to be viewed higher (7.40 ± 1.37) than others in their own school. In regard to acculturation, participants scored similarly on the Mexican Orientation (mean = 3.34 ± 0.88) scale of the acculturation instrument as they scored on the Anglo Orientation (mean = 3.73 ± 0.67) scale with a mean of the total score of 0.39 ± 1.16, ranging from -0.83 to 2.67. Cronbach’s α coefficient for internal reliability for the ARSMAII total score, the Mexican Orientation score and the Anglo Orientation score were 0.70, 0.84 and 0.73.
respectively. Although this instrument has been administered to adolescents regionally in earlier studies, the internal reliability in this sample was not as strong as reported previously ($\alpha \approx 85–90$).

TABLE 6. Socio-Demographics: Range, Means, Standard Deviations

<table>
<thead>
<tr>
<th></th>
<th>$n = 45$</th>
<th>Possible Range</th>
<th>Range</th>
<th>Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td>15 – 19</td>
<td>15 – 19</td>
<td>16.40 ± 1.27</td>
</tr>
<tr>
<td>Grade</td>
<td></td>
<td>NA</td>
<td>8 – 14</td>
<td>10.76 ± 1.37</td>
</tr>
<tr>
<td>Years of Education</td>
<td></td>
<td>NA</td>
<td>9 – 15</td>
<td>11.49 ± 1.48</td>
</tr>
</tbody>
</table>

Subjective Social Status

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Compared Nationally</td>
<td>1 – 10</td>
<td>4 – 10</td>
<td>5.82 ± 1.30</td>
<td></td>
</tr>
<tr>
<td>Compared Locally</td>
<td>1 – 10</td>
<td>4 – 10</td>
<td>7.40 ± 1.37</td>
<td></td>
</tr>
</tbody>
</table>

Acculturation

<p>| | | | | |</p>
<table>
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<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Mexican</td>
<td>1 – 6</td>
<td>1.5 – 5.0</td>
<td>3.34 ± 0.88</td>
<td></td>
</tr>
<tr>
<td>Orientation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anglo</td>
<td>1 – 6</td>
<td>1.5 – 5.0</td>
<td>3.73 ± 0.68</td>
<td></td>
</tr>
<tr>
<td>Orientation</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

ARSMA II Level -5 – 5 -2.83 – 2.67 0.39 ± 1.16

The ranges, means and standard deviations of the sample for IR markers of height, weight, BMI percentile for age and gender, WC, fasting glucose, and HOMA–IR are presented in Table 7.

TABLE 7. Insulin Resistance Markers [means, SDs, normal values]

<table>
<thead>
<tr>
<th></th>
<th>$n = 45$</th>
<th>Mean ± SD</th>
<th>Range</th>
<th>Normal Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height (cm)</td>
<td>166.19 ± 9.7</td>
<td>150.80–190.50</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>84.52 ± 17.46</td>
<td>63.50–133.20</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>BMI Percentile</td>
<td>94.63 ± 3.76</td>
<td>85.5–99.69</td>
<td>$&lt;$85th</td>
<td></td>
</tr>
<tr>
<td>Waist Circumference (cm)</td>
<td>100.70 ± 13.35</td>
<td>81.40–141.55</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Fasting Glucose (mg/dl)</td>
<td>91.30 ± 6.54</td>
<td>72.00–106.50</td>
<td>70–126</td>
<td></td>
</tr>
<tr>
<td>Fasting Insulin (µU/ml)</td>
<td>23.54 ± 14.65</td>
<td>2.60–68.10</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Insulin Resistance (HOMA–IR)</td>
<td>5.39 ± 3.52</td>
<td>0.57–16.03</td>
<td>$&lt;$ 3.15</td>
<td></td>
</tr>
</tbody>
</table>
These data are further characterized by gender in Table 8 without any clear differences noted. The frequencies and percents for categories of BMI percentile for age and gender, WC, fasting glucose, and HOMA–IR are presented in Table 9. When categorized in this manner, more female participants (29%) fell into the overweight category (85th ≥ BMI percentile ≤95th) than males (11%).

### TABLE 8. Insulin Resistance Markers [means, SDs] by Gender

<table>
<thead>
<tr>
<th></th>
<th>Females (n = 28)</th>
<th>Males (n = 17)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Mean ± SD</td>
<td>Range</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>161.67 ± 5.39</td>
<td>150.80–173.10</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>79.94 ± 15.89</td>
<td>63.50–133.20</td>
</tr>
<tr>
<td>BMI Percentile</td>
<td>94.11 ± 3.79</td>
<td>85.57–99.57</td>
</tr>
<tr>
<td>Waist Circumference (cm)</td>
<td>100.25 ± 13.79</td>
<td>81.40–141.55</td>
</tr>
<tr>
<td>Fasting Glucose (mg/dl)</td>
<td>89.41 ± 6.15</td>
<td>72.00–106.50</td>
</tr>
<tr>
<td>Fasting Insulin (µU/ml)</td>
<td>23.64 ± 15.44</td>
<td>2.60–65.30</td>
</tr>
</tbody>
</table>

### TABLE 9. Normal and Abnormal Categorization of Insulin Resistance Markers by Gender

<table>
<thead>
<tr>
<th></th>
<th>TOTAL</th>
<th>FEMALES</th>
<th>MALES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n = 45</td>
<td>n = 28</td>
<td>n = 17</td>
</tr>
<tr>
<td>BMI PERCENTILE CATEGORIES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥85th to 95th</td>
<td>18</td>
<td>13</td>
<td>5</td>
</tr>
<tr>
<td>&gt;95th</td>
<td>27</td>
<td>15</td>
<td>12</td>
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<tr>
<td>WAIST CIRCUMFERENCE PERCENTILE CATEGORIES</td>
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<td></td>
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<td>&lt;75th</td>
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<td>4</td>
<td>1</td>
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<tr>
<td>≥75th and &lt;90th</td>
<td>18</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>≥90th</td>
<td>19</td>
<td>14</td>
<td>6</td>
</tr>
<tr>
<td>FASTING GLUCOSE (mg/dl)</td>
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<td>&lt; 70 mg/dl</td>
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<td>0</td>
</tr>
<tr>
<td>≥70 and &lt;100 mg/dl</td>
<td>41</td>
<td>27</td>
<td>14</td>
</tr>
<tr>
<td>≥100 and &lt;126 mg/dl</td>
<td>4</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>&gt; 126 mg/dl</td>
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<tr>
<td>INSULIN RESISTANCE</td>
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<tr>
<td>&lt;3.15</td>
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<td>9</td>
<td>2</td>
</tr>
<tr>
<td>≥3.16</td>
<td>34</td>
<td>19</td>
<td>15</td>
</tr>
<tr>
<td>Insulin Resistance (HOMA–IR)</td>
<td>5.31 ± 3.65</td>
<td>0.57–15.70</td>
<td>5.52±3.39</td>
</tr>
</tbody>
</table>
Participants mean height was 166.19 cm (5 feet 5 inches) with the males on the average about 1 foot taller than the females. The mean weight was 84.52 cm (186.3 pounds) with males weighing only an average of five pounds more than females. The range in BMI percentile for age and gender was similar for males and females with a mean percentile of 94.63 ± 3.76 ranging from the 85.57\textsuperscript{th} to the 99.69\textsuperscript{th} percentile. All participants were considered overweight as screened by inclusion criteria (BMI ≥ 85\textsuperscript{th} percentile); however 60% of these adolescents met the criteria for obesity (BMI ≥ 95\textsuperscript{th} percentile). Even when age and gender were not considered in these overweight participants, BMI values ranged from 24.18 to 47.53 ± 4.84 (mean = 30.44) indicating that mean BMI values for this sample exceed the cut point for adult obesity.

Waist circumference values which averaged about 100.70 cm (40 inches) were also elevated (100.25 cm ± 13.35) with about a 2 cm difference on average between the male and female participants. Only 12% of the participants’ WC measured under the 75\textsuperscript{th} percentile for WC; whereas, 45% of the participants’ WC were ≥ 95\textsuperscript{th} percentile. With normal cutoff values for adult females and males at 88 cm (35 inches) and 102 cm (40 inches) respectively, it is clear that many of these overweight adolescents are obese and already at risk for obesity related diseases such as type 2 diabetes.

Fasting glucose levels ranged from 72 to 106 mg/dl in the sample. These glucose values were all within normal range; however, four participants (females = 1; male = 3) had impaired fasting glucose. The mean HOMA–IR value was 5.31 ± 3.65. Although nationally accepted standard cutoff points for IR have yet to be established, one study by Keskin et al. (2005) provides evidence to support a cutoff point of 3.16. Using Keskin’s cutoff point, 75.56% of these overweight or obese adolescents would be considered insulin resistant. Overall 42% of females
and 33% of males had HOMA–IR values ≥ 3.16 indicating a need for early intervention to prevent disease in this group.

Reliability of Instruments in this Sample

Range, mean, and standard deviation for each of the instruments are displayed in Table 10. In regard to self–esteem, the mean score of 21.33 ± 5.26 indicates high levels of self–esteem (≥ 15). Only one individual scored quite low (score = 3). Over 90% (n = 41) of the participants scored over 15 on the Rosenberg Self–Esteem Scale. Similarly, although no cut points are provided, the mean scores for self–efficacy (for physical activity and for nutrition: fruits and vegetables), hope and HPB are in the top third of the possible range. Only self–efficacy for nutrition: fat and sodium had scores that were barely over the lowest possible score; however this instrument uses a dichotomous response rather than a Likert type scale.

| TABLE 10: Ranges, Means and Standard Deviations of Instruments for Variables in the Models: Psychological Attributes and Health Promoting Behaviors |
|-------------------------------------------------|-----------------|-----------------|
| n = 45                                           | POSSIBLE RANGE  | RANGE           |
| SELF–ESTEEM                                     | 0 – 30          | 3–30            | 21.33 ± 5.26    |
| SELF–EFFICACY:                                  |                 |                 |
| Physical Activity                               | 8 – 40          | 8 – 40          | 30.67 ± 6.57    |
| Nutrition Fat & Sodium                          | 9 – 18          | 11 – 17         | 13.84 ± 1.54    |
| Nutrition Fruits & Vegetables                   | 0 – 60          | 28 – 60         | 46.87 ± 7.38    |
| HOPE                                            | 13 – 52         | 24 – 48         | 42.98 ± 5.67    |
| HEALTH PROMOTING BEHAVIORS                      | 44 – 176        | 89 – 165        | 125.00 ± 17.50  |

The internal reliability coefficient data from previous studies along with the Cronbach’s α from this present study are displayed on Table 11. As described previously, the 10–item 4 point Likert type Rosenberg Self–Esteem Scale (Appendix I) was used to measure self–esteem was (Rosenberg, 1989). Internal reliability coefficients for this widely used scale range from 0.74 to 0.82 with the Cronbach’s α for this present study reaching 0.88.
Three self–efficacy instruments are also listed on Table 11 with internal reliability from previous studies along with the current study’s Cronbach’s $\alpha$ results. Pender’s 8–item Perceived Self–Efficacy [Self Regulatory Efficacy] (Adolescent Version) (Appendix I), an 8–item 5–point Likert type scale, has reported psychometric properties that included a Cronbach’s $\alpha$ of 0.87 in a racially diverse sample of 286 adolescents, which is similar ($\alpha = 0.88$) to this present study.
(Garcia et al., 1995). Parcel’s Dietary (1995) Self-Efficacy for Lower Fat & Sodium (Appendix I) 9-item dichotomous choice instrument has been used widely. These studies included Mexican American adolescents with good internal consistency (0.84–0.85); however in this present sample, a Cronbach’s $\alpha$ was 0.16. This instrument contained multiple missing values on 2 participants. These participants left items blank. When queried, the items were left blank because the participant did not eat either of the items. The Cronbach’s $\alpha$ remained at 0.16 after removing the cases with missing data. This poor reliability (0.16) cast doubt on the value of this instrument. The 15-item Fruit–Vegetable Consumption Self-Efficacy Scale (Appendix I), a 4-point Likert type instrument reports internal reliability coefficients of 0.76 to 0.90 and has been used in studies with Hispanic adolescents (Heatey & Thombs, 2004; Long & Stevens, 2004). Cronbach’s $\alpha$ internal reliability coefficient for this sample was 0.88.

The Adolescent Hope Scale, a 4-point Likert type scale, used to measure hope in this study (Appendix I), is a 13-item scale with internal reliability coefficients reported at 0.93 (Hendricks et al., 2005). The Cronbach’s $\alpha$ internal reliability for this sample was 0.91. The 4-point Likert type scale, Adolescent Lifestyle Profile (ALP), measured HPB. Studies using the 44-item instrument report internal reliability coefficients of 0.92–0.93. Cronbach’s $\alpha$ for this sample was 0.92.

Data Analyses to Respond to Each Study Aim

Each aim is addressed in this section. The ability to predict outcomes depicted in the proposed model was tested using correlation and multiple regression analyses with multiple predictors and multiple dependent variables. Aim 1, to test the ability of self-esteem, self-efficacy, and hope to predict HPB of Mexican American adolescents living in TX along the US–
Mexico border, was evaluated using regression analysis with multiple predictors. The variable HPB was regressed simultaneously on self-esteem, self-efficacy and hope using the following regression equation: $\text{HPB} = \beta_0 + \beta_1(\text{Self-Esteem}) + \beta_2(\text{Self-Efficacy}) + \beta_3(\text{Hope})$. Because there were three different measures for self-efficacy, three regressions were performed. The variable HPB was regressed on self-esteem, self-efficacy and hope with the predictor variable of self-efficacy represented differently in each model: 1) self-efficacy for physical activity, 2) self-efficacy for nutrition: fat and sodium intake and 3) self-efficacy for nutrition: fruit and vegetable intake. These regression models are depicted in figure 4, 5 and 6, respectively.

In Table 12, the coefficient of determination ($R^2$) was 0.3771 indicating that 38% of the variance is explained by the model where HPB is regressed on self-esteem, self-physical activity and hope. This regression resulted in the following equation for this model:

$$\text{HPB} = 41.22 + -0.316(\text{Self-Esteem}) + 0.115(\text{Self-Efficacy for Physical Activity}) + 2.024(\text{Hope})$$

In this model hope was the only significant independent predictor ($\beta = 2.02$). This model is depicted graphically in Figure 4.

| TABLE 12. Model: Health Promoting Behaviors Regressed Simultaneously on Self-Esteem, Self-Efficacy for Physical Activity and Hope |
| --- | --- | --- | --- | --- |
| Intercept | 41.2218 | 17.2614 | 2.39 | 0.0216 |
| Self-Esteem | -0.3157 | 0.5730 | -0.55 | 0.5846 |
| Self-Efficacy for Physical Activity | 0.1149 | 0.3674 | 0.31 | 0.7562 |
| Hope | 2.0241 | 0.5454 | 3.71 | 0.0006* |

$R^2 = 0.3771*; p<.0002; F = 8.27 *$ Significant $<0.05$

In Table 13, the coefficient of determination ($R^2$) was 0.4382 indicating that 44% of the variance is explained by the model where HPB is regressed on self-esteem, self-efficacy for nutrition: fat and sodium intake and hope. This regression resulted in the following equation for
this model: HPB = 3.127 – 0.128(Self–Esteem) + 2.878 (Self–Efficacy for Fat and Sodium Intake) + 1.972(Hope). Both self–efficacy for nutrition: fat and sodium intake ($\beta = 2.88$) and hope are significant independent predictors in this model ($\beta = 1.97$). This model is depicted graphically in Figure 5.

### AIM 1

$R^2 = 0.3771 \quad p<0.002 \quad 38\%$ of the Variance Explained by Hope

![Figure 4. Aim 1: Health Promoting Behaviors Regressed on Self Esteem, Self Efficacy for Physical Activity and Hope](image)


<table>
<thead>
<tr>
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<td>0.8985</td>
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<td>Self–Esteem</td>
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<td>0.5455</td>
<td>-0.24</td>
<td>0.8153</td>
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<tr>
<td>Self–Efficacy for Nutrition: Fats and Sodium</td>
<td>2.8782</td>
<td>1.3465</td>
<td>2.14</td>
<td>0.0386*</td>
</tr>
<tr>
<td>Hope</td>
<td>1.9722</td>
<td>0.5025</td>
<td>3.92</td>
<td>0.0003*</td>
</tr>
</tbody>
</table>

$R^2 = 0.4382*; \ p<.0001; \ F = 10.66 \ *$ Significant $<0.05$
AIM 1
$R^2=0.4382 \quad p<0.001$
44% of the variance explained by Self Efficacy for Nutrition: Fats & Sodium and Hope

$$\beta = 2.88$$
$$p = 0.0386$$

$$\beta = 1.97$$
$$p = 0.0003$$

Finally for Aim 1, in Table 14, the coefficient of determination ($R^2$) was 0.4894 indicating that 49% of the variance is explained by the model where HPB is regressed on self-esteem, self-efficacy for nutrition: fruit and vegetables and hope. This regression resulted in the following equation for this model: $HPB = 23.364 + -0.399\text{(Self–Esteem)} + 0.914\text{(Self–Efficacy for Fruits and Vegetables)} + 1.566\text{(Hope)}$. Both self-efficacy for nutrition: fruit and vegetables ($\beta = 0.91$) and hope are significant independent predictors in this model ($\beta = 1.57$). This model is depicted graphically in Figure 6.

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>23.364</td>
<td>16.505</td>
<td>1.42</td>
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<tr>
<td>Self–Esteem</td>
<td>-0.398</td>
<td>0.5159</td>
<td>-0.77</td>
<td>0.4441</td>
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<tr>
<td>Self–Efficacy Nutrition: Fruits/Vegetables</td>
<td>0.91411</td>
<td>0.3024</td>
<td>3.02</td>
<td>0.0043*</td>
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<tr>
<td>Hope</td>
<td>1.5659</td>
<td>0.5053</td>
<td>3.10</td>
<td>0.0035*</td>
</tr>
</tbody>
</table>

\[ R^2 = 0.4894*; \ p<0.0001; \ F = 13.10 \text{ Significant} \ <0.05 \]

AIM 1
\[ R^2=0.4894 \ p<0.001 \text{ or } \ 49\% \text{ of the Variance Explained} \]

Each of these three models predicts HPB significantly. The model explaining the most variance (49%) contains the measure of self–efficacy for nutrition: fruits and vegetables. The measure that uses self–efficacy for nutrition: fats and sodium has a very low intercept of 3.127 for the HPB score. These models lend support for the use of the self–efficacy for nutrition: fruits
and vegetables instrument over the self-efficacy for nutrition: fats and sodium as the instrument to measure self-efficacy for nutrition. Hope in all three models was a strong independent predictor of HPB; whereas, self-esteem offered little explanatory value in any of the models.

Aim 2, to test the ability of self-esteem, self-efficacy, hope and HPB to predict IR in Mexican American adolescents living in TX along the US–Mexico border, was evaluated using regression analysis with multiple predictors and multiple outcome variables. The variable HPB was regressed simultaneously on self-esteem, self-efficacy, hope and HPB using the following regression equation: \[ \text{IR} = \beta_0 + \beta_1(\text{Self-Esteem}) + \beta_2(\text{Self-Efficacy}) + \beta_3(\text{Hope}) + \beta_4(\text{HPB}). \]

Because there were three different measures for self-efficacy, three regressions were performed using one of the measures for self-efficacy as a predictor variable each time resulting in three separate regression models: 1) self-efficacy for physical activity, 2) self-efficacy for nutrition: fat and sodium intake and 3) self-efficacy for nutrition: fruit and vegetable intake. In each model HPB was regressed on self-esteem, self-efficacy and hope with the predictor variable of self-efficacy represented differently in each model: 1) self-efficacy for physical activity, 2) self-efficacy for nutrition: fat and sodium intake and 3) self-efficacy for nutrition: fruit and vegetable intake. In addition, there were 3 measures of IR to use as outcome variables resulting in 3 additional separate regression models for each measure of self-efficacy and each measure of IR. The significant models are depicted in Figure 7, 8, and 9.

For the regression where IR reflected as BMI percentile accounting for gender and age (BMI percentile) was regressed on self-esteem, self-efficacy for physical activity, hope and HPB, the coefficient of determination \( R^2 \) was not significant (0.10881). This regression resulted in the following equation for this model: \[ \text{IR (BMI percentile)} = 103.022 + 0.18 \text{(Self-Esteem)} - 0.064 \text{(Self-Efficacy for Physical Activity)} - 0.082 \text{(Hope)} - 0.164 \text{(HPB)}. \] In this
model there were no significant independent predictors; however, the $\beta$ values for both self-efficacy for physical activity and hope are negative indicating that when these values decreased, IR (BMI percentile) increased, which is the expected direction.

Likewise, where IR reflected as BMI percentile was regressed on self-esteem, self-efficacy for nutrition: fats and sodium, hope and HPB, $R^2$ was not significant (0.1063). This regression resulted in the following equation for this model: $\text{IR (BMI percentile)} = 99.699 + 0.18 \text{ (Self–Esteem)} + 0.225 \text{ (Self–Efficacy for Nutrition: Fats and Sodium)} – 0.095 \text{ (Hope)} + 0.063 \text{ (HPB)}$. In this model there were no significant independent predictors. Here, the $\beta$ values for hope and HPB are negative indicating that when these values decreased, IR (BMI percentile) increased, which is the expected direction. Although there were no significant independent predictors, self-esteem and self-efficacy for nutrition: fats and sodium in this model were both positive indicating that when self-efficacy increased, IR (BMI percentile) also increased which is counter to the expectation.

When IR reflected as BMI percentile for age and gender was regressed on self-esteem, self-efficacy for nutrition: fruits and vegetables, hope and HPB, the $R^2$ of 0.0996 was also non-significant. This regression resulted in the following equation for this model: $\text{IR (BMI percentile)} = 102.636 + 0.17 \text{ (Self–Esteem)} – 0.017 \text{ (Self–Efficacy for Nutrition: Fruits and Vegetables)} – 0.101 \text{ (Hope)} – 0.052 \text{ (HPB)}$. As in the previous regression equations with the outcome variable of IR (BMI percentile), no significant independent predictors were revealed. In this model, the $\beta$ values for all predictor variables except self-esteem are negative indicating that when these values decreased, IR reflected as BMI percentile accounting for age and gender increased, which is the expected direction.
Insulin resistance reflected as WC percentile was regressed three times with a different predictor variable for self–efficacy each time: self–efficacy for physical activity, self–efficacy for nutrition: fats and sodium and self–efficacy for nutrition: fruits and vegetables respectively. Table 15 depicts a significant $R^2$ (0.2129) with 21% of the variance is explained by self–esteem and self–efficacy for physical activity. In this model IR, reflected as WC percentile, is regressed on self–esteem, self–efficacy for physical activity, hope and HPB. This regression resulted in the following equation: \[ \text{IR (WC percentile)} = 126.1438 + 1.079 \text{ (Self–Esteem)} - 0.777 \text{ (Self–Efficacy for Physical Activity)} - 0.249 \text{ (Hope)} - 0.112 \text{ (HPB)}. \] In this model, self–esteem and self–efficacy for physical activity were significant independent predictors. As expected, an inverse relationship between self-efficacy for physical activity and WC was observed. Possible reasons for the unexpected positive influence of self–esteem on WC are discussed in Chapter 5. This model is depicted graphically in Figure 7.

**TABLE 15. Model: Insulin Resistance as Waist Circumference Regressed Simultaneously on Self–Esteem, Self–Efficacy for Physical Activity, Hope and Health Promoting Behaviors**

<table>
<thead>
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<td>Intercept</td>
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<td>.88</td>
<td>&lt;.0001</td>
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<td>Self–Esteem</td>
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<td>Self–Efficacy for Physical Activity</td>
<td>-0.7772</td>
<td>0.3195</td>
<td>-2.43</td>
<td>0.0196*</td>
</tr>
<tr>
<td>Hope</td>
<td>-0.2487</td>
<td>0.5476</td>
<td>-0.45</td>
<td>0.6522</td>
</tr>
<tr>
<td>Health Promoting Behaviors</td>
<td>-0.1116</td>
<td>0.1357</td>
<td>-0.82</td>
<td>0.4158</td>
</tr>
</tbody>
</table>

$R^2 = 0.2129*$; $p = 0.0437$; $F = 2.71$ * Significant <0.05
When IR (WC percentile) was regressed on self–esteem, self–efficacy for nutrition: fats and sodium, hope and HPB, the regression resulted in a non-significant $R^2$ (0.0967) for the following equation: \( IR (WC \text{ percentile}) = 120.2125 + 0.91896 \times \text{Self–Esteem} – 0.11 \times \text{Self–Efficacy for Nutrition: Fats and Sodium} – 0.516 \times \text{Hope} – 0.124 \times \text{HPB} \). In this model, there were no significant independent predictors. Likewise, when IR (WC percentile) was regressed on self–esteem, self–efficacy for nutrition: fruits and vegetables, hope and HPB, the regression resulted in a non-significant $R^2$ (0.1573) for the following equation: \( IR (WC) = 125.9087 + 1.0217 \times \text{Self Esteem} – 0.564 \times \text{Self Efficacy for Nutrition: Fruits & Vegetables} – 0.435 \times \text{Hope} – 0.015 \times \text{HPB} \).

Table 16 depicts a significant $R^2$ (0.2214) with 22% of the variance is explained by self–efficacy for physical activity. In this model IR, reflected as HOMA–IR, is regressed on self–esteem, self–efficacy for physical activity, hope and HPB. This regression resulted in the following equation for the model: \( IR \text{ (HOMA–IR)} = 14.3365 + 0.0099 \times \text{Self–Esteem} – 0.232 \).
(Self–Efficacy for Physical Activity) – 0.058 (Hope) – 0.003 (HPB). In this model, only self-efficacy for physical activity was a significant independent predictor with negative $\beta$ values for all predictor variables except self–esteem indicating that when these values decreased, HOMA–IR increased, which is the expected direction for these variables. This model is depicted graphically in Figure 8.


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<td>Intercept</td>
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<td>4.1915</td>
<td>3.45</td>
<td>0.0013</td>
</tr>
<tr>
<td>Self–Esteem</td>
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<td>0.1308</td>
<td>0.08</td>
<td>0.9400</td>
</tr>
<tr>
<td>Self–Efficacy for Physical Activity</td>
<td>-0.2324</td>
<td>0.0837</td>
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<tr>
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<tr>
<td>Health Promoting Behaviors</td>
<td>0.00270</td>
<td>0.0355</td>
<td>0.08</td>
<td>0.9398</td>
</tr>
</tbody>
</table>

$R^2 = 0.2214; p = 0.04$; $F = 2.84$ * Significant $<0.05$

AIM 2

$R^2 = 0.2214; p = 0.04$ or 22% of the Variance Explained by Self Efficacy for Physical Activity

**FIGURE 8. Insulin Resistance as HOMA–IR Regressed on Self–Esteem, Self–Efficacy for Physical Activity, Hope and Health Promoting Behavior**
Insulin resistance (HOMA–IR) regressed on self-esteem, self-efficacy for nutrition: fats and sodium, hope and HPB resulted in a non-significant $R^2$ (0.1029) with the following equation for this model: $\text{IR (HOMA–IR) = 7.024 – 0.0261 (Self–Esteem) + 0.433 (Self–Efficacy for Nutrition: Fats and Sodium) – 0.1195 (Hope) – 0.017 (HPB)}.$

Table 17 depicts a significant $R^2$ (0.2254) with 23% of the variance explained by self-efficacy for nutrition: fruits and vegetables. In this model, reflected as HOMA–IR, was regressed on self-esteem, self-efficacy for nutrition: fruits and vegetables, hope and HPB. This regression resulted in the following equation for this model: $\text{IR (HOMA–IR) = 15.2136 + 0.0045 (Self–Esteem) – 0.236 (Self–Efficacy for Nutrition: Fruits and Vegetables) – 0.104 (Hope) – 0.045 (HPB)}.$ In this model, only the variable self-efficacy for nutrition: fruits and vegetables was a significant independent predictor. There were negative $\beta$ values for all predictor variables except self-esteem indicating that when these values decrease, IR (HOMA–IR) increased, which was the expected direction. This model is depicted graphically in Figure 9.

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<td>beta</td>
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<tr>
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<td>4.2372</td>
<td>3.59</td>
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<tr>
<td>Self–Esteem</td>
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<td>0.1303</td>
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<td>Self–Efficacy for Nutrition: Fruits and Vegetables</td>
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<td>0.0074*</td>
</tr>
<tr>
<td>Hope</td>
<td>-0.1040</td>
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<td>-0.74</td>
<td>0.4843</td>
</tr>
<tr>
<td>Health Promoting Behaviors</td>
<td>0.0450</td>
<td>0.0392</td>
<td>1.15</td>
<td>0.2570</td>
</tr>
</tbody>
</table>

$R^2 = 0.2254 *; p = 0.0333; F = 2.91 *$ Significant $<0.05$
Summary

Results of the analyses of these data were reported as a response to the two study aims. Regression analyses resulted in six models. Analysis of the first three models for Aim 1 with HPB regressed on self-esteem, self-efficacy and hope was described. Hope and self-efficacy explained 37% to 49% of the variance on HPB. Analysis of Aim 2 resulted in three significant models explaining 21% to 23% of the variance in IR. Regression equations were presented and significant independent predictors were delineated. Figures for the significant models were presented that included the coefficient of determination and the $\beta$ coefficient for each independent predictor in the equation.
CHAPTER 5: DISCUSSION AND IMPLICATIONS

This study aimed to test the predictive ability of 1) self–esteem, self–efficacy, and hope on health promoting behaviors (HPB); and 2) self–esteem, self–efficacy, hope, and HPB on insulin resistance (IR) in overweight Mexican American adolescents \(n = 45\) living in TX along the US–Mexico border. This chapter discusses study findings within the context of the study aims with emphasis on theoretical conceptualization, Hendricks’ Perceptual Health Promotion Determinants (HPHD) Model, and current relevant literature. Both research aims were addressed using regression analysis with multiple predictors resulting in six models. Three of the six models responded to Aim 1 that tested the HPHD Model regressing self–esteem, self–efficacy, and hope on HPB. Because three instruments were administered to measure self–efficacy (self–efficacy for physical activity, self–efficacy for nutrition: fat and sodium, and self–efficacy for nutrition: fruit and vegetables), three regression equations were used to predict HPB. Each regression used a unique predictor variable for self–efficacy efficacy (self–efficacy for physical activity, self–efficacy for nutrition: fat and sodium, and self–efficacy for nutrition: fruit and vegetables) to test the HPHD Model. Aim 2 resulted in additional nine regression equations, because three outcome variables were used to indicate IR (BMI percentile, WC percentile, and HOMA–IR). As a result, BMI percentile was first regressed on self–efficacy for physical activity, then self–efficacy for nutrition: fat and sodium, and finally self–efficacy for nutrition: fruit and vegetables. This process was repeated for both WC and HOMA–IR resulting in the nine additional regressions. Discussion and conclusions presented in this chapter stem from the analyses of data collected from January 31, 2009 to July 17, 2009 to respond to these aims. Chapter highlights include recommendations for theory development, nursing implications for practice and future research to prevent obesity and diabetes. Study limitations and concluding
remarks are also presented.

Study Aim 1: Predicting Health Promoting Behaviors (HPB)

Aim 1 proposed that self-esteem, self-efficacy and hope were significant predictors of HPB using the theoretical framework proposed by Hendricks in the HPHD Model (See Figure 1). Three regressions tested Aim 1. Data were collected for each of the study variables. The HPHD Model was tested using regression analyses with multiple predictor variables for the concept of self-efficacy (self-efficacy for physical activity, self-efficacy for nutrition: fat and sodium, and self-efficacy for nutrition: fruits and vegetables). The findings partially support concepts in the HPHD Model to explain HPB in this sample. Each of the three study variables of self-efficacy (self-efficacy for physical activity, self-efficacy for nutrition: fat and sodium, and self-efficacy for nutrition: fruits and vegetables) significantly predicted HPB, providing evidence to partially support Hendricks’ theoretical conceptualization.

The model incorporating self-efficacy for nutrition: fruits and vegetables to measure self-efficacy explained the highest amount of variance in HPB (49%). This finding indicates that this measure of self-efficacy was the best predictor of HPB. Hope was a significant independent predictor in all three models and self-efficacy was a significant predictor in two (self-efficacy for physical activity and self-efficacy for nutrition: fruits and vegetables) of the three. Self-efficacy for nutrition: fat and sodium intake was not a significant independent predictor.

Literature supports a positive relationship between self-esteem and HPB. For example, in Hendricks’s work, self-esteem was positively associated with self-efficacy, hope, and HPB. Self-esteem also contributes to positive ethnic and bicultural identification (Phinney, 1990). In their study of overweight adolescents, Fulkerson, et al. (2007) provided support for poor self-esteem as a consequence of overweight rather than an antecedent to HPB as depicted in this
study and the HPHD Model. These researchers linked family connectedness to self–esteem in a large sample of adolescents \((n > 1200)\), highlighting the importance of social support and family connectedness as antecedents to self–esteem. In another study, 534 Latino adolescents’ responses linked socioeconomic factors, such as income and parental education to self–esteem, again indicating that these concepts were antecedents to self–esteem rather than consequences (Plunkett, Arbarca–Mortensen, Behnke & Sands, 2007). Such literature support provides evidence that self–esteem conceptually belongs in models of health promotions and contributes to HPB.

With the model tested three times, each time with a different predictor variable for self–efficacy (physical activity, nutrition: fats & sodium, and nutrition: fruits/vegetables), along with hope and self–esteem, a significant amount of variance in HPB (38%, 44%, and 49% respectively) was explained by self–efficacy and hope.

The contribution of the second concept in the model, self–efficacy was examined. Self–efficacy develops from self–concept, self–confidence and a coherent sense of self (Catalano, Berglund, Lonczak, & Hawkins, 2004). Measuring the concept of self–efficacy with three unique measures offered multiple perspectives of the concept. Self–efficacy performed as a significant independent predictor in two of the three models designed to predict HPB. Regression analysis indicates that when scores for self–efficacy for nutrition: fats and sodium and fruits and vegetables increased by 2.88 and 0.91 respectively, HPB scores increased by 1 unit. However, when self–efficacy for physical activity was used as the predictor variable, self–efficacy was not a significant independent predictor. This finding is contrary to results reported in other studies about domain specific self–efficacy for physical activity (Callaghan, 2006; Dunton, Schneider, & Cooper, 2007; Jago, Baranowski, Baranowski, Cullen, & Thompson, 2007), where self–efficacy
for physical activity has been associated with health promoting behaviors. Of these three studies reviewed, only Callaghan (2006) used the Pender’s Perceived Self–Efficacy [Self-Regulatory Efficacy] (Adolescent Version), which is the instrument used to measure self–efficacy for physical activity in this study. Studies measuring domain specific self–efficacy have used a variety of instruments making study comparison difficult (Summerbell et al., 2006).

Furthermore, Mexican American adolescents are underrepresented in these studies. Only Dunton (2007) reported a sample ($n = 122$) that included Hispanic adolescents (20%). An internal reliability Cronbach’s $\alpha$ of 0.88 supported the use of Pender’s Perceived Self–Efficacy [Self-Regulatory Efficacy] (Adolescent Version) in this sample. These findings warrant further study in similar samples of Mexican American adolescents using Pender’s Perceived Self–Efficacy [Self-Regulatory Efficacy] (Adolescent Version).

Hope was a significant independent predictor in all three models tested to determine the ability of self–esteem, self–efficacy and hope to predict HPB. Findings indicate that hope plays a major role in the prediction of HPB. This finding is consistent with results from other studies of healthy adolescents (Cantrell & Lupinacci, 2004; Canty Mitchell, 2003; Chang & Banks, 2007; Edwards, Ong, & Lopez, 2007; Hendricks et al., 2000; D. L. Hendricks & Hendricks, 2005). For example, Canty Mitchell (2003) reported a significant association between lower hope scores and lower health status ratings in 202 African American adolescents. Cantrell and Lupinacci (2004) reported similar findings in her sample of 90 adolescents. Neither of these studies, however, included Mexican American adolescents.

Few models of health promotion have incorporated the concept of hope as a contributing psychological attribute (Hendricks, 1998; Hendricks et al., 2000; Hendricks & Hendricks, 2005). Moreover, this concept has not been consistently incorporated into models that explain health
promotion behavior. Combining hope with other concepts in health promotion models extends the use of this well defined concept that has been studied extensively by nurses and others as a component of chronic illness (Chamberlain, 2006; Dickerson, Boehmke, Ogle, & Brown, 2006; Guest, Bunce, Johnson, Akumatey, & Adeokun, 2005; Miller, 2007; Pelaez-Ballestas et al., 2006; Wang, Chang, Shih, Sun, & Jeng, 2006). Studies of hope as a feature in illness have identified socioeconomic status and family support as antecedents to hope. For example, Wang, et al. (2006) reported social support as the best predictor of hope \( (n = 45) \). Furthermore, hope in health promotion as consequence of social determinants and an antecedent to HPB is consistent with the literature about the concept of hope (Hendricks et al., 2000; Hendricks et al., 2005; Norwood, 2006; Plunkett, Abarca–Mortensen, Behnke, & Sands, 2007; Snyder, Ritschel, Rand, & Berg, 2006). Social determinants may impact hope which in turn may influence individuals’ choices about health behavior.

This present study examined the predictive ability of the concepts of self–esteem, self–efficacy and hope on HPB. These significant relationships indicate support for the contribution of these concepts to increase HPB. The self–efficacy for nutrition: fats and sodium instrument, discussed below, performed poorly (Cronbach’s \( \alpha = 0.16 \)). Overall, however, the findings from this study provide partial support for Aim 1. The findings also support the use of all but one of the instruments (self–efficacy for nutrition: fats and sodium) in this sample. These findings also provide evidence for the usefulness of some of the concepts in the HPHD Model for understanding HPB in populations other than Black adolescents living in the southern US; such as, Mexican American adolescents living in TX along the US–Mexico border.
Study Aim 2: Predicting Insulin Resistance (IR)

Aim 2 focused on the ability to predict IR when HPHD Model predictor variables (self-esteem, self-efficacy, and hope) were combined HPB to form a new model. Several of the tested models explained a significant portion of the variance. Three unique self-efficacy predictor variables (self-efficacy for physical activity, self-efficacy for nutrition: fat and sodium, and self-efficacy for nutrition: fruits and vegetables) created three separate regression equations for each of the three IR outcome variables (BMI percentile, WC percentile, and HOMA–IR) which resulted in a total of nine regression equations to respond to Aim 2. Three models tested explained a significant amount of the variance in IR (Figures 7, 8, and 9). In these three significant models, the outcome variable (IR) was depicted as WC for one, and IR was depicted as HOMA–IR for the other two models. Waist circumference regressed on self-esteem, self-efficacy, hope, and HPB together, resulted in one significant model (Figure 7). Regressing HOMA–IR on self-esteem, self-efficacy, hope, and HPB resulted in two models (Figures 8 and 9) with significant coefficients of determination. These significant models supported the idea that the psychological attribute of self-efficacy contributed to the variance of IR in this sample of Mexican American adolescents living in TX along the US–Mexico border.

Two independent significant predictor variables, self-esteem and self-efficacy for physical activity ($\beta = 1.08$ and $\beta = -0.77$, respectively) were significant predictors of WC. These data suggest that an increase in self-esteem of 1.08 and a decrease in self-efficacy for physical activity by 0.77 predict a 1 cm increase in WC.

Self-esteem uncharacteristically increased in this model along with increases in WC. This phenomenon is discussed elsewhere in this chapter. This ability of a model that estimates markers of obesity with self-efficacy as a significant independent predictor is consistent with
findings in the literature, further supporting the importance of the concept of self-efficacy in these kinds of prediction models (Dishman et al., 2005; Dowda, Dishman, Pfeiffer, & Pate, 2007; Motl et al., 2005; Trost et al., 2002). For example, Dishman, et al. (2005) reported direct effects of self-efficacy on physical activity in over 4000 adolescent females. Dishman, et al. (2005) noted that self-efficacy accounted for enjoyment factors such as social support, increased skill level, sense of accomplishment and goal attainment. Motl et al. (2005) also demonstrated increased self-efficacy and physical activity in their study of 1038 adolescent females (8th and 9th grade). In another related study, Trost (2002) reported similar findings (n = 1114, African American females) that support including strategies to increase self-efficacy in order to increase physical activity participation. None of these studies used biological markers as outcome variables.

Studies that use objective outcome measures to predict physical activity may use measures of BMI or physical activity with cycle ergometers or accelerometers. For example, Dunton, Schneider, and Cooper (2007) reported in their longitudinal analysis (3 time points over 9 months) that self-efficacy increased as cardiovascular fitness improved using the cycle ergometer to measure cardiovascular fitness in 146 sedentary adolescent females. Jago et al. (2007) intentionally explored the connection between self-report and objectively measured physical activity using accelerometers in 10 to 14 year old adolescent males (n = 447). Of these urban participants 72% were classified as Anglo with the remaining classified as other. Self-efficacy reports strongly predicted self-reports of physical activity; however this relationship weakened when accelerometer readings were used as the outcome measure (Jago et al., 2007). These findings are consistent with the findings noted above. In this present study psychological attributes of self-esteem, self-efficacy and hope were able to predict HPB in all three models.
(Figures 4, 5, and 6); however these psychological variables combined with HPB to predict IR (BMI percentile, WC percentile, and HOMA–IR) resulted in fewer significant models with lower percentage of explained variance (Figures 7, 8, and 9).

In their systematic review of exercise interventions to treat overweight in children and adolescents, Atlantis, Barnes, and Singh (2006), found only 14 of 45 potentially relevant papers were examined. Mostly these studies used highly sensitive measures of body fat (bioimpedence and dual X-ray absorptiometry) in addition to the clinical measures of BMI and WC (Atlantis et al., 2006). Insulin resistance was featured prominently as a consideration in adolescent obesity; nevertheless, these reviewers did not include blood samples for IR in their evaluation of objective measures (Atlantis et al., 2006). The findings from this current study about the ability to predict IR using psychological attributes and HPB, therefore, contribute new information to the complex health issues of overweight and obesity in Mexican American adolescents living along the US–Mexico border.

Insulin resistance was assessed as an outcome measure in this present study about overweight Mexican American adolescents. Figure 7 depicts one model with a significant coefficient of determination ($R^2$) that explained 21% of the variance in self–efficacy for physical activity. Figure 8 and 9 depict two models with significant coefficients of determination ($R^2$), with 22% and 23% of the variance explained, respectively. In both of these models (Figures 8 and 9) the significant independent predictor variable was self–efficacy. In Figure 8 the significant independent predictor variable was self–efficacy for physical activity ($\beta = -0.2324$); whereas, self–efficacy for nutrition: fruits and vegetables ($\beta = -0.2364$) was the independent predictor variable in the second model (Figure 9). Both models depict an increase in HOMA–IR. With a decrease in self–efficacy for physical activity of 0.23, HOMA–IR is expected to increase
by 1 unit. Similarly, for an increase in HOMA–IR of one to occur, a decrease of 0.24 in self–
efficacy for nutrition: fruits and vegetables would have been expected. These findings provide
partial support for intervening to improve insulin sensitivity by increasing self–efficacy for
physical activity and nutrition.

These findings are consistent with those reported earlier by Jago (2007) where
associations were stronger for the prediction of self reported HPB. Social desirability, the
response bias where participants choose what they perceive are the most acceptable responses,
may influence the strength of the estimation of outcome variables, in this case IR, with self
report predictors (self–esteem, self–efficacy, hope, and HPB). Watson et al. (2006) reported the
ability to measure social desirability in their study of 473 adolescent males. These investigators
used a 9-item Likert type scale to evaluate the influence of social desirability (Watson et al.,
2006). Jago (2007) reported improved associations between self reports and accelerometer
physical activity improving the estimation of the prediction controlling for social desirability.
This literature supports the idea that social desirability bias in the self report instruments may
have influenced the strength of the IR predictions in Aim 2. However, social desirability was not
measured in this study providing little support for this specific explanation for the decrease.
Furthermore, genetics, inflammatory markers and other physiologic conditions that contribute to
IR were not measured and also may have exerted influence on the variation of IR separate from
the influence of the self report predictors.

For Aim 2, self–efficacy for nutrition: fat and sodium was in the model as a predictor
variable to estimate IR, coefficients of determination ($R^2$) was not significant. This finding is
different from Aim 1 where self–efficacy for nutrition: fat and sodium performed as a significant
independent predictor to estimate HPB. Nevertheless, self–efficacy as a concept functioned well
when measures with adequate internal reliability were used. This finding supports the use of self-efficacy as a concept in the model; however, the self-efficacy for nutrition: fats and sodium instrument, discussed below, had poor internal reliability (0.16).

Lastly regarding Aim 2, none of the models designed to predict IR that used BMI percentile as the outcome variable (See Figures 7, 8, and 9) resulted in significant coefficients of determination ($R^2$). This finding indicates that BMI percentile may not be the most sensitive biomarker of IR in this sample. In clinical practice BMI percentile is used more commonly than WC percentile to screen adolescents for IR because of the potential impact of pubertal hormones on central adiposity and growth spurts during this developmental stage (Ball et al., 2006; Cruz et al., 2005; Rentfro, 2007; Shaibi & Goran, 2008); however, considerable support exists for considering WC in the evaluation of overweight adolescents to prevent obesity and type 2 diabetes (Ball et al., 2006; Bindler, Massey, Shultz, Mills, & Short, 2007; Hirschler, Aranda, Calcagno Mde, Maccalini, & Jadzinsky, 2005). For example, Hirschler (2005) reported WC as a significant predictor ($\beta = 0.05\text{[95\% confidence interval, 0.028 to 0.073]}$) of IR in a sample of 84 adolescents. Although BMI percentile remains the standard growth and development evaluation in adolescents, WC with its contribution of central adiposity may better predict IR.

Discussion: Instruments and Sample Characteristics

This study addressed the predictive ability of the HPHD model in a new population, Mexican American adolescents living in TX along the US–Mexico border. The ability of the concepts in the HPHD model (self-esteem, self-efficacy and hope) to predict HPB and IR was determined. In general, instruments administered to the participants performed satisfactorily as measures of the concepts in this new population. One instrument used to measure the concept of self-efficacy for nutrition: fats and sodium did not perform well ($\alpha = 0.16$) even though this
instrument has been used widely in TX and in the US–Mexico border region with samples including Hispanic adolescents.

Missing values appeared for two items in the self–efficacy for nutrition: fats and sodium. When queried, the two participants reported that these particular foods were not consumed, resulting in multiple items with missing data. One item left blank was the choice between catsup and tomatoes. In this case the participant never ate either catsup or tomatoes. Another choice left blank by a participant was between popcorn with salt or butter or without. In this case the participant did not like popcorn and left the item blank. Although in general, instruments that collect nutritional intake data are fraught with difficulty when administered to diverse cultural groups, in this situation, the blank items seemed to be more connected to food preferences than to cultural inadequacy of the instrument. In addition, poverty and food security have been associated with adolescent overweight (Casey et al., 2006). The environment of poverty might limit exposure to foods other than low cost items for these adolescent. The context of poverty in this case did not seem to influence missing values. The instrument (self–efficacy for nutrition: fats and sodium) used in this sample has been employed in large samples sizes with multiple instruments where analyses techniques routinely handling a few missing items.

A code was used in the SAS program to indicate that Cronbach’s $\alpha$ reliability coefficient was being performed with a set that was missing data. This reliability coefficient programming accounted for the missing data, however, Cronbach’s $\alpha$ internal consistency coefficient remained low. The cases with missing data were eliminated from and the Cronbach’s $\alpha$ internal consistency coefficient remained at 0.16. This finding of low Cronbach’s $\alpha$ internal reliability coefficient ($\alpha = 0.16$) casts doubt on the value of this instrument to consistently measure self–efficacy for nutrition: fats and sodium in this sample. In comparison with previous studies, the
unique issues contributing to this concern with the self–efficacy for nutrition: fats and sodium variable include the following factors: the low internal reliability coefficient, ethnic homogeneity, the small sample, and missing data. As reported and displayed on Table 11, previous studies report adequate internal reliability with Cronbach’s $\alpha$ ranging from 0.83 to 0.87 (Edmundson et al., 1996; Parcel et al., 1995). Because of the low reliability coefficient for this measure of self–efficacy for nutrition: fats and sodium both the reliability and validity of the measure for this study’s sample are in question. The interpretation of any of the significant findings related to this instrument must be viewed as speculative and with caution.

Most studies reviewed included Mexican American adolescents; therefore, the homogeneity of ethnicity in this sample of 100% Mexican American is not likely to be a reason for the poor performance of the instrument or lack of significance for this independent predictor (Edmundson et al., 1996; Hoelscher et al., 2004; Parcel et al., 1995). This instrument has also been used widely in surveillance surveys in TX with large sample sizes (Hoelscher et al., 2004). The instrument is administered as a part of a battery of instruments. Although care was taken to avoid missing data, regression analyses assume no measurement error. Therefore, this assumption is violated with the regression equations that include this instrument (Kerlinger & Lee, 2000).

The Dietary Self–Efficacy for Lower Fat and Sodium instrument should not be used in similar samples until adequate reliability can be assured. This instrument should undergo further psychometric analyses in samples similar to this study sample. It is possible that the scaling difference may have been confusing. This instrument has a dichotomous scale; whereas the other scales in this current study were Likert type scales. Furthermore, this instrument is currently used within a battery of other instruments. Although adequate reliability coefficients have been
reported for its use alone, it is currently embedded within a large survey instrument with multiple other measures. The instrument should be evaluated for reliability using the entire survey instrument and by itself without other measures in samples of adolescents living in TX along the US Mexico border until reliability can be assured.

Regarding instrumentation, internal reliability (Table 11) for the instruments was excellent except for the Dietary Self–Efficacy for Lower Fat and Sodium which performed poorly ($\alpha = 0.16$) as mentioned previously. The remaining instruments performed extremely well with high internal reliability coefficients (0.88 – 0.92) or higher than those reported in previous studies (Table 11). These findings are consistent with the literature and provide support for use of these instruments in future studies with this border population.

Self–esteem scores in this sample were fairly homogenous with 90% of the scores considered normal (>15). Only one very low score of 3 was reported. This homogeneity of scores may have contributed to the inability of self–esteem to become a significant independent predictor in the models. However, HPB regressed on the single variable of self–esteem separated from the other variables in the models explained a significant portion (14%) of the variance. Norms for the other variables (self–efficacy and hope) have not been established, but responses indicated that scores tended to be in the high ranges (Bandura, 1999; Snyder et al., 1991). Hope scores were particularly high indicating that even in the presence of poverty, these adolescents felt hopeful.

Demographic data collected was used to characterize the participants regarding socioeconomic status, culture, attributes in the model, HPB and IR. Socioeconomic status was depicted by the sample’s location in one of the poorest counties in the US as well as the participants’ responses to the MacArthur Scale of Subjective Social Status–Youth Version
intended to measure social position. Subjective social status scores in this sample of adolescents living in TX are consistent with the literature and indicate that adolescents in this sample experience socioeconomic status along a continuum with multiple pathways as Adler and Ostrove suggest (1999). Adolescents in this study scored higher (mean 7.40) on the ladder that viewed their position in their school community than they scored (5.82) for their perception of their position in American society. These findings are consistent with Goodman’s (2001) reported means for the community (7.6) ladder and society ladder (7.2) scores. Adolescents’ responses to the two scales were within 0.4 points in Goodman’s (2001) study ($n = 10,843$); whereas, adolescents in this sample differed by 1.58 points. This finding indicates that adolescents in this TX sample distinguished the poverty gradient between American society and their community school. This finding is noteworthy when considering that socioeconomic gradient plays an important role in the association between income and health.

These adolescents with their higher subjective social status scores for their peer environment exhibit the characteristics identified by Adler and Ostrove (1999). These researchers asserted that comprehensive analyses of the associations between socioeconomic status and health include contextual and social factors along with individual psychological attributes, behaviors and biological mechanisms (Adler & Ostrove, 1999). Adler and Osgrove’s (1999) assertions are consistent with the findings related to subjective social status described. For example, Franzini and Fernandez–Esquer (2004) identified complex interactions among socioeconomic, cultural and personal characteristics in their sample of 1,745 Mexican origin adults indicating that socioeconomic status is not always associated with poor outcomes.

This phenomenon where lower socioeconomic status is unexpectedly associated with lower morbidity or mortality in some Hispanic populations has been noted in adults, known as...
the Latino mortality paradox or Hispanic paradox (Abraido–Lanza, Chao, & Florez, 2005). In their secondary data analysis of NHANES data, Abraido–Lanza, Chao, and Florez (2005) found partial support for these ideas with their report of less cigarette smoking and alcohol use, but higher BMI and more sedentary behavior in Latino individuals compared to non-Latino whites after adjusting for age and socioeconomic status. Furthermore, Zsembik and Fennel (2005) found this paradox to be different among the ethnic subgroups with individuals of Mexican descent who experienced more health advantage along with more deterioration when socioeconomic status and length of time in the US increased compared to other Hispanic subgroups. A paradox has also been noted regarding low prevalence of low birth weight infants with high prevalence rates of maternal obesity, impaired glucose tolerance and diabetes in the Mexican American population (Kieffer, 2000). According to Kieffer (2000) low birth weight, a major public health indicator is less prominent in the Mexican American population and may be masked by conditions predisposing infants to macrosomia (birth weight > 4.5 kg/10lb); such as, maternal obesity, impaired glucose tolerance and diabetes that are highly prevalent in the maternal population. Gordon–Larsen, Harris, Ward and Popkin (2003) also reported striking differences in obesity risk behaviors between US–born and foreign–born Hispanic adolescents from their secondary analysis of data from the US National Longitudinal Study of Adolescent Health. These investigators (2003) concluded that rapid acquisition of nutrition, smoking and sedentary behaviors contribute to overweight in this population. Clearly, as suggested by Adler, Boyce, Chesney and Cohen (1994) complex analytic study designs are needed to identify how socioeconomic status, culture, and health intersect.

Results of this research includes many elements described in the literature that have predicted health outcomes such as obesity and IR in past research (Adler, Epel, Castellazzo, &
Ickovics, 2000; Goodman et al., 2001; Goodman, Dolan, Morrison, & Daniels, 2005; Ostrove, Adler, Kuppermann, & Washington, 2000; Sapolsky, 2005). For example in Sapolsky’s (2004) study of primates, marginalized animals gained more weight, had higher cortisol levels and became more aggressive (Sapolsky, 2004). These primate studies support the concept that perceptions of social differences shape a gradient in social status that impact health outcomes.

The concept of subjective social status addresses subjective perception of social differences. Results support the use of the MacArthur Scale of Subjective Social Status–Youth Version to measure subjective social status in Mexican American adolescents living in TX at the US–Mexico border. Because this instrument has two scales each with one item, reliability of this instrument should be further established with test–retest reliability with intra class correlation a procedure that was not possible with the study design of one data collection event. Future longitudinal research in larger sample sizes is needed to determine the reliability of the instrument and associations between the concept of subjective social status and the variables in the models presented here.

The US–Mexico border region provides a unique setting to study culture and how acculturation may influence the development of obesity and type 2 diabetes (McEwen, Rentfro, & Vincent, 2009). Adolescents living in TX along the US–Mexico experience more opportunity to speak Spanish both at home, with their peers, and in the community businesses (Anderson & Gerber, 2008; J. Anderson, 2003; Mejias & Anderson, 1988). The border region compared to other regions in the US with Hispanic populations is ethnically homogeneous with approximately 80% of the population reporting Mexican American descent (United States Census Bureau, 2004). These characteristics require comprehensive awareness of how the concept of acculturation differs for this region. Acculturation scores in this sample of Mexican American
adolescents ranged from -2.83 to +2.83 with histograms of these scores demonstrating the pattern of a normal curve. These participants scored similarly on the two scales of the Acculturation Rating Scale for Mexican Americans (ARSMA-II). Their orientation to Mexican traditions and Anglo traditions were similar with means of 3.34 and 3.29, respectively. This finding is consistent with a border perspective of acculturation where integration of bicultural viewpoints predominates over assimilation, acculturation or separation (Lara, Gamboa, Kahramanian, Morales, & Hayes Bautista, 2005). These acculturation findings are of particular interest in this sample of Mexican American adolescents living in one of the poorest regions of TX at the US–Mexico border and consistent with the reflections of Lara et al. (2005). Lara et al. (2005) claim that rigor is lacking in the conceptualization of acculturation. Morales and Hansen (2005) concur adding their review of the literature regarding language within immigrant families. Hunt, Schneider and Comer (2004) reviewed over 200 articles with 69 meeting their inclusion criteria. In their conclusions, Hunt, Schneider and Comer (2004) question whether central elements of the concept have been precisely delineated using their systematic review to highlight misconceptions and to posit that the concept of acculturation may lie upon a foundation of stereotypical labeling rather than objective depiction.

Adolescents may act as language brokers in their family with legitimate bilingual and bicultural abilities (Morales & Hanson, 2005). In fact, in their systematic review of proxy measures of acculturation, Carter–Pokras, et al. (2008) maintain that acculturation at the US–Mexico border differs from that in other regions of the US. These researchers posit that HPB rather than acculturation status influences health; therefore, community norms and socioeconomic position along with behavioral risk and protective factors should be considered more important than acculturation (Carter–Pokras et al., 2008). These ideas are consistent with
the fairly low Cronbach’s α coefficient for internal reliability for the ARSMAII in this study (total = 0.73; Mexican American Orientation = 0.70, and Anglo Orientation = 0.84). Internal reliability in this sample was weaker than reported previously (α ~ 85 – 90) in sample sizes ranging from 250 to 558 (Bauman, 2005; Cuellar, Arnold, & Maldonado, 1995; Guinn, Semper, Jorgensen, & Skaggs, 1997; Guinn, Vincent, Semper, & Jorgensen, 2000; Guinn, Jorgensen, Semper, & Vincent, 2002; B. Guinn, 1998). Adolescents in this sample may have differed from those in earlier studies regarding community norms and socioeconomic position, behavioral risk, and protective factors as Carter–Pokras et al. (2008) suggest making measurement of acculturation with any scale tenuous.

These findings about subjective social status and acculturation are consistent with the literature about poverty and health. Although associated with poverty, the impact of lower socioeconomic status on health outcomes is complex (Adler & Ostrove, 1999; Singh-Manoux, Adler, & Marmot, 2003). The age of the participants, their ethnicity, their exposure to poverty, and other social disadvantages, for example, single parent homes, represent factors that characterize this sample as a vulnerable group (Bauman, Silver, & Stein, 2006). Moreover, these adolescents live in TX at the US–Mexico border where regional conditions increase risk exposure for substandard housing, limited education, obesity, type 2 diabetes, and other health disparities (Smith et al., 2005).

Over half of the adolescents who participated were in 8th through 10th grade with the grade level (10.76 ± 1.37) indicating that these students in general were slightly older than the typical mean age for grade or approximately 14.5 years. Information collected did not ascertain whether students had repeated a grade in school, but based on this information, it is likely that some of these students were delayed in school. Delay in school has implications for the
psychological attributes (self-esteem, self-efficacy, and hope), HPB, and subsequent IR.

More females participated than males, which is not unusual in research when adult volunteers are recruited (Preloran, Browner, & Lieber, 2001). Villarruel et al. (2006) describes issues related to recruitment and retention of adolescents in her study of 106 (males: female = 46: 60) Latino adolescents which is the same as the ratio of females males to (approximately 2:3) as recruited for this study. Although the number of males is lower than that of females, Villarruel et al. (2006) report that the majority of adolescents in their study had no barriers to participate with males’ responses during the interview similar to females’.

Although clearly more females participated than males, there were no clear gender differences in results in this study except those expected related to physical stature (height, weight, BMI and BMI percentile). Males weighed on average only 5 pounds more than females, indicating that overweight may be more severe in females than in males. Although, males were on average 1 foot taller than females this is not unexpected. When these anthropometric measures were explored accounting for gender and age with BMI percentile; however, the difference abated. The mean BMI percentile for age and gender (94.63) indicates that these overweight adolescents are extremely overweight with many obese individuals. Moreover if adult standards were applied, the mean BMI (30.44) for the sample would meet the criteria for adult obesity (≥ 30). Using WC as a measure reveals similar findings. This sample of overweight Mexican American adolescents also exhibited notable visceral adiposity. Although glucose levels were not abnormal, other indicators of risk for obesity related disease, such as impaired fasting glucose and HOMA–IR were apparent.

Approximately half of the female participants were categorized as overweight (85th ≥ BMI percentile < 95th) with the other half categorized as obese (BMI ≥ 95th percentile). Of these
overweight adolescents, more females (29%) were in the overweight category (85th ≥ BMI percentile < 95th) than males (11%) with over 70% of the males categorized as obese (≥ 95th percentile). This extreme finding differs from national rates for obesity in Mexican American adolescents; however, this sample was a convenience sample and cannot be considered representative of the region. Ogden, Carroll, and Flegal (2008) reported that about half of the Mexican American males and females who were categorized as over the 85th BMI percentile, were in the obese category (≥ 95th percentile) Using National Health and Nutrition Examination Survey (NHANES) data, Ogden, Carroll and Flegal (2008) conclude that trends for elevated BMI in children have remained high but have not been increasing. Ogden, Carroll and Flegal (2008) claim that the prevalence of high BMI had reached a plateau in adolescents from 1999 through 2006; however, ethnic disparities in prevalence rates of high BMI in adolescents continue. Mexican American adolescents are more likely to have a high BMI than non Hispanic white adolescents, but less likely than black adolescents to have high BMI (Ogden et al., 2008). Findings in this sample of 45 overweight (BMI ≥ 85th percentile) Mexican American adolescents are consistent with nationally reported data with one exception. The obesity rates (BMI ≥ 95th percentile) for males (71%) in this sample of obese Mexican American adolescents are even higher than national obesity rates (40%) for Mexican American adolescent overweight male adolescents (Ogden et al., 2008). Nationally, Mexican American male adolescents have significantly higher rates of overweight than non-Hispanic white male adolescents (Ogden et al., 2006). This sample exhibited this same trend, but with even higher rates of obesity in the males.

Furthermore, adult Mexican American adult males in this region are also more overweight BMI ≥ 25 (46%) than Mexican American adult men nationally (36%) with extremes of obesity in both males and females (Fisher-Hoch et al., 2009). In the Cameron County Hispanic
Cohort (CCHC), a study conducted in the same region as this dissertation research study, 59% of the participants were obese (BMI ≥ 30) (Fisher-Hoch et al., 2009), compared to 36.8% of Mexican American adults nationally (Ogden et al., 2006). Morbid obesity (BMI ≥ 40) was found in 9% of the participants compared to 4.5% of Mexican American adults nationally (Ogden et al., 2006). These findings suggest that adult disease related to obesity will increase in the future requiring interventions specific to the Mexican American population in this border region (Freedman, Khan, Serdula, Ogden, & Dietz, 2006). If adolescent obesity continues, adult rates will escalate in the future.

Nine (17%) of those who consented to participate were excluded after the screening process. The only reason for exclusion during screening occurred because interested adolescents did not meet the criteria for overweight (BMI ≥ 85th percentile). No other inclusion or exclusion criteria were violated. The low number of normal/underweight adolescents may have been a result of selection bias, because the recruitment flyer indicated that the study was for adolescents who were overweight. The second recruiting wave targeted church youth groups and summer science internships which could presumably represent a selection bias for a generally healthier sample.

Most (88%) of the participants had WC measurements ≥ 75th percentile for age and gender. Almost half (45%) of these overweight participants had WC measures ≥ 95th percentile for gender and age. Differences in the rate of abnormal WC between males and females were not notable. Waist circumference has not been used routinely in adolescents as a marker for IR for a variety of reasons. Hormonal influences at puberty and growth spurts have been implicated as confounding factors for the use of this measure in children (Cruz et al., 2005). However, abdominal obesity has been identified as a measure that contributes to more accurate prediction
of risk, resulting in attempts to use WC in children and adolescents (Ball et al., 2006; Cook, Auinger, Li, & Ford, 2008; Shaibi, Cruz, & Goran, 2008). Data from this sample of 45 Mexican American adolescents suggest that WC may be a useful tool for evaluation of IR in adolescents. Recently, waist–to–height ratio has been advocated as a sensitive measure to predict metabolic and cardiovascular risk (Maffeis et al., 2008). This measure has not been studied in adolescents and may be a way to account for growth when measuring central adiposity. The mean waist–to–height ratio in this current sample of overweight adolescents was 0.61 (females = 0.62; males = 0.58), which is over the threshold value recommended by Grundy et al. (2005). Using this criterion of 0.50 as a cutoff point, 96% (n = 43) of these adolescents (female n = 27; male n = 16) would be identified as having central obesity compared to 88% when using WC alone.

The highest fasting glucose level in this sample of adolescents was 106.5 mg/dl with only four (9%) individuals (females n = 1; males n = 3) classified as having a fasting glucose > 100 mg/dl and ≤ 126mg/dl, or impaired fasting glucose (IFG). According to Williams (2005), 1 in 6 overweight adolescents have IFG; whereas in this sample 1 in 4.5 had IFG. Racial and ethnic disparities have been widely reported. Higher rates of IFG have been reported in Mexican American adolescents than in other ethnic groups (Williams et al., 2005). Using the NHANES data, Williams (2005) reported an IFG prevalence rate of 7% in adolescents (n = 915) with 13% in the Mexican American adolescents compared to 4.2% and 7% for non–Hispanic white and non–Hispanic black adolescents, respectively. Future studies with larger sample sizes are needed to determine whether disparities in IFG are present at higher rates in overweight Mexican American adolescents in this border region.

In this study, insulin levels were measured; however other measures of metabolic status were not. Future studies should examine other metabolic indicators such as low density
lipoproteins, high density lipoproteins, triglycerides, cholesterol, and glycosylated hemoglobin in this vulnerable population with documented health disparities (Freedman et al., 2006; Freedman et al., 2007; Freedman, Wang et al., 2007; Miech et al., 2006; Ogden et al., 2008).

Fourteen participants (29%) had insulin values > 25 $\mu$U/ml with the highest value reaching 68.1 $\mu$U/ml. Three fourths of the participants had HOMA–IR values over 3.16 with a mean HOMA–IR OF 5.36 (SD = 3.52) indicating that most of these overweight Mexican American adolescents were at risk for disease. Future studies should test interventions to decrease these disease risk factors.

Discussion Summary: Aim 1, Aim 2, Instruments and Sample Characterization

In summary, findings support the use of the HPHD Model in this sample as well as extending the model to include the additional concept of IR. Not all models tested for predictors of IR were significant. The concepts of social status, acculturation, and social support were discussed for their value as contextual factors in this sample. Characteristics of the sample predictor variables and contextual factors were described highlighting notable findings with reference to supporting literature to provide an overall illustration of the meaning and impact of the findings.

Strengths and Limitations of the Study

One strength of this descriptive correlational design included the ability to assess numerous relationships simultaneously (Kerlinger & Lee, 2000). The regression techniques used to analyze the data explored questions that included dynamic interactions of multiple predictor concepts and their combined influence on IR the outcome variable of interest. Therefore, working knowledge of these multivariate techniques is an important skill to establish for investigators working with vulnerable populations.
Temporal precedence was lacking for this descriptive correlational design (Kerlinger & Lee, 2000). Data were collected at only one point in time, which also limits the causal inferences being made with predictive analyses. Alternative reasons for the findings, such as genetic predisposition or social desirability were additional limitations recognized. Missing data was avoided by reviewing each participant’s study instruments before they left the clinic; however, two participants submitted instruments with missing items which limited the findings. Internal consistency was addressed with Cronbach’s $\alpha$ reliability coefficients. One low reliability coefficient indicated that one scale had a large amount of error, limiting the strength of the findings for self-efficacy for nutrition: fats and sodium. Moreover, this poor reliability may have produced underestimation of relationships among the predictors with a subsequent inflation of relationships with the outcome variables and increase the risk of Type II error.

One notable event, an influenza outbreak, was associated with decreased enrollment. A potential history threat occurred with this outbreak in May 2009. Data collection slowed considerably with Public Service Announcements flooding the media about promoting health and avoiding influenza. Enrollment increased rapidly after the outbreak subsided. This increased enrollment also corresponded to the summer school break which enabled data collection to occur six days a week. No apparent differences in responses were noted when responses were compared from before and after the outbreak. One final consideration is the non-random sampling plan that presents an external validity threat. Findings may not represent the population from which the sample is drawn. Generalizability of the findings to the broader population of Mexican American adolescents is not possible.

This study relied on primary data collection which permits the investigator to design data collection to respond to the specific research aims rather than manipulating variables in a data set
designed for another purpose. Meticulous attention to instrument administration and data
collection protocol enhanced the quality of the findings in this study. One strength of this study
was the sampling plan that drew participants from a community that is over 90% Mexican
American. The inclusion criteria of Mexican American ethnicity and \( \text{BMI} \geq 85^{\text{th}} \) percentile
produced a more homogeneous sample strengthening the study findings.

Reading levels of the instruments were reasonable; time to complete the data collection
ranged from 20 minutes to 2 hours with an average of 40 minutes. The low outlier of 20 minutes
was related to the need for the participant to leave and receive their results by phone. Longer
times were sometimes related to the participants waiting for family members who were in the
clinic for another appointment. Once these outliers were eliminated, completion time ranged
from 30 minutes to 1 hour and 15 minutes. These findings indicated that subject burden did not
negatively influence the responses.

Theory Development

The findings from this study clearly support the use of the HPHD model in future studies
with larger samples of Mexican American adolescents living in TX along the US–Mexico
border; however evidence was also provided for the expansion of the model to include biological
markers of IR as outcome variables. Justification for this expanded model was delineated with
the findings from this sample of overweight Mexican American adolescents living in TX at the
US–Mexico border. In addition to this model expansion, theoretical support was offered for the
consideration of other concepts in the model as antecedent to the predictor variables of self–
esteeem, self–efficacy, hope and HPB. Social determinants such as poverty, education, social
support, family relationships, and parental education should be evaluated for inclusion in future
models to further strengthen the prediction of IR (Fulkerson, Strauss, Neumark-Sztainer, Story,
The correlation matrix for the concepts in the model demonstrated positive relationships among the psychological variables and HPB (Table 4). As expected an inverse relationship between biological markers of IR and the predictor variables existed. The direction of these correlations provides support for the concepts in the model. Identifying a theoretical model estimating the influence of self-esteem, self-efficacy, hope and HPB on IR provides valuable information to use to design intervention to prevent obesity and type 2 diabetes in Mexican American adolescents living in TX along the US–Mexico border.

Nursing Implications for Practice

These findings inform nursing practice aimed to prevent overweight and type 2 diabetes. The framework presented combines psychological and behavioral predictors with an objective measure of health status. Research to clarify the relationships that focuses on enhancing the predictive ability of the model informs nursing practice. Evidence-based behavioral interventions can be designed to improve IR, decrease WC and prevent obesity and diabetes. Research designed to improve the predictive ability of the model would include contextual antecedents such as social support and social status in Mexican American adolescents living in TX along the US–Mexico border. Interventions would be designed to assess levels of self-esteem, self-efficacy for physical activity and nutrition, hope and HPB in adolescents for early intervention. Strategies to improve self-esteem, self-efficacy, and hope can be designed to enhance HPB. For example, strategies would identify measures that contribute to capturing more of the explained variance. These findings may identify modifiable factors in a prediction model. A program of research could be designed to include strategies to promote nursing interventions to address modifiable factors such as self-efficacy or hope. Findings support nursing practice interventions
aimed to influence self–efficacy and/or hope that will influence HPB and ultimately decrease IR and ameliorate the burden of type 2 diabetes.

A model that accurately estimates HPB and IR presents opportunities for interventional research based on research findings. Controlled intervention studies could be designed to develop accurate dose response for activity, nutritional strategies and interventions to improve HPB and IR.

Recommendations for Future Research

In the future, research should focus on the concepts within the expanded HPHD model as well as adding concepts to further explain variance in IR. Future studies should address the concept of hope in health promotion/disease prevention. Domain specific self–efficacy clearly contributes to the theoretical framework for predictors to estimate IR; however, the theoretical framework should include multiple domain specific self–efficacy concepts to determine the most accurate and sensitive measures self–efficacy. The self–efficacy for nutrition: fats and sodium instrument should be tested further before relying on its use to accurately determine self efficacy for nutrition in samples of Mexican American adolescents living in TX along the US–Mexico border.

Future study of this expanded theoretical framework should explore the addition of concepts that provide additional explanations for variance in the model. The antecedents to self–esteem, social support, subjective social status, and acculturation require further theoretical conceptualization of factors that contribute with HPB to predict IR. For example, hope in health promotion is generally considered a consequence of social determinants and an antecedent to HPB; therefore the concept of hope becomes pivotal to this model. Social support, a major antecedent to hope, and acculturation should also receive further study. Other biological markers
associated with IR (C–reactive protein, IL–6 and TNF–α) should be included.

Acculturation requires concept analysis for its use with Mexican American adolescents living in TX along the US–Mexico border. Qualitative research may be warranted to fully develop the concept of acculturation for use in this binational and bicultural setting. Subjective social status offered a perspective to evaluate complex phenomena involved with poverty, ethnicity in the border region. In addition, the concept of social desirability may help to capture variance in the model. Finally the concepts of self–esteem, self–efficacy, hope and HPB in the original HPHD model should continue to be studied. Self–efficacy in particular may need more than one measure to fully capture the concept and its specific domains for its use with HPB. The HPB instrument (Adolescent Health Profile) contains seven subscales (health responsibility, physical activity, nutrition, positive life perspective, interpersonal relations, stress management, and spiritual health) many of which pertain to IR. Future studies, with larger sample sizes, should include analyses of the ability of self–esteem, self–efficacy, and hope to predict the subscale HPBs.

Multiple contextual factors should be included in a program of research to prevent type 2 diabetes in Mexican American adolescents living in TX along the US–Mexico border. Poverty, subjective social status, parent and child educational level, income, and housing all contribute to environmental conditions that influence health outcomes and IR in particular. Strategies to promote peer and family support, self–efficacy for physical activity and nutrition, and hope should be considered along with removal of barriers to physical activity and to healthy nutritional habits.

Future prevention research should continue to use biological markers of health and disease as outcomes. Other metabolic indicators such as low density lipoproteins, high density
lipoproteins, triglycerides, cholesterol, inflammatory markers, such as C–Reactive Protein, TNF–α, and IL–6, along with glycosylated hemoglobin should be evaluated in this vulnerable population with documented health disparities. Research should aim to determine the most accurate clinical markers to screen for IR and consider evaluating the measure of waist-to-height ratio. More robust designs with sensitive measures and large sample sizes should be used to prepare intervention studies. Intervention studies that aim to manipulate variables to increase HPB and decrease IR are needed. Furthermore, future research designs that address the complexity of health promotion to prevent diseases such as type 2 diabetes will require complex model testing and structural equation modeling. Research should be conducted in adolescent populations to address prevention of health problems such as obesity and type 2 diabetes and begin early targeted interventions to decrease disparities in obesity and diabetes that the Mexican American population endures.

Adolescents should be included as members of the research team when studies involving adolescents are designed. Creative strategies should be employed to encourage full participation of the sampling frame particularly males. Research design should consider the role families play in neighborhood communities. Research findings should be used to guide health care policy to develop incentives to change individual and community behavior and execute strategies to motivate continued healthy behavior.

Conclusions and Future Implications

Support for concepts in the HPHD Model was demonstrated using regression analyses. Participants live in or near poverty; however, subjectively these adolescents rate themselves as about average social status when compared to other people in the nation and above average when compared to other people in their school. Their responses indicated that they may not experience
a sense of social status gradient, even with disparities in health status attributed to poverty. The influence of poverty on overweight has not been well studied in Mexican American adolescents (Freedman et al., 2007); however, Freedman (2007) reports an inverse relationship between family income and BMI percentile for age and gender in both non–Hispanic white and Mexican American children. This association often differs with immigration status with increased length of time in the US being associated with increased obesity rates in Mexican American individuals. As discuss earlier, the process of acculturation and immigration in border region differs from non-border regions (Lara et al., 2005). In border regions, proximity to the homeland, bilingualism and biculturalism may confound acculturation processes without a geographic separation from Mexican heritage. Findings from this current study suggest that issues associated with poverty need further study in samples consisting of Mexican American adolescents living in border regions.

As the Hispanic population in the US grows, with the population consisting of 65% Mexican Americans, it is imperative that researchers include Mexican American individuals as participants, use validated instruments, analyze data by pertinent subgroups, and identify reasons for health disparities (Flores et al., 2002). Findings from this study provide some support for predicting IR. Psychological attributes that contribute to HPB may in fact contribute to physiologic outcomes. The psychological attributes, HPB, and metabolic features including obesity, glucose homeostasis, abnormal high density lipoproteins and cholesterol must be explored to determine strategies to target obesity prevention (Franks et al., 2007). A further understanding of these connections and linkages will provide support for specific interventions in vulnerable populations, particularly those experiencing health disparities such as the Mexican American adolescent population in TX along the US–Mexico border.
APPENDIX A: STUDY SITE AUTHORIZATION
April 4, 2008    Site Authorization Letter

Anne Rentfro, MSN, RN  
4925 Lakeway Drive  
Brownsville, TX 78520

Dear Anne Rentfro:

I have reviewed your request regarding your study and I am pleased to support your research project entitled “Relationships among Self-Esteem, Self-Efficacy, Hope, Health Promoting Behaviors and Insulin Resistance in Mexican American Adolescents”. Your request to use The University of Texas School of Public Health–Brownsville Regional Campus as a research and recruitment site is granted.

The research will include recruitment of participants from the Cameron County Hispanic Cohort and use of the Clinical Research Unit for data collection and sample processing pending approval from the Committee for the Protection of Human Subjects’ Institutional Review Board and the Scientific Advisory Committee, The Review Committee for utilization of the Clinical Research Unit. This authorization covers the time period of June 1, 2008 until May 31, 2009. We look forward to working with you. Should you have any questions please contact me at 956-882-5166 or 5165 or via email at joseph.b.mccormick@uth.tmc.edu.

Sincerely,

Joseph B. McCormick, MD
Regional Dean and James H. Steele Professor
APPENDIX B: INSTITUTIONAL REVIEW BOARD APPROVALS
9 June 2008

Anne Rentfro, Doctoral Student
Advisor: Marylyn McEwen
College of Nursing
PO Box 210203

RE: PROJECT NO 08-0510-02 SELF-ESTEEM, SELF-EFFICACY, HOPE, HEALTH PROMOTING BEHAVIORS AND INSULIN RESISTANCE IN MEXICAN AMERICAN ADOLESCENTS

Dear Ms. Rentfro:

We received your research proposal as cited above. The procedures to be followed in this study pose no more than minimal risk to participating subjects and have been reviewed by the Institutional Review Board (IRB) through an Expedited Review procedure as cited in the regulations issued by the U.S. Department of Health and Human Services [45 CFR Part 46.110(b)(1)] based on their inclusion under research categories 2, 4 and 7. As this is not a treatment intervention study, the IRB has waived the statement of Alternative Treatments in the consent form as allowed by 45 CFR 46.116(d)(2). Please make copies of the attached IRB stamped consent documents to consent your subjects.

Although full Committee review is not required, notification of the study is submitted to the Committee for their endorsement and/or comment, if any, after administrative approval is granted. This project is approved with an expiration date of 9 June 2009.

The Institutional Review Board (IRB) of the University of Arizona has a current Federalwide Assurance of compliance, FWA00004218, which is on file with the Department of Health and Human Services and covers this activity.

Approval is granted with the understanding that no further changes or additions will be made to the procedures followed without the knowledge and approval of the Human Subjects Committee (IRB) and your College or Departmental Review Committee. Any research related physical or psychological harm to any subject must also be reported to each committee.

A university policy requires that all signed subject consent forms be kept in a permanent file in an area designated for that purpose by the Department Head or comparable authority. This will assure their accessibility in the event that university officials require the information and the principal investigator is unavailable for some reason.

Sincerely yours,

Elaine Jones, PhD, RN, FNAP
Chair, Social and Behavioral Sciences Human Subjects Committee

EGI/nn
cc: Departmental/College Review Committee
Dr. Anne Rentfro - Principal Investigator
Nursing Department
University of Texas at Brownsville and Texas Southmost College
80 Fort Brown
Brownsville, Texas 78520

RE: IRB-HS Approval

Study Title: “Self-Esteem, Self-Efficacy, Hope, Health Promoting Behaviors and Insulin Resistance in Mexican American Adolescents”

Approval Type:
- Full Board Review
- Continuing Review
- Change Request/Modification/Amendment
- Exempt Cat. 1 2 3 4 5 6
- Expedited Cat. 1 2 3 4 5 6 7 8 9

Approval Period:
Start Date: 7/30/08  End Date: 7/01/09

Protocol #: 2008-020-IRB-1

Dear Dr. Rentfro,

In accordance with Federal Regulations for review of research protocols, the Institutional Review Board – Human Subjects of the University of Texas at Brownsville and Texas Southmost College have reviewed your study as requested.

The IRB-HS grants its approval for this project contingent on compliance with the following items. You may make as many copies of the stamped consent form as are necessary for your activity. All consent forms MUST bear the UTB/TSC IRB stamp indicating approval.

Responsibilities of the Principal Investigator also include:

- Inform the IRB-HS in writing immediately of any emergent problems or proposed changes.
- Do not proceed with the research until any problems have been resolved and the IRB-HS have reviewed and approved any changes.
- Report any significant findings that become known in the course of the research that might effect the willingness of the subjects to take part.
- Protect the confidentiality of all personally identifiable information collected.
- Submit for review and approval by the IRB-HS all modifications to the protocol or consent form(s) prior to implementation of any change(s).
- Submit an activity/progres report regarding research activities to the IRB-HS on no less than an annual basis or as directed by the IRB-HS through the Continuing Review Form.
- Notify the IRB-HS when study has been completed through submission of a Project Completion Report.

Should you have any questions or need any further information concerning this document please feel free to contact me at (956) 882-6083 or via email at Linda.MacDonald@utb.edu.

Sincerely yours,
Linda R. MacDonald
Linda R. MacDonald
IRB – Chair
NOTICE OF APPROVAL TO BEGIN RESEARCH  

September 03, 2008

HSC-SPH-08-0360 - Self Esteem, Self-Efficacy, Hope, Health Promoting Behaviors and Insulin Resistance in Mexican American Adolescents

PROVISIONS: This approval relates to the research to be conducted under the above referenced title and/or to any associated materials considered at this meeting, e.g. study documents, informed consent, etc.

NOTE: If this study meets the federal registration requirements and this is an investigator-initiated study, or if the PI is the study sponsor or holds the IND/IDE applicable to this study, and no one else has registered this trial on the national registry, you are required to register at https://register.clinicaltrials.gov/ before enrollment or no later than 21 days after the first patient is enrolled. For website access and further information visit http://www.uth.tmc.edu/research/clinicalregistration.htm or contact Gena Monroe at 713.500.7903.

APPROVED:  

At a Convened Meeting on 08/01/2008

EXPIRATION DATE: 07/31/2009

CHAIRPERSON: Richard Kireelde, PhD

Subject to any provisions noted above, you may now begin this research.

CHANGES: The principal investigator (PI) must receive approval from the CPHS before initiating any changes, including those required by the sponsor, which would affect human subjects, e.g. changes in methods or procedures, numbers or kinds of human subjects, or revisions to the informed consent document or procedures. The addition of co-investigators must also receive approval from the CPHS. ALL PROTOCOL REVISIONS MUST BE SUBMITTED TO THE SPONSOR OF THE RESEARCH.

INFORMED CONSENT: Informed consent must be obtained by the PI or designee(s), using the format and procedures approved by the CPHS. The PI is responsible to instruct the designee in the methods approved by the CPHS for the consent process. The individual obtaining informed consent must also sign the consent document. Please note that only copies of the stamped approved informed consent form can be used when obtaining consent.

UNANTICIPATED RISK OR HARM, OR ADVERSE DRUG REACTIONS: The PI will immediately inform the CPHS of any unanticipated problems involving risks to subjects or others, of any serious harm to subjects, and of any adverse drug reactions.

RECORDS: The PI will maintain adequate records, including signed consent documents if required, in a manner that ensures subject confidentiality.
Dear Participant

You are receiving this letter because you have participated in a research study conducted by the University of Texas Health Science Center—School of Public Health—Brownsville Regional Campus. At the time of that study you told us that we could contact you again for future studies. We currently have a study that I would like to tell you about.

This study is being conducted by Anne Rentfro, MSN, RN who is a doctoral student at the University of Arizona in Tucson, Arizona. Her study is about health promoting behaviors and insulin resistance. Her study will include only males and non-pregnant females who are overweight.

She would like to invite your child (under 18 years)/you (18 to 19 years old) to take part in this study he/she is an overweight and a male or non-pregnant female adolescent. Please contact Anne Rentfro if you/your child are interested in participating. She can be contacted by telephone (956) 346 6411 or by email at arentfro@nursing.arizona.edu. I will also be calling you in about a week to see if your child or you are interested.

If you permit your child or if you choose to take part in the study your participation is voluntary. The purpose of the project is to describe relationships among health promoting behaviors and insulin resistance in healthy Mexican American adolescents who live near the border between Texas and Mexico. Because diabetes is common in Mexican Americans and insulin resistance is considered a sign that diabetes may develop, knowing how health promoting behaviors are connected to insulin resistance may help to develop future prevention techniques.

If your child is interested in participating, Anne Rentfro will explain the study in more detail so you and your child can decide.

If you agree to take part you will be invited to the research clinic located at The University of Texas Health Science Center Brownsville Campus Clinical Research Center on Jefferson Road next to Valley Baptist Medical Center. All of the tests and examinations will be carried out by trained personnel. The investigator will maintain confidentiality of your information.

I hope you will consider permitting your child to participate in this study. I look forward to talking to you about it. I will be calling your house in about 1 week from when I sent the letters through the mail.

Sincerely,

Dr. Susan Fisher-Hoch
Querido participante:

Usted ha recibido esta carta debido a que participo en un estudio de investigación llevado a cabo por la Universidad de Texas Centro de Ciencias de la Salud - Escuela de Salud Pública – Campo Regional en Brownsville. En el momento de ese estudio usted nos dejó saber que podíamos contactarlo otra vez para estudios futuros. Actualmente nosotros tenemos un estudio del cual me gustaría platicarle.

Este estudio está siendo llevado a cabo por la enfermera registrada y con maestría Anne Renfro, quien es estudiante de doctorado en la Universidad de Arizona en Tucson. El estudio es acerca de Promover Comportamiento Saludable y Resistencia a la Insulina. Su estudio incluirá solo personas con sobrepeso, hombres y mujeres que no estén embarazadas.

A ella le gustaría invitar a su hijo(a) (entre 15 y 19 años) o a usted si cuenta con esta edad a tomar parte en este estudio. Si usted o su hijo(a) es un adolecente con sobrepeso y no está embarazada, por favor contacte a Anne Renfro. Si usted está interesado(a) en participar o en que su hijo(a) participe o si su hijo(a) desea participar en el estudio, Anne Renfro puede ser contactada por teléfono al (956) 982 24 29 o por correo electrónico a arenfro@nursing.arizona.edu. También yo le hablare por teléfono a usted en aproximadamente una semana para ver si usted o su hijo(a) está interesado(a).

Si usted permite que su hijo(a) o usted elige tomar parte en este estudio, su participación es voluntaria. El propósito del proyecto es para describir la relación entre promover comportamiento saludable y resistencia a la insulina en adolescentes mexicanoamericanos saludables quienes viven cerca de la frontera entre Texas y México. Porque diabetes es común en mexicanoamericanos y la resistencia a la insulina es un signo que la diabetes podría desarrollarse, conociendo como promoviendo comportamientos saludables están conectados con la resistencia a la insulina podría ayudar a desarrollar técnicas futuras de prevención.

Si su hijo(a) está interesado en participar, Anne Renfro le explicara el estudio en más detalle de manera que usted o su hijo(a) puedan decidir.

Si usted o su hijo(a) está de acuerdo a tomar parte se le invitará al Centro de Investigación de Salud Hispana clínica localizada en el 800 W Jefferson St. Suite 230 enseguida del Centro Médico Bautista. Todas las pruebas y exámenes serán llevados a cabo por personal entrenado. El investigador mantendrá su información confidencial.

Ojalá que considere permitirle a su hijo(a) que participe en este estudio. Espero con ansia para hablar con usted al respecto. Le hablare a su casa en aproximadamente una semana, a partir de la fecha en la que envíe la carta por correo.

Sinceramente,

Dra. Susan Fisher-Hoch
APPENDIX D: STUDY PROTOCOL
# Protocol # HSC-SPH-08-0360
## Health Promoting Behaviors and Insulin Resistance
### Recruitment Procedures

<table>
<thead>
<tr>
<th>Step</th>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Extract data from all Households that enumerate adolescents who are in age range depicted by the inclusion criteria (&gt;15 to &lt;19).</td>
</tr>
<tr>
<td>2.</td>
<td>Randomly select 200 of these households</td>
</tr>
<tr>
<td>3.</td>
<td>Send recruitment letter to these 200 households</td>
</tr>
<tr>
<td>4.</td>
<td>Wait 10 days to 2 weeks</td>
</tr>
<tr>
<td>5.</td>
<td>Begin making recruitment phone calls</td>
</tr>
<tr>
<td>6.</td>
<td>PI and Nurse data collector begin to make recruitment contact list</td>
</tr>
<tr>
<td>7.</td>
<td>PI and Nurse data collector begin to make appointments</td>
</tr>
<tr>
<td>8.</td>
<td>Close coordination with Blanca Ortiz until recruitment &amp; data collected on 45 subjects is attained.</td>
</tr>
</tbody>
</table>

### Data Collection Procedures:

<table>
<thead>
<tr>
<th>Step</th>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Begin the consent process</td>
</tr>
<tr>
<td>2.</td>
<td>Obtain and document written consent</td>
</tr>
<tr>
<td>3.</td>
<td>Assure that the participant is fasting for 10 or more hours</td>
</tr>
<tr>
<td>4.</td>
<td>Ask screening questions</td>
</tr>
<tr>
<td>5.</td>
<td>Provide community referral information for participants who answer “yes” to the pregnancy question</td>
</tr>
<tr>
<td>6.</td>
<td>Continue study if participant responds “no” to the pregnancy question.</td>
</tr>
<tr>
<td>7.</td>
<td>Obtain Height, Weight Waist Circumference</td>
</tr>
<tr>
<td>8.</td>
<td>Determine BMI percentile</td>
</tr>
<tr>
<td>9.</td>
<td>Provide BMI percentile and community referral information for participants who have BMI &lt; 85th percentile</td>
</tr>
<tr>
<td>10.</td>
<td>Continue study if participant is &gt; 85th percentile</td>
</tr>
<tr>
<td>11.</td>
<td>Obtain specimen (2 EDTA tubes)</td>
</tr>
<tr>
<td>12.</td>
<td>Obtain glucose result with Glucose Stat machine</td>
</tr>
<tr>
<td>13.</td>
<td>Record glucose on laboratory form</td>
</tr>
<tr>
<td>14.</td>
<td>Centrifuge specimens at 4 degrees centigrade for 15 minutes</td>
</tr>
<tr>
<td>15.</td>
<td>Prepare aliquots of plasma/red cells/serum</td>
</tr>
<tr>
<td>16.</td>
<td>Provide snack</td>
</tr>
<tr>
<td>17.</td>
<td>Provide quiet place with a desk and pencils to complete the study instruments</td>
</tr>
<tr>
<td>18.</td>
<td>Provide information about glucose and anthropometric measures</td>
</tr>
<tr>
<td>19.</td>
<td>Provide information about community referral information</td>
</tr>
<tr>
<td>20.</td>
<td>Provide the incentive gift card and study contact information</td>
</tr>
</tbody>
</table>

### Data Entry Protocols

1. Data will be entered by A and B entry system persons (Anne-A) (Julie-B) 
2. Use caps locks and no spaces for phone numbers 
3. When entering numbers, such as age or years of education, enter whole numbers 
4. For grade in college ask college 1 year, 2 year, and so on
5. Enter new addresses only for those cohort households that have moved
6. Can leave in/out in key information blank
7. If not from cohort leave household key blank; fill in with demographic information
8. Order of entry is household data, anthropometrics, lab, case report forms
9. Case report format is closely followed enter numbers circled
10. For data on who participant lives with enter 1 if live with 0 if not
11. If the case report form does not have numbered answers, number them from left to right 1, 2, 3, 4, 5
12. For the ladder, number from bottom to top 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
13. Generally 1 is yes and 2 is no
14. Save all data in computer and back up data set name

PROTOCOL # HSC-SPH-08-0360
HEALTH PROMOTING BEHAVIORS AND INSULIN RESISTANCE

Inclusion Criteria:
- Mexican American
- Age 15-19 years
- Able to read and write in English
- Body Mass Index (BMI) 85%
- Wants to participate

Exclusion Criteria: These must all be answered all NO!
- Pregnant
- BMI less than 85%
- Unable to read/write English
- Does not want to participate

PI/nurse Signature Date
APPENDIX E: CONSENT DOCUMENTS
PARTICIPANT CONSENT FORM

Project Title: HEALTH PROMOTING BEHAVIORS AND INSULIN RESISTANCE
HSC-SPH-08-0360
You are being invited to take part in a study called "Health Promoting Behaviors and Insulin Resistance" being conducted by Anne Rentfro, MSN, RN. Your decision to take part is voluntary and you may refuse to take part, or choose to stop taking part, at any time. A decision not to take part or to stop being a part of the research project will not change the services that are available to you from Anne Rentfro or the research staff (physician, hospital, service agency, etc.) or (your grades, employment

PURPOSE
You are being invited to take part in the Health Promoting Behaviors and Insulin Resistance research project. The purpose of this project is to describe health promoting behaviors and insulin resistance in healthy Mexican American adolescents who live near the Texas Mexico border. Because diabetes is common in Mexican Americans and insulin resistance is considered a sign that diabetes may develop, knowing how health promoting behaviors are connected to insulin resistance may help to develop prevent diabetes.

SELECTION CRITERIA
Ms. Rentfro or research staff will discuss the requirements for taking part in this study with you. To be able to take part you must be: 1) of Mexican heritage, 2) between 15 and 19 years of age, 3) able to speak, read and write English, 4), have a Body Mass Index of greater than the 85th percentile (determined by your height and weight), and 5) be willing and able to take part in the study. You will not be able to take part if you cannot read and write English. If you tell us you are pregnant at the time of the study, you will not be able to take part. A total of 45 individuals will be enrolled in this study.

PROCEDURE(S)
The following information describes what will happen if you choose to take part in this study, which will take about 1 ½ hours of your time. If you agree to take part, you will be invited to the research clinic located at Valley Baptist Medical Center-Brownsville in the Edelstein Office building on Jefferson Road. You can complete the study procedures in your home if you prefer.

On the day of the appointment, you will come to the clinic after fasting for 10 hours (nothing to eat or drink except water). You will be asked if you are pregnant. Your parent or guardian will know that we are asking you this question if you are less than 18 years old. If you tell us you are pregnant, we will provide you with information about community resources and you will not complete the rest of the study. A trained person will measure your height, weight and waist

Version Date: December 9, 2008
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circumference. You will take your shoes off before you stand still on the scale to be weighed. You will be asked to hold your breath and look straight ahead while you are measured for how tall you are. You will also be measured around your body at the waistline. If your weight is in the normal range, you will not complete the rest of the study. If you are not able to take part in the study, you will be given a snack of crackers and juice and thanked for your time. This part of the study will take about 10 minutes. If you are able to take part, a trained person will take a blood specimen (about 4 teaspoons). After your blood is drawn, you will receive a snack of some crackers, cheese and juice. This part of the study will take about 15 minutes. Some of the blood will be used to measure blood sugar and insulin and the rest will be saved for future studies about insulin resistance and diabetes. No samples will be used for genetic testing for this study. No stored samples from this study will be released in the future for genetic studies.

After your blood is drawn and you are measured, you will be asked to answer some written questions about yourself and the way you take care of your health. There will be about 120 short questions to answer. This part of the study will take about 45 minutes to 1 hour.

After you finish answering the questions, you will receive written results of your measurements. These results and the results of the blood sugar and insulin tests will be sent to you and your doctor if you choose. If the tests and examinations are not normal, you will be provided with information and resources in the community that are available to you.

**TIME COMMITMENT**
The time you spend with the study will take about 1 to 2 hours.

**KNOWN RISKS**
Trained personnel will perform the tests and exams. The risk from having your blood drawn is small. Taking blood is a common procedure that may cause some discomfort. You may experience some discomfort when the blood is taken. A small black and blue spot may develop where the needle went through your skin. If this happens, it will usually go away in 2 or 3 days. Rarely, complications such as bleeding or infection may occur. Some of the study questions are about your feelings and you may feel uncomfortable about answering them. You may choose not to answer any of the questions.

**BENEFITS**
There is no direct benefit to you for taking part in this study. By taking part, you may help the researcher better understand insulin resistance and prevention of diabetes. There may be a benefit to society from the results of this study.

**CONFIDENTIALITY**
All study information is coded and personal identifying information is maintained in locked cabinets in a locked room away from any other records including your medical record. Please understand that representatives of the Committee for the Protection of Human Subjects and the
sponsors of this research may review your research records for the purposes of verifying research data, and will see personal identifiers. However, identifying information will not appear on records retained by the sponsor. The blood samples kept for future studies will remain confidential and you will not be personally identified on any blood samples. These blood samples will remain in storage indefinitely at the laboratory at the Brownsville Regional Campus of the University of Texas Health Science Center at Houston. Anne Rentfro does not own these samples. Anne Rentfro will be responsible for maintaining confidentiality of the information you provide and for the care and release of any blood samples or information. You will not be personally identified in any reports or publications that may result from this study.

STUDY WITHDRAWAL:
Continuing to take part in this study is completely voluntary. You may choose not to continue in this study or leave this study at any time. You may ask to have your blood samples destroyed if you leave the study and any information and/or the blood samples will be destroyed if you direct us to do that. You will be treated the same no matter what you decide.

COSTS, REIMBURSEMENT, AND COMPENSATION
There is no cost to you for taking part except your time. You will receive a $10.00 gift card for taking part if you are included in the study. You will also receive your height, weight, waist circumference and blood test results if you are included in the study. You will not receive any economic gain from taking part in this study. If you receive a bill that you believe is related to your taking part in this research study, please contact Anne Rentfro, MSN, RN at (956) 346-6411 with questions.

QUESTIONS
You can obtain further information or make a complaint about the research by calling the Principal Investigator Anne Rentfro, MSN, RN at (956) 346-6411. Anne Rentfro is the person who is conducting this study as part of her doctoral studies from the University of Arizona in Tucson. If you have questions, complaints, or concerns about the research and cannot reach the Principal Investigator, or want to talk to someone other than the Investigator, you may call the University of Arizona Human Subjects Protection Program office at (520) 626-6721. (If out of state, use the toll-free number 1-866-278-1455.) If you would like to contact the Human Subjects Protection Program using the Internet, please visit the following website http://www.irb.arizona.edu/contact/.

IN CASE OF INJURY
If you suffer any injury because of taking part in this research study, please understand that nothing has been arranged to provide free treatment of the injury or any other type of payment. However, all needed facilities, emergency treatment and professional services will be available to you, just as they are to the community in general. You should report any injury to Anne Rentfro, MSN, RN, at (956) 346-6411 and to the Committee for the Protection of Human Subjects at (713) 500-7943. You will not give up any of your legal rights by signing this consent form.

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SIGNATURES:
Before giving my consent by signing this form, the methods, inconveniences, risks, and benefits have been explained to me and my questions have been answered. I may ask questions at any time and I am free to withdraw from the project at any time without causing bad feelings. The investigator may end my participation in this project for reasons that would be explained. New information developed during the course of this study, which may affect my willingness to continue in this research project, will be given to me as it becomes available. This consent form will be filed in an area designated by the Human Subjects Protection Program with access restricted by the principal investigator, Anne Rentfro, MSN, RN at (956) 346-6411. I do not give up any of my legal rights by signing this form. A copy of this signed consent form will be given to me.

______________________________
Printed Name of Subject

______________________________  __________________________
Subject Signature   Date/Time

INVESTIGATOR'S AFFIDAVIT:
Either I have or my agent has carefully explained to the subject the nature of the above project. I hereby certify that to the best of my knowledge the person who signed this consent form was informed of the nature, demands, benefits, and risks involved in his/her participation.

______________________________
Printed Name of Person Obtaining Consent

______________________________  __________________________
Signature of Person Obtaining Consent   Date/Time

CPHS Statement:
This study (HSC-SPH-08-0360) has been reviewed by the Committee for the Protection of Human Subjects (CPHS) of the University of Texas Health Science Center at Houston. For any questions about research subject's rights, or to report a research-related injury, call the CPHS at (713) 500-7943.

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PARENT/LEGAL GUARDIAN PERMISSION FORM

Project Title: HEALTH PROMOTING BEHAVIORS AND INSULIN RESISTANCE
HSC-SPH-08-0360

You are being asked to read this paper to inform you about a study called "Health Promoting Behaviors and Insulin Resistance" being conducted by Anne Rentfro, MSN, RN to help you decide if you will permit your child to take part. Your decision to allow your child to take part is voluntary. If you sign this form, you are telling us that you are informed and give your permission. Federal regulations require written informed consent so that you can know the risks of your child’s participation and can allow him/her to participate or not participate in a free and informed manner. Your decision to allow your child to take part is voluntary and you may refuse to allow your child to take part, or choose to stop them from taking part, at any time. A decision not to allow your child to take part or to stop being a part of the research project will not change the services that are available to your child from Anne Rentfro or the research staff (physician, hospital, service agency, etc.) or your child’s grades or employment.

PURPOSE
Your child is being invited to take part in the Health Promoting Behaviors and Insulin Resistance research project. The purpose of this project is to describe health promoting behaviors and insulin resistance in healthy Mexican American adolescents who live near the Texas-Mexico border. Because diabetes is common in Mexican Americans and insulin resistance is considered a sign that diabetes may develop, knowing how health promoting behaviors are connected to insulin resistance may help to prevent diabetes.

SELECTION CRITERIA
Ms. Rentfro or research staff will discuss the requirements for taking part in this study with you and your child. To be eligible to take part, your child must be: 1) of Mexican heritage, 2) between 15 and 19 years of age, 3) able to speak, read and write English, 4) have a Body Mass Index of greater than the 85th percentile (determined by measuring height and weight) and 5) be willing and able to participate in the study. Your child will not be able to take part if he/she cannot read and write English. We will be asking the female participants if they are pregnant. If your daughter tells us she is pregnant she will not able to take part in the study, but we will provide her with information about community resources for her care. A total of 45 individuals will be enrolled in this study.

PROCEDURE(S)
The following information describes what will happen if your child chooses to take part in this study, which will take about 1 ½ hours of your child’s time. If your child agrees to take part, he/she will be invited to the research clinic located at Valley Baptist Medical Center-Brownsville in the Edelstein Office building on Jefferson Road. We can also complete the study procedures in your home if you or your child prefers.

On the day of the appointment, your child will come to the clinic after fasting for 10 hours (nothing to eat or drink except water). If your child is female, she will be asked if she is...
pregnant. Your child knows that we will be asking this question and that you know about the question. If your daughter tells us she is pregnant, we will provide her with information about community resources and she will not complete the rest of the study. A trained person will measure your child’s height, weight and waist circumference. Your child will be asked to take off his/her shoes and stand still on the scale to be weighed. To measure height, your child will be asked to hold his/her breath and look straight ahead while being measured for how tall he/she is. Your child will also be measured around his/her body at the waistline. Based on these measures your child will either continue in the study or be finished. If your child is not eligible to participate in the study, he/she will be given a snack of crackers and juice and thanked for his/her time. This part of the study will take about 10 minutes. If your child is eligible to participate, a trained person will take a blood specimen (about 4 teaspoons of blood). After your child’s blood is drawn, he/she will receive a snack of some crackers, cheese and juice. This will require an additional 15 minutes. Some of the blood will be used to measure blood sugar and insulin and the rest will be saved for future studies about insulin resistance and diabetes. No samples will be used for genetic testing for this study. No stored samples from this study will be released in the future for genetic studies.

After your child’s blood is drawn and he/she is measured, he/she will be asked to answer some written questions about the way he/she takes care of his/her health. There will be about 120 short questions to answer. This part of the study will take about 45 minutes to 1 hour.

After your child finishes answering the questions, he/she will receive written results of the measurements. These results and the results of the blood sugar and insulin tests will be sent to you and your child’s doctor if your child chooses. If the tests and exams are not normal, you and your child will be provided with information and resources in the community that are available.

TIME COMMITMENT
The time your child will spend with the study will take about 1 to 2 hours.

KNOWN RISKS
Trained personnel will perform all of the tests and examinations out. The risk from having blood drawn is small. Taking blood is a common procedure that may cause some discomfort. Your child may experience some discomfort when the blood is taken. A small black and blue spot may develop where the needle went through your child’s skin. If this happens, it will usually go away in 2 or 3 days. Rarely, complications such as bleeding or infection may occur. Some of the study questions are about feelings and your child may feel uncomfortable about answering them. You child may choose not to answer any of the questions.

BENEFITS
There is no direct benefit to you or your child for taking part in this study. By taking part, your child may help the researcher better understand insulin resistance and prevention of diabetes. There may be a benefit to society from the results of this study.

CONFIDENTIALITY
All study information is coded and personal identifying information is maintained in locked cabinets in a locked room away from any other records including your child’s medical record.
Please understand that representatives of the Committee for the Protection of Human Subjects and the sponsor of this research may review your child’s research records for the purposes of verifying research data, and will see personal identifiers. However, identifying information will not appear on records retained by the sponsor. The blood samples saved for future studies will remain confidential and your child will not be personally identified on the samples. These blood samples will remain in storage indefinitely at the laboratory at the Brownsville Regional Campus of the University of Texas Health Science Center at Houston. Anne Rentfro does not own these samples. Anne Rentfro will be responsible for maintaining confidentiality of the information your child provides and for the care and release of any blood samples or information. Your child will not be personally identified in any reports or publications that may result from this study.

STUDY WITHDRAWAL:
Continuing to take part in this study is completely voluntary. You may choose not to allow your child to continue in this study or remove them from this study at any time. Your child may ask to have his/her blood samples destroyed if he/she leaves the study and any information and/or the blood samples will be destroyed if your child directs us to do that. Your child will be treated the same no matter what you decide.

COSTS, REIMBURSEMENT, AND COMPENSATION
There is no cost to you or your child for participating except for the time. Your child will receive a $10.00 gift card for participating if he/she is included in the study. Your child will also receive his/her height, weight, waist circumference and blood test results if he/she is included in this study. You and your child will not receive any economic gain from taking part in this study. If you or your child receives a bill that you believe is related to your taking part in this research study, please contact Anne Rentfro, MSN, RN at (956) 346-6411 with questions.

QUESTIONS
You can obtain more information or make a complaint about the research by calling the Principal Investigator Anne Rentfro, MSN, RN at (956) 346-6411. Anne Rentfro is the person who is conducting this study as part of her doctoral studies from the University of Arizona in Tucson. If you have questions, complaints, or concerns about the research and cannot reach Anne Rentfro (the Principal Investigator), or want to talk to someone other than the investigator, you may call the University of Arizona Human Subjects Protection Program office at (520) 626-6721. (If out of state, use the toll-free number 1-866-278-1455.) If you would like to contact the Human Subjects Protection Program using the Internet, please use following website http://www.irb.arizona.edu/contact/.

IN CASE OF INJURY
If your child suffers any injury because of taking part in this research study, please understand that nothing has been arranged to provide free treatment of the injury or any other type of payment. However, all needed facilities, emergency treatment and professional services will be available to your child, just as they are to the community in general. You should report any injury your child experiences to Anne Rentfro, MSN, RN at (956) 346-6411 and to the Committee for the Protection of Human Subjects at (713) 500-7943. You and your child will not give up any of your legal rights by signing this consent form.
SIGNATURES:
Before giving my consent by signing this form, the methods, inconveniences, risks, and benefits have been explained to me and my questions have been answered. I may ask questions at any time and I am free to withdraw my child from the project at any time without causing bad feelings or affecting his/her medical care. The investigator may end my child’s participation in this project for reasons that would be explained. New information developed during the course of this study which may affect either my willingness or that of my child to continue in this research project will be given to me as it becomes available. This consent form will be filed in an area designated by the Human Subjects Protection Program with access restricted by the principal investigator, Anne Rentro, MSN, RN at (956) 346-6411. I do not give up any of my legal rights or the legal rights of my child by signing this form. A copy of this signed consent form will be given to me.

Printed Name of Subject

Printed Name of Parent/Legal Guardian

Parent/Legal Guardian Signature  Date/Time

INVESTIGATOR’S AFFIDAVIT:
Either I have or my agent has carefully explained to the parent/legal guardian of the subject the nature of the above project. I hereby certify that to the best of my knowledge the person who signed this consent form was informed of the nature, demands, benefits, and risks involved in his/her child’s participation.

Printed Name of Person Obtaining Consent

Signature of Person Obtaining Consent  Date/Time

CPHS Statement:
This study (HSC-SPH-08-0360) has been reviewed by the Committee for the Protection of Human Subjects (CPHS) of the University of Texas Health Science Center at Houston. For any questions about research subject’s rights, or to report a research-related injury, call the CPHS at (713) 500-7942.

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FORMA DE CONSENTIMIENTO PARA PARTICIPANTES

Título del proyecto: PROMOVIEDO COMPORNTAMIENTO SALUDABLE Y RESISTENCIA A LA INSULINA

Se le ha invitado a tomar parte en un estudio llamado "Promoviendo Comportamiento Saludable y Resistencia a la Insulina" que es llevado a cabo por Ann Rentfro, MSN, RN. Su decisión de participar es voluntaria y puede rehusarse o detener su participación en cualquier momento. Su decisión de no participar o detener su participación en este proyecto de investigación no cambiará; los servicios que están disponibles para usted de parte de Anne Rentfro o del personal de la investigación (doctores, hospitales, agencias de servicios, etc.); o sus calificaciones; ni su empleo.

PROPOSITO

Usted ha sido invitado(a) a participar voluntariamente en el proyecto de investigación Promoviendo Comportamiento Saludable y Resistencia a la Insulina. El propósito de este estudio es describir la relación entre promover comportamiento saludable y la resistencia a la insulina en adolescentes mexicanoamericanos saludables quienes viven cerca de la frontera entre Texas y México. Debido a que la diabetes es común en mexicanoamericanos, y la resistencia a la insulina es considerada un indicador que se podría desarrollar diabetes, conociendo el cómo promover comportamientos saludables está conectado con la resistencia a la insulina, podría ayudar a avanzar en cuanto a la prevención de la diabetes.

CRITERIO DE SELECCIÓN

El investigador principal hablará con usted acerca de los requerimientos para la participación en este estudio. Para ser elegible para participar, deberá de: 1) ser de origen mexicano, 2) tener entre 15 y 19 años de edad, 3) ser capaz de hablar, leer y escribir en inglés, 4) tener una masa corporal no más del 85%(determinado por la altura y el peso), y 5) y que pueda y esté dispuesto(a) a participar en el estudio. No podrá participar en el estudio si no es capaz de leer y escribir en inglés. Si nos dice que está embarazada al tiempo del estudio no podrá participar en el estudio. Un total de 45 individuos serán registrados en este estudio.

PROCEDIMIENTO(S)

La siguiente información describe lo que pasará si decide participar en este estudio, el cual tomará alrededor de 1½ hora de su tiempo. Si acede a participar será invitado(a) a la clínica de investigación ubicada en el Centro Médico Bautista del Valle en Brownsville en el edificio Edelstein sobre la calle Jefferson. También podríamos llevar a cabo los procedimientos del estudio en su casa si usted así lo prefiere.

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IRB NUMBER: HSC-SPH-08-0260
IRB APPROVAL DATE: 12/10/2008
IRB EXPIRATION DATE: 7/31/2009

USB/CRS IRB
2008-026-IRB Rentfro
Approval Date:07/09/2008
Expiration Date:07/01/2009
En el día de la cita tendrá que venir a la clínica después de haber ayunado por 10 horas (rueda de comer o de beber excepto agua). Si usted es mujer, se le preguntará si está embarazada. Su padre, o madre, o guardián sabrán que le haremos esta pregunta si es usted menor de 18 años de edad.

Si nos dice que está embarazada le proveeremos información acerca de recursos en la comunidad y no completará el resto del estudio. Una persona capacitada tomará la medida de su altura, el peso y la medida de la cintura. Se quitará los zapatos antes de que se ponga de pie, y sin moverse, sobre la balanza para ser pesado(a). Se le pedirá que detergae la respiración y que vue de frente derecho mientras se toma la medida para saber que tan alto(a) es. También se le medirá alrededor de su cuerpo a la altura de la cintura. Si su peso está en el rango normal no completará el resto del estudio. Si no puede participar en el estudio, le daríamos un bocadillo, galletas, jugo, y le agradeceríamos por su tiempo. Esta parte del estudio tomará alrededor de 10 minutos. Si puede participar, una persona capacitada obtendrá una muestra de sangre (alrededor de 4 cucharaditas de sangre). Después de sacarle la sangre, recibirá un bocadillo de galletas, quesos y jugo. Esto requerirá de 15 minutos adicionales. Alguna porción de su sangre será usada para medir los niveles de azúcar e insulina y el resto de la sangre será almacenada para estudios futuros como la resistencia a la insulina y diabetes. En este estudio sus muestras de sangre no serán usadas para exámenes genéticos. Así mismo sus muestras de sangre almacenadas no serán liberadas en el futuro para exámenes genéticos.

Después de que se obtuva la muestra de sangre y se le tomaron las medidas, se le pedirá que responda unas preguntas escritas acerca de la manera en que toma cuidado de su salud. Habrá alrededor de 120 preguntas cortas para responder. Esta parte del estudio tomará alrededor de 45 minutos a 1 hora.

Después de que termine de responder las preguntas, recibirá por escrito los resultados de las medidas. Estos resultados y los resultados de azúcar en la sangre y las pruebas de insulina serán enviados a usted y a su doctor si usted lo decide. Si los resultados de los exámenes no son normales se le proveerá información y recursos que están disponibles para usted en la comunidad.

**TIEMPO COMPROMETIDO**

El tiempo que toma el estudio es alrededor de 1 a 2 horas.

**RIESGOS CONOCIDOS**

Personal capacitado llevará a cabo todas las pruebas y exámenes. El riesgo de obtener la sangre es pequeño. Sacar sangre es un procedimiento de rutina que puede causar un poco de malestar. Usted podría sentir este malestar al momento de obtener la muestra de sangre. Una pequeña

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mancha negra y azul podría aparecer en su piel en el lugar en donde la aguja entró. Si esto sucede, usualmente desaparecerá en 2 o 3 días. Raramente, complicaciones como sangrado o infección podrían ocurrir. Algunas de las preguntas en el estudio son acerca de sus sentimientos y podría sentirse incómodo(a) al responderlas. Usted podría no responder cualquiera de las preguntas.

**BENEFICIOS**

No hay un beneficio directo por su participación en este estudio. Por tomar parte podría ayudar a los investigadores a entender mejor la resistencia a la insulina y prevención de diabetes. Podría haber un beneficio para la sociedad de los resultados de este estudio.

**CONFIDENCIALIDAD**

Toda la información de este estudio es codificada e información personal es mantenida en gabinetes bajo llave en un cuarto también bajo llave, separada de los demás expedientes. Por favor entienda que representantes del Comité para la Protección de los Sujetos Humanos y el patrocinador de este estudio podría revisar sus expedientes en la investigación con el propósito de verificar datos de investigación, y podrían ver identificadores personales. Sin embargo, información que lo pueda identificar no aparecerá en los expedientes que podría retener el patrocinador. Su muestra de sangre almacenadas para estudios futuros permanecerá confidencial y usted no será personalmente identificado(a). Estas muestras de sangre se quedarán almacenadas por tiempo indefinido en el laboratorio del Campo Regional de Brownsville de la Universidad de Texas Centro de Ciencias de la Salud en Houston. Anne Rentfro no es la propietaria de estas muestras. Anne Rentfro será responsable de mantener confidencialmente su información así como del cuidado y liberación de cualquier muestra de sangre o información. Usted no será personalmente identificado(a) en ninguno de los reportes o publicaciones que pudieran resultar de este estudio.

**RETIRADA DEL ESTUDIO:**

El continuar participando en este estudio es completamente voluntario. Usted podría decidir no continuar participando en este estudio o dejar de hacerlo en cualquier momento. Usted podrá solicitar que sus muestras de sangre sean destruidas si deja el estudio y cualquier información y/o las muestras de sangre serán destruidas si usted así lo requiere. Sería tratado de la misma manera no importa lo que decida.

**COSTOS, REEMBOLSO, Y COMPENSACIÓN**

No existe costo para usted por participar excepto por su tiempo. Usted recibirá un certificado de regalo de $10.00 por participar si es incluido(a) en el estudio. También recibirá los resultados de

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su altura, peso, circunferencia de la cintura y resultados de la sangre, si es usted incluido(a) en este estudio. No recibirá ninguna compensación económica por tomar parte en este estudio. Si recibe algún cobro que usted cree es relacionado con el tomar parte en este estudio, por favor contacte y refiera sus preguntas a Anne Rentfro, MSN, RN al (956) 346-6411

PREGUNTAS
Más adelante usted podría obtener información acerca de la investigación o si tiene inquietudes o quejas acerca de la investigación llamando al Investigador Principal Anne Rentfro, MSN, RN, quien es una candidata a doctorado al (956) 346-6411. Anne Rentfro es la persona que está dirigiendo este proyecto como parte de sus estudios de doctorado de la Universidad de Arizona en Tucson. Si usted tiene preguntas concernientes a sus derechos como participante en una investigación, quejas o inquietudes acerca de la investigación y no puede localizar al Investigador Principal, o quiere hablar con alguien más que no sea el Investigador, usted podría llamar a la oficina del Programa de Protección de los Sujetos Humanos de la Universidad de Arizona al (520) 626-6721 (si esta fuera del estado llame al número gratuito 1-866-278-1455.) Si prefiere contactar al Programa de Protección de los Sujetos Humanos a través de su sitio de Internet, favor de visitar la siguiente página: http://www.irm.arizona.edu/contact/

EN CASO DE UNA LESIÓN
Si usted sufre cualquier lesión como resultado de su participación en este estudio, por favor entienda que no se han hecho arreglos para proveer tratamiento gratuito por la herida o ningún otro tipo de pago. Sin embargo, todas las instalaciones necesarias, tratamiento de emergencia y servicios profesionales estarán disponibles para usted, como lo están para la comunidad en general. Usted debe de reportar cualquier lesión a Anne Rentfro, MSN, RN, al (956) 346-6411 y al Comité para la Protección de los Sujetos Humanos al (713) 500-7943. Usted no está renunciando a ninguno de sus derechos legales al firmar esta forma de consentimiento.

FIRMA
Antes de dar mi consentimiento firmando esta forma, los métodos, inconvenientes, riesgos y beneficios me han sido explicados y mis preguntas han tenido respuesta. Puedo hacer preguntas en cualquier momento y tengo la libertad de retirarme del proyecto cuando lo desee sin causar mayores entendidos o afectando mi cuidado médico. El investigador podría dar por terminada mi participación en este proyecto por razones que me serían explicadas. La información nueva que se desarrolla durante el transcurso de este estudio que podría afectar, ya sea mi buena voluntad o que pueda continuar en este proyecto de investigación, se me dará a conocer tan pronto como sea posible. Esta forma de consentimiento se resguardará en un área designada por el Programa de Protección de los Sujetos Humanos con acceso restringido por el investigador principal, Anne

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Rentfro, MSN, RN al (956) 346-6411. Al firmar esta forma yo no renuncio a ninguno de mis derechos legales. Se me proporcionará una copia del consentimiento firmado.

Nombre del Participante en letra de molde

Firma del Participante

Fecha/Hora

DECLARACIÓN DEL INVESTIGADOR

Ya sea yo o mi agente le hemos explicado con detalle al sujeto la naturaleza del proyecto arriba mencionado. Mediante la presente certifico que, a mi leal saber y entender, la persona que firmó esta forma de consentimiento estaba informado(a) de la naturaleza, demandas, beneficios y riesgos involucrados en su participación.

Nombre de la Persona que obtiene el consentimiento
(En letra de molde)

Firma de la Persona que obtiene el consentimiento

Fecha/Hora

Declaración de CPHS:

Este estudio (HSC-SPH-08-0360) ha sido revisado por el Comité para la Protección de los Sujetos Humanos (CPHS) del Centro de Ciencias de Salud de la Universidad de Texas en Houston. Para cualquier pregunta acerca de los derechos de los sujetos de investigación, o para reportar lesiones relacionadas con la investigación, llame a CPHS al (713) 500-7943.
FORMA DE CONSENTIMIENTO PARA PARTICIPANTES

Título del proyecto: PROMOVIENTO COMPORTAMIENTO SALUDABLE Y RESISTENCIA A LA INSULINA

Se le ha invitado a tomar parte en un estudio llamado “Promoviendo Comportamiento Saludable y Resistencia a la Insulina” que es llevado a cabo por Ann Rentfro, MSN, RN. Su decisión de participar es voluntaria y puede rehusarse o detener su participación en cualquier momento. Su decisión de no participar o detener su participación en este proyecto de investigación no cambiará; los servicios que están disponibles para usted de parte de Anne Rentfro o del personal de la investigación (doctores, hospitales, agencias de servicios, etc.); o sus calificaciones; ni su empleo.

PROPOSITO

Usted ha sido invitado(a) a participar voluntariamente en el proyecto de investigación Promoviendo Comportamiento Saludable y Resistencia a la Insulina. El propósito de este estudio es describir la relación entre promover comportamiento saludable y la resistencia a la insulina en adolescentes mexicoamericanos saludables quienes viven cerca de la frontera entre Texas y México. Debido a que la diabetes es común en mexicoamericanos, y la resistencia a la insulina es considerada un indicador que se podría desarrollar diabetes, conociendo cómo promover comportamientos saludables está conectado con la resistencia a la insulina, podría ayudar a avanzar en cuanto a la prevención de la diabetes.

CRITERIO DE SELECCIÓN

El investigador principal hablará con usted acerca de los requerimientos para la participación en este estudio. Para ser elegible para participar, deberá de: 1) ser de origen mexicano, 2) tener entre 15 y 19 años de edad, 3) ser capaz de hablar, leer y escribir en inglés, 4) tener una masa corporal no más del 85% (determinado por la altura y el peso), y 5) que pueda y este dispuesta(a) a participar en el estudio. No podrá participar en el estudio si no es capaz de leer y escribir en inglés. Si nos dice que está embarazada al tiempo del estudio no podrá participar en el estudio. Un total de 45 individuos serán registrados en este estudio.

PROCEDIMIENTO(S)

La siguiente información describe lo que pasará si decide participar en este estudio, el cual tomará alrededor de 1/2 hora de su tiempo. Si accede a participar será invitado(a) a la clínica de investigación ubicada en el Centro Médico Bautista del Valle en Brownsville en el edificio Edelstein sobre la calle Jefferson. También podríamos llevar a cabo los procedimientos del estudio en su casa si usted así lo prefiera.

Fecha de la versión: 9 de Diciembre de 2008
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APPROBADO POR EL IRB DE LA UNIVERSIDAD DE ARIZONA ESTE SELLO DEBE APARECER EN TODOS LOS DOCUMENTOS USADOS PARA OBTENER EL CONSENTIMIENTO DEL PARTICIPA

FECHA: 11/12/08 VENCIMIENTO: 1/9/10

IRB NUMBER: IRB-SPH-08-0360
IRB APPROVAL DATE: 2/13/2008
IRB EXPIRATION DATE: 7/31/2009
En el día de la cita tendrá que venir a la clínica después de haber ayunado por 10 horas (nada de comer o de beber excepto agua). Si usted es mujer, se le preguntará si está embarazada. Su padre, o madre, o guardián sabrán que le haremos esta pregunta si es usted menor de 18 años de edad. Si nos dice que está embarazada le proveeremos información acerca de recursos en la comunidad y no completará el resto del estudio. Una persona capacitada tomará la medida de su altura, el peso y la medida de la cintura. Se quitará los zapatos antes de que se ponga de pie, y sin moverse, sobre la balanza para ser pesado(a). Se le pedirá que detenga la respiración y que vea de frente derecho mientras se toma la medida para saber que tan alto(a) es. También se le medirá alrededor de su cuerpo a la altura de la cintura. Si su peso está en el rango normal no completará el resto del estudio. Si no puede participar en el estudio, le daríamos un bocadillo, galletas, jugo, y le agradeceríamos por su tiempo. Esta parte del estudio tomará alrededor de 10 minutos. Si puede participar, una persona capacitada obtendrá una muestra de sangre (alrededor de 4 cucharaditas de sangre). Después de sacarle la sangre, recibirá un bocado de galletas, queso y jugo. Esto requerirá de 15 minutos adicionales. Alguna porción de su sangre será usada para medir los niveles de azúcar e insulina y el resto de la sangre será almacenada para estudios futuros como la resistencia a la insulina y diabetes. En este estudio sus muestras de sangre no serán usadas para exámenes genéticos. Así mismo sus muestras de sangre almacenadas no serán liberadas en el futuro para exámenes genéticos.

Después de que se obtuvió la muestra de sangre y se le tomaron las medidas, se le pedirá que responda unas preguntas escritas acerca de la manera en que toma cuidado de su salud. Habrá alrededor de 120 preguntas cortas para responder. Esta parte del estudio tomará alrededor de 45 minutos a 1 hora.

Después de que termine de responder las preguntas, recibirá por escrito los resultados de las mediciones. Estos resultados y los resultados de azúcar en la sangre y las pruebas de insulina serán enviados a usted y a su doctor si usted lo decide. Si los resultados de los exámenes no son normales se le proveerá información y recursos que están disponibles para usted en la comunidad.

TIEMPO COMPROMETIDO
El tiempo que toma el estudio es alrededor de 1 a 2 horas.

RIESGOS CONOCIDOS
Personal capacitado llevará a cabo todas las pruebas y exámenes. El riesgo de obtener la sangre es pequeño. Sacar sangre es un procedimiento de rutina que puede causar un poco de malestar. Usted podría sentir esto malestar al momento de obtener la muestra de sangre. Una pequeña

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mancha negra y azul podría aparecer en su piel en el lugar en donde la aguja entró. Si esto sucede, usualmente desaparecerá en 2 o 3 días. Raramente, complicaciones como sangrado o infección podrían ocurrir. Algunas de las preguntas en el estudio son acerca de sus sentimientos y podría sentirse incómodo(a) al responderlas. Usted podría no responder cualquiera de las preguntas.

BENEFICIOS
No hay un beneficio directo por su participación en este estudio. Por tomar parte podría ayudar a los investigadores a entender mejor la resistencia a la insulina y prevención de diabetes. Podría haber un beneficio para la sociedad de los resultados de este estudio.

CONFIDENCIALIDAD
Toda la información de este estudio es codificada e información personal es mantenida en gabinetes bajo llave en un cuarto también bajo llave, separada de los demás expedientes. Por favor entienda que representantes del Comité para la Protección de los Sujetos Humanos y el patrocinador de este estudio podría revisar sus expedientes en la investigación con el propósito de verificar datos de investigación, y podrían ver identificadores personales. Sin embargo, información que lo pueda identificar no aparecerá en los expedientes que podría retener el patrocinador. Su muestra de sangre almacenadas para estudios futuros permanecerán confidenciales y usted no será personalmente identificado(a). Estas muestras de sangre se quedarán almacenadas por tiempo indefinido en el laboratorio del Campo Regional de Brownsville de la Universidad de Texas Centro de Ciencias de la Salud en Houston. Anne Rentfro no es la propietaria de estas muestras. Anne Rentfro será responsable de mantener confidencialmente su información así como del cuidado y liberación de cualquier muestra de sangre o información. Usted no será personalmente identificado(a) en ninguno de los reportes o publicaciones que pudieran resultar de este estudio.

RETIRO DEL ESTUDIO:
El continuar participando en este estudio es completamente voluntario. Usted podría decidir no continuar participando en este estudio o dejar de hacerlo en cualquier momento. Usted podrá solicitar que sus muestras de sangre sean destruidas si deja el estudio y cualquier información y/o las muestras de sangre serán destruidas si usted así lo requiere. Sería tratado de la misma manera no importa lo que decida.

COSTOS, REEMBOLSO, Y COMPENSACIÓN
No existe costo para usted por participar excepto por su tiempo. Usted recibirá un certificado de regalo de $10.00 por participar si es incluido(a) en el estudio. También recibirá los resultados de

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su altura, peso, circunferencia de la cintura y resultados de la sangre, si es usted incluido(a) en este estudio. No recibirá ninguna compensación económica por tomar parte en este estudio. Si recibe algún cobro que usted cree es relacionado con el tomar parte en este estudio, por favor contacte y refiera sus preguntas a Anne Rentfro, MSN, RN al (956) 346-6411

PREGUNTAS
Más adelante usted podría obtener información acerca de la investigación o si tiene inquietudes o quejas acerca de la investigación llamando al Investigador Principal Anne Rentfro, MSN, RN, quien es una candidata a doctorado al (956) 346-6411. Anne Rentfro es la persona que está dirigiendo este proyecto como parte de sus estudios de doctorado de la Universidad de Arizona en Tucson. Si usted tiene preguntas concernientes a sus derechos como participante en una investigación, quejas o inquietudes acerca de la investigación y no puede localizar al Investigador Principal, o quiere hablar con alguien más que no sea el Investigador, usted podrá llamar a la oficina del Programa de Protección de los Sujetos Humanos de la Universidad de Arizona al (520) 626-6721 (si está fuera del estado llame al número gratuito 1-866-278-1455.) Si prefiere contactar al Programa de Protección de los Sujetos Humanos a través de su sitio de Internet, favor de visitar la siguiente página:  http://www.irb.arizona.edu/contact/

EN CASO DE UNA LESIÓN
Si usted sufre cualquier lesión como resultado de su participación en este estudio, por favor entienda que no se han hecho arreglos para proveer tratamiento gratuito por la herida o ningún otro tipo de pago. Sin embargo, todas las instalaciones necesarias, tratamiento de emergencia y servicios profesionales estarán disponibles para usted, como lo están para la comunidad en general. Usted debe de reportar cualquier lesión a Anne Rentfro, MSN, RN, al (956) 346-6411 y al Comité para la Protección de los Sujetos Humanos al (713) 300-7943. Usted no está renunciando a ninguno de sus derechos legales al firmar esta forma de consentimiento.

FIRMAS
Antes de dar mi consentimiento firmando esta forma, los métodos, inconvenientes, riesgos y beneficios me han sido explicados y mis preguntas han tenido respuesta. Puedo hacer preguntas en cualquier momento y tengo la libertad de retirarme del proyecto cada vez que lo desee sin causar males intencionales o afectando mi cuidado médico. El investigador podría dar por terminada mi participación en este proyecto por razones que me serían explicadas. La información nueva que se desarrolle durante el transcurso de este estudio que podría afectar, ya sea mi buena voluntad o que pueda continuar en este proyecto de investigación, se me dará a conocer tan pronto como sea posible. Esta forma de consentimiento se guardará en un área designada por el Programa de Protección de los Sujetos Humanos y acceso restringido por el investigador principal, Anne
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APPENDIX F: LABORATORY SPECIMEN RECORDING FORM
Determine if fasting 10 hours:

2. Record today's DATE and TIME:
   Date: [ ] [ ] [ ] Time: [ ] [ ]

3. When did you last eat or drink (except water)?
   Date: [ ] [ ] [ ] Time: [ ] [ ]

4. Is person at least 10 hours fasting (except water)?
   \(1 = \text{yes}; 2 = \text{no}\)

   If NOT at least 10 hours fasting, reschedule,
   Note here and on packet front:
   Date: [ ] [ ] [ ] Time: [ ] [ ]

5. Did you smoke or use tobacco in the last 10 hours?
   \(1 = \text{yes}; 2 = \text{no}\)

Collect vacutainers:

6. EDTA 1 (purple top) – 10 ml Vacutainer filled?
   \(1 = \text{yes}; 2 = \text{no}; 3 = \text{partial}\)
   Fill to capacity Gently invert tube 4 times to mix

7. EDTA 2 (purple top) – 10 ml Vacutainer filled?
   \(1 = \text{yes}; 2 = \text{no}; 3 = \text{partial}\)
   Fill to capacity Gently invert tube 4 times to mix

8. Phlebotomist ID:

   [ ]

Process EDTA 1 vacutainer:

Centrifuge sample (within 30 minutes of collection) in Refrigerated Centrifuge for 12 minutes at 2,000 RPM

9. After centrifugation, determine duplicate Fasting Glucose on Glucostat
   FBG1 9a. [ ] [ ] [ ] FBG2 9b. [ ] [ ]

   9c. Glucostat machine number:
      Glucostat # 9c. (01 = YSI2300)
APPENDIX G: RESULTS REPORTING FORM
HEALTH RESULTS FORM
HEALTH PROMOTING BEHAVIORS STUDY (AR)
HEISICAN HEALTH RESEARCH CENTER page 1 of 1

Date of Examination

Height  
Weight
Body Mass Index
Waist Circumference
Fasting Blood Glucose

The results summarized here represent the primary findings from your examination today.

ID number of person completing this Health Results Form:

Copy of CDC BMI percentile for age and gender is placed on the back of this form
### Diabetes Assistance Locations/
Lugares para acudir ayuda para la Diabetes

<table>
<thead>
<tr>
<th>Center</th>
<th>Services/Cost</th>
<th>Address</th>
<th>Phone Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brownsville Community Health Center</td>
<td>Free classes, low-cost medical care, laboratory, pharmacy.</td>
<td>2137 East 22nd St, Brownsville, TX 78521</td>
<td>956-548-7400</td>
</tr>
<tr>
<td>Valley Baptist Medical Center at Brownsville</td>
<td>Diabetes Education classes, accepts most insurance types, Medicare, Medicaid.</td>
<td>1040 W. Jefferson St, Brownsville, TX 78521</td>
<td>956-544-1400</td>
</tr>
<tr>
<td>Su Clinica Familiar</td>
<td>Free classes, low-cost medical care, laboratory, pharmacy.</td>
<td>4000 FM 511, Brownsville, TX 78521</td>
<td>956-831-8338</td>
</tr>
<tr>
<td>Clinica Santa Maria</td>
<td>For pregnant women: Diabetes education classes offer assistance for gestational diabetes. Accepts Medicaid, private pay, offers payment plans.</td>
<td>95 E. Price Rd, 1076 E. Los Ebanos Blvd, 3855 Southmost Rd, Brownsville, TX 78521</td>
<td>956-544-2001</td>
</tr>
<tr>
<td>American Diabetes Association</td>
<td>Free bilingual educational material.</td>
<td>515 Nolan Loop, McAllen, TX 78504</td>
<td>956-631-1118</td>
</tr>
<tr>
<td>Planned Parenthood</td>
<td>Laboratory testing. Cost varies depending on income.</td>
<td>370 Old Port Isabel Rd, 4671 Southmost Rd, Brownsville, TX 78521</td>
<td>956-546-4571, 956-544-2723</td>
</tr>
<tr>
<td>Dr. Dora Mendoza, MD, PhD, MPH</td>
<td>Diabetes screening and outreach</td>
<td>Please call for appointments</td>
<td>956-554-0778</td>
</tr>
<tr>
<td>HHRC Diabetes Impact Study</td>
<td>Diabetes information</td>
<td>Please call for appointments</td>
<td>956-554-5169</td>
</tr>
<tr>
<td>Dr. Willie Teo-Ong, ADA-certified</td>
<td>Diabetes control and management after diagnosis. Referrals not required.</td>
<td>844 Central Boulevard, Ste. 370, Brownsville, TX 78520</td>
<td>956-548-0077</td>
</tr>
</tbody>
</table>

If you know of additional locations that may help people who have or think they may have Diabetes please call Extra Care at (956) 556-5184.

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[Image of logos: Planned Parenthood, Healthy Communities, HHRC, The University of Texas Health Science Center at Houston, School of Public Health]
ANTHROPOMETRICS:

1. Record standing height (no shoes; cm to nearest 10th)
2. Record weight (no shoes; kg to nearest 10th)
3. Record waist circumference (measure twice with tape, level at the navel in cm to nearest 10th)
4. BMI (wt (kg) ÷ ht (cm) -ht (cm) x 10,000)
5. ID of individual performing anthropometrics:
APPENDIX I: STUDY INSTRUMENTS
Demographic and Descriptive Information Questionnaire

Directions: The following questions will tell me about you. There are no wrong answers.

1. How old are you today? I am _______ years old today.

2. What month were you born? Month __________

3. What date of the month were you born? Date __________

4. What year were you born? Year __________

5. Are you (circle one):
   a. Female
   b. Male

6. Are you (circle one):
   a. Mexican American
   b. Other Hispanic Group
   c. Black
   d. Asian
   e. American Indian
   f. Pacific Islander
   g. White

7. How many of years of education have you had? _____
8. Are you a parent? Yes No

9. Do you live with your ____________(circle all that apply)
   a. Mother
   b. Father
   c. Grandmother (Mother’s mother)
   d. Grandmother (Father’s mother)
   e. Grandfather (Father’s father)
   f. Grandfather (Mother’s father)
   g. Group Home
   h. Stepmother
   i. Stepfather
   j. Other - please specify_______________________
The MacArthur Scale of Subjective Social Status–Youth Version

Imagine that this ladder pictures how American society is set up.

At the top of the ladder are people who are best off—they have the most money, the highest amount of schooling, and the jobs that bring the most respect.

At the bottom are people who are the worst off—they have the least money, little or no education, no job or jobs that no one wants or respects.

Now think about your family. Please tell us where you think your family would be on this ladder. Fill in the circle that best represent where your family would be on this ladder.

Now assume that the ladder is a way of picturing your school.

At the top of the ladder are people in your school with the most respect, the highest grades, and the highest standing.

At the bottom are people who no one respects, no one wants to hang around with, and have the worst grades.

Where would you place yourself on this ladder? Fill in the circle that best represent where your family would be on this ladder.

from Goodman (2001)
### Brief ARSMAL Scale

#### Appendix A

**The Brief Acculturation Rating Scale for Mexican Americans—II**

<table>
<thead>
<tr>
<th>NAME</th>
<th>GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIRCLE: BOY</td>
<td>GIRL</td>
</tr>
<tr>
<td>CIRCLE: HISPANIC/LATINO</td>
<td>WHITE</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Very Not</th>
<th>Little/Un</th>
<th>At All/</th>
<th>Poquito</th>
<th>Moderately/</th>
<th>Mucho</th>
<th>Almost</th>
<th>Muñy</th>
<th>Frequent</th>
<th>Casi Todo</th>
<th>el Tiempo</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I speak Spanish.</td>
<td>Yo hablo Español.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. I speak English.</td>
<td>Yo hablo Inglés.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. I enjoy speaking Spanish.</td>
<td>Me gusta hablar Español.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. I associate with Anglos.</td>
<td>Me asocio con Anglos.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. I enjoy English language movies.</td>
<td>Me gusta ver películas en Inglés.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. I enjoy Spanish language TV.</td>
<td>Me gusta ver programas en la televisión que sean en Español.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. My thinking is done in the English language.</td>
<td>Mis pensamientos ocurren en el idioma Inglés.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. My thinking is done in the Spanish language.</td>
<td>Mis pensamientos ocurren en el idioma Español.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. My friends are of Anglo origin.</td>
<td>Mis amigos recientes son Anglo Americano.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Used by permission from Dr. Israel Cuéllar, former director of the Julian Samora Research Institute at Michigan State University.
Rosenberg Self-Esteem Scale

Instructions:
Below is a list of statements dealing with your general feelings about yourself. If you agree with the statement, circle A. If you strongly agree, circle SA. If you disagree, circle D. If you strongly disagree, circle SD.

<table>
<thead>
<tr>
<th></th>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>On whole I am satisfied with myself.</td>
<td>SA</td>
<td>A</td>
<td>S</td>
<td>SD</td>
</tr>
<tr>
<td>2</td>
<td>At times I think I am no good at all.</td>
<td>SA</td>
<td>A</td>
<td>S</td>
<td>SD</td>
</tr>
<tr>
<td>3</td>
<td>I feel that I have a number of good qualities.</td>
<td>SA</td>
<td>A</td>
<td>S</td>
<td>SD</td>
</tr>
<tr>
<td>4</td>
<td>I am able to do things as well as most other people.</td>
<td>SA</td>
<td>A</td>
<td>S</td>
<td>SD</td>
</tr>
<tr>
<td>5</td>
<td>I feel I do not have much to be proud of.</td>
<td>SA</td>
<td>A</td>
<td>S</td>
<td>SD</td>
</tr>
<tr>
<td>6</td>
<td>I certainly feel useless at times.</td>
<td>SA</td>
<td>A</td>
<td>S</td>
<td>SD</td>
</tr>
<tr>
<td>7</td>
<td>I feel I do not have much to be proud of.</td>
<td>SA</td>
<td>A</td>
<td>S</td>
<td>SD</td>
</tr>
<tr>
<td>8</td>
<td>I wish I could have more respect for myself.</td>
<td>SA</td>
<td>A</td>
<td>S</td>
<td>SD</td>
</tr>
<tr>
<td>9</td>
<td>All in all, I am inclined to feel that I am a failure.</td>
<td>SA</td>
<td>A</td>
<td>S</td>
<td>SD</td>
</tr>
<tr>
<td>10</td>
<td>I take a positive attitude toward myself.</td>
<td>SA</td>
<td>A</td>
<td>S</td>
<td>SD</td>
</tr>
</tbody>
</table>

Source: Courtesy Morris Rosenberg. This scale is in the public domain and may be used without securing permission.
Perceived Self-Efficacy [Self-Regulatory Efficacy] (Adolescent Version)

Below are sentences about exercise. Exercise is being active enough to breathe fast, get sweaty, or have your heart beat fast.

Please place a check (✓) in the box to show how true each sentence is about you.

<table>
<thead>
<tr>
<th>ID Number</th>
<th></th>
<th>Not at all true</th>
<th>Not very true</th>
<th>In-between</th>
<th>Sort of true</th>
<th>Very true</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1. I could exercise even if I was tired.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G2. I could exercise even if I had other things I wanted to do.</td>
<td>Not at all true</td>
<td>Not very true</td>
<td>In-between</td>
<td>Sort of true</td>
<td>Very True</td>
<td></td>
</tr>
<tr>
<td>G3. I could exercise even if I had to exercise alone.</td>
<td>Not at all true</td>
<td>Not very true</td>
<td>In-between</td>
<td>Sort of true</td>
<td>Very True</td>
<td></td>
</tr>
<tr>
<td>G4. I could exercise even if I had a bad day at school.</td>
<td>Not at all true</td>
<td>Not very true</td>
<td>In-between</td>
<td>Sort of true</td>
<td>Very True</td>
<td></td>
</tr>
<tr>
<td>G5. I could exercise even if I was feeling lazy.</td>
<td>Not at all true</td>
<td>Not very true</td>
<td>In-between</td>
<td>Sort of true</td>
<td>Very true</td>
<td></td>
</tr>
<tr>
<td>G6. I could exercise even if I was not very good at it.</td>
<td>Not at all true</td>
<td>Not very true</td>
<td>In-between</td>
<td>Sort of true</td>
<td>Very true</td>
<td></td>
</tr>
<tr>
<td>G7. I could exercise even if I was sore from exercising the day before.</td>
<td>Not at all true</td>
<td>Not very true</td>
<td>In-between</td>
<td>Sort of true</td>
<td>Very true</td>
<td></td>
</tr>
<tr>
<td>G8. I could exercise even if I was not in the mood.</td>
<td>Not at all true</td>
<td>Not very true</td>
<td>In-between</td>
<td>Sort of true</td>
<td>Very true</td>
<td></td>
</tr>
</tbody>
</table>
Dietary Self–Efficacy for Lower Fat and Sodium

CHILD AND ADOLESCENT TRIAL FOR CARDIOVASCULAR HEALTH

HEALTH BEHAVIOR QUESTIONNAIRE

INTRODUCTION: This is a questionnaire about health. There are no right or wrong answers. Please read each question and answer the best you can. Do not work ahead. Stop at the end of each section. Remember no one at school will see your answers.

SECTION A: WHAT WOULD YOU DO?

INSTRUCTIONS: Circle one of the two foods that you would pick if you had to choose just one.

1. If you were at the movies, which one would you pick?

   popcorn with salt or butter
   popcorn without salt or butter

2. Which one would you pick to fix with dinner?

   fresh or frozen vegetables
   canned vegetables

3. If you were going to eat your lunch, which would you do?

   eat the food without adding salt
   shake salt on the food before eating
4. Which would you put on your hamburger?
   
   catsup   tomato

5. Which would you pick to drink?
   
   regular (whole) milk   low fat or skim milk

6. Which food would you eat for a snack?
   
   candy bar   fresh fruit

7. What would you put on your toast?
   
   margarine   butter

8. Which would you do if you were going to eat a piece of chicken?
   
   leave on the skin   take off the skin and not eat the skin

9. Which food would you ask for?
   
   frozen yogurt   ice cream
Fruit and Vegetable Self–Efficacy Scale

Instructions: The following group of questions asks you your own feeling about fruits and vegetables you may eat. Please respond if you do not eat fruit and vegetables. If you never eat fruit and vegetables indicate how you think you would feel if you did eat them. Circle the answer for each question that best describes how you feel.

1. I am confident I could purchase only fruits and vegetables in a grocery store without feeling embarrassed.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Undecided</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

2. I am confident I could remember to bring fruits and vegetables with me to school for a snack.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Undecided</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

3. I am confident in my ability to suggest to a friend that they eat more fruits and vegetables.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Undecided</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

4. I am confident in my ability to persuade a friend to eat fruit and vegetables when we are choosing foods in the school cafeteria.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Undecided</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

5. I am confident in my ability to eat fruits and vegetables at social events such as parties.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Undecided</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

6. I am confident I could eat lots of fruits and vegetables without looking like a “nutrition freak”.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Undecided</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

7. I am confident that I would remember to eat fruits and vegetables even if I weren’t eating with my parents.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Undecided</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>
8. I am confident that I could enjoy eating lots of fruits and vegetables.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Undecided</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

9. I am confident I could eat fruits and vegetables even if no one else at the lunch table was doing so.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Undecided</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

10. I am confident I could eat fruits and vegetables during a meal at home.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Undecided</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

11. I am confident that I can increase the number of servings of fruits and vegetables I eat each day.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Undecided</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

12. I am confident that I can prepare food like fruits and vegetables without adding a lot of fat to them.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Undecided</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

13. I am confident that I could eat lots of fruits and vegetables even if I had braces.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Undecided</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

14. I am confident that I could eat fruits and vegetables at school if they look appealing.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Undecided</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

15. I am confident that I could suggest eating fruits and vegetables to others and at the same time not make them feel ignorant about healthy eating habits.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Undecided</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
Adolescent Hope Scale

**Adolescent Hope Scale**

**Directions:** Read each statement and then indicate your own personal feelings about the statement by circling the number that best describes your attitude. Please describe yourself as you really are, not as you would like to be. Please use the following key:

- 1 means that you disagree a lot with the statement
- 2 means that you disagree a little with the statement
- 3 means that you agree a little with the statement
- 4 means that you agree a lot with the statement

<table>
<thead>
<tr>
<th>Statement</th>
<th>Disagree A Lot</th>
<th>Disagree A Little</th>
<th>Agree A Little</th>
<th>Agree A Lot</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I am positive about most parts of my life.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2. I look forward to an enjoyable future.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3. There are things I want to do in life.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4. I am able to set goals I want to reach.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5. I am at peace with myself.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. My life has meaning.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>7. I make plans for my own future.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>8. I intend to make the most out of life.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>9. I am positive about the future.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. I spend time planning for the future.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. I am able to reach my goals in life.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. I am valued for what I am.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. I feel loved.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Adolescent Lifestyle Profile (ALP-R2)

**DIRECTIONS:** Think carefully about each statement in this questionnaire and tell us how frequently you do each behavior by circling:

N for never, S for sometimes, O for often, or A for always

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Sometimes</th>
<th>Often</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Spend time talking to members of my family.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Spend time with my family being active (walking, playing games).</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>3. See my school nurse or my doctor if I am not feeling well.</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>4. Engage in vigorous physical activity for 20 minutes or more 3 days a week (aerobic dancing, brisk walking, running, rope jumping, bicycling, swimming).</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>5. Get 6-8 hours of sleep at night.</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>6. Congratulate others when they do something well.</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>7. Avoid “sweets” or other foods high in sugar.</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>8. Read articles about health topics.</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>9. Talk with others about my spiritual beliefs.</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>10. Choose low-fat milk or low-fat dairy products (yogurt, cheese, ice cream).</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>11. Take time to relax each day.</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>12. Try to be sensitive to the feelings of others.</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>13. Eat breakfast.</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>14. Ask questions of the doctor or nurse to understand their instructions.</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>15. Feel that there is a higher power guiding my life.</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>16. Participate in recreational activities or sports.</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th></th>
<th>Adolescent Lifestyle Profile ©</th>
<th></th>
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<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>17.</td>
<td>Accept things in my life that I cannot change.</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>18.</td>
<td>Am excited about the future.</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>19.</td>
<td>Spend time with close friends.</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>20.</td>
<td>Attend a group that shares my spiritual beliefs.</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>21.</td>
<td>Eat 2-4 servings of fruit each day.</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>22.</td>
<td>Attend programs about preventing health problems and improving my health.</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>23.</td>
<td>Am happy with who I am.</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>24.</td>
<td>Eat 3-5 servings of vegetables each day.</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>25.</td>
<td>Take time for myself to do something I like.</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>26.</td>
<td>Work toward important goals in my life.</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>27.</td>
<td>Walk or do something active during my free time.</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>28.</td>
<td>Look forward to each new day.</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>29.</td>
<td>Engage in activities to help me grow spiritually.</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>30.</td>
<td>Eat a variety of meats (chicken, fish, beef, pork).</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>31.</td>
<td>Settle conflicts through discussion rather than fighting.</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>32.</td>
<td>Play active games with my friends (basketball, softball, volleyball, tennis, etc.).</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>33.</td>
<td>Seek guidance from school counselor when needed.</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>34.</td>
<td>Ask questions of the doctor or nurse about improving my health.</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>35.</td>
<td>Spend time in prayer or meditation.</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>36.</td>
<td>Try to think pleasant thoughts as I fall asleep.</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>37.</td>
<td>Make a special effort to be helpful to others.</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>38.</td>
<td>Set goals that I can achieve.</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>39.</td>
<td>Feel good about myself when I do something well.</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
</tbody>
</table>

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<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>40. Exercise until my heart beats fast and I perspire.</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>41. Use my spiritual beliefs as a guide for what I do.</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>42. Drink six (6) or more glasses of water each day.</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>43. Discuss my problems with someone close to me to try and solve them.</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
<tr>
<td>44. Avoid behaviors that damage my health (smoking, drinking, doing drugs, sexual activity).</td>
<td>N</td>
<td>S</td>
<td>O</td>
<td>A</td>
</tr>
</tbody>
</table>
**Health Responsibility**

3. See my school nurse or my doctor if I am not feeling well.

8. Read articles about health topics.

14. Ask questions of the doctor or nurse to understand their instructions.

22. Attend programs about preventing health problems and improving my health.

33. Seek guidance from school counselor when needed.

34. Ask questions of the doctor or nurse about improving my health.

44. Avoid behaviors that damage my health (smoking, drinking, doing drugs, sexual activity).

**Physical Activity**

2. Spend time with my family being active (walking, playing games).

4. Exercise in vigorous physical activity for 20 minutes or more 3 days a week (aerobic dancing, brisk walking, running, rope jumping, bicycling, swimming).

16. Participate in recreational activities or sports.

27. Walk or do something active during my free time.

32. Play active games with my friends (basketball, softball, volleyball, tennis, etc.).

40. Exercise until my heart beats fast and I perspire.

**Nutrition**

7. Avoid “sweets” and other foods high in sugar.

10. Choose low-fat milk or low fat dairy products (yogurt, cheese, ice cream).

13. Eat breakfast.

21. Eat 2-4 servings of fruit each day.

24. Eat 3-5 servings of vegetables each day.

30. Eat a variety of meats (chicken, fish, beef, pork).

42. Drink six (6) or more glasses of water each day.
Positive Life Perspective

18. Am excited about the future.
23. Am happy with who I am.
26. Work toward important goals in my life.
28. Look forward to each new day.
38. Set goals that I can achieve.
39. Feel good about myself when I do something well.

Interpersonal Relations

1. Spend time talking to members of my family.
6. Congratulate others when they do something well.
12. Try to be sensitive to the feelings of others.
19. Spend time with close friends.
31. Settle conflicts through discussion rather than fighting.
37. Make a special effort to be helpful to others.

Stress Management

5. Get 6-8 hours of sleep at night.
11. Take time to relax each day.
17. Accept things in my life that I cannot change.
25. Take time for myself to do something I like.
35. Try to think pleasant thoughts as I fall asleep.
43. Discuss my problems with someone close to me to try and solve them.

Spiritual Health

9. Talk with others about my spiritual beliefs.
15. Feel that there is a higher power guiding my life.
20. Attend a group that shares my spiritual beliefs.
29. Engage in activities to help me grow spiritually.
36. Spend time in prayer or meditation.
41. Use my spiritual beliefs as a guide for what I do.
APPENDIX J: PERMISSIONS
April 4, 2008

Anne Rentfro
4925 Lakeway Drive
Brownsville, TX 78520

Dear Ms. Rentfro:

I received your request to use the Child and Adolescent Trial for Cardiovascular Health (CATCH) self-efficacy scales. Enclosed is copy of the Health Behavior Questionnaire (HBQ) and protocol for the HBQ. Feel free to use the HBQ for your research. Should you publish your research, please cite at least one of these articles below:


Best wishes,

Guy S. Parcel, Ph.D.
Dean
M. David Low Chair in Public Health
John P. McGovern Professor in Health Promotion

Located in the Texas Medical Center
JoAnn D. Long, RN MSN  
Department of Nursing  
Lubbock Christian University  
5601 West 19th Street  
Lubbock, TX 79407  

August 31, 1999  

Dear Ms. Lubbock:  

You have my permission to use the fruit-vegetable consumption self-efficacy scale. The instrument is not copyrighted. I published the items in the American Journal of Health Behavior to facilitate its use by others. When complete, I would appreciate a photocopy of your dissertation.  

Good luck with your research.  

Sincerely,  

Dennis L. Thombs, Ph.D.  
Associate Professor
Ms. Anne Remfro
4925 Lakeway Drive
Brownsville, TX 78520

Dear Ms. Remfro:

Thank you for your interest in the Adolescent Hope Scale © (AHS). The AHS was designed to measure perceived levels of hope among adolescents (early, middle and late). The AHS is a 13-item scale that uses a four-point Likert format to measure response frequencies (“disagree a lot” = 1, “disagree a little” = 2, “agree a little” = 3, “agree a lot” = 4). The possible range of scores is 13 to 52, or 1 to 4 if using the mean of the values assigned based on the four point scale. Higher scores indicate higher perceived levels of hope. A mean score between 4 and 3 was considered high, between 3 and 2 considered moderate, and mean score between 2 and 1 was considered low. The reliability for the instrument is 0.93 as measured by Cronbach’s alpha. The reading level for this tool is grade 3.3.

A manuscript describing the reliability and validity of the AHS original has been published in following:


The same instrument has been used with adult women with HIV in rural South Carolina and adult caregivers in Virginia. So, whether adolescents or adults the psychometric properties of the AHS were similar and robust.

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© Copyright of all versions of the AHS® is held by Hendricks, C., Murdaugh, C. & Hendricks, D. (2004). Reproduction without consent is not permitted. Permission to use this scale must be obtained from the Adolescent Health Promotion Program, 612 Kimberly Circle, Selma, AL 36701. Permission to use this scale for any other use must be obtained from the Adolescent Health Promotion Program.

Best wishes in your research endeavors. Please provide us with a copy of your results, as it will assist us in assessing the efficacy of the instrument. If you have additional questions, please contact me.

Sincerely,

Constance Smith Hendricks
Constance Smith Hendricks, PhD, RN
NINR/NIH Minority Mentored Research Scientist

ATTACHMENTS

This program was originally funded by a Mentored Research Scientist Development Award for Minority Investigators by the National Institute of Nursing Research/ National Institutes of Health (K01 NR00128-01)
Ms. Anne Rentfro
4925 Lakeway Drive
Brownsville, TX 78520

Dear Ms. Rentfro:

Thank you for your interest in the Adolescent Lifestyle Profile® (ALP). The ALP is designed for measuring the frequency of health-promoting behaviors in adolescents (early, middle, and late). The Health Promoting Lifestyle Profile (HPLP) is the assessment tool most frequently used by nurses in research and practice (Walker, Sechrist & Pender, 1987). The original HPLP scale consists of the sub-scales of self-actualization, health responsibility, exercise, nutrition, interpersonal support and stress management and has both English and Spanish versions (Walker, Keef, Pender, and Sechrist, 1990). The revised Health-Promoting Lifestyle Profile II, which included some modifications in items and subscales, served as the prototype for the initial generation of the ALP. It became apparent that items used for adults did not “fit” adolescents (Pender, 2001).

The ALP-R2 is a 44-item summed behavior rating scale that employs a 4-point Likert-type response format to measure the frequency of self-reported health-promoting behaviors in the domains of health responsibility, physical activity, nutrition, positive life perspective, interpersonal relations, stress management and spiritual health. The scoring level for this tool is grade 5.0. It is appropriate for use in research within the framework of the Health Promotion Model-Revised (Pender, 1996), as well as for a variety of other purposes.

A manuscript describing the reliability and validity of the ALP original has been published in the Journal of the Black Nurses Association. Hendricks, C., Murchough, C. & Pender, N. (2006). The adolescent lifestyle profile: Development and psychometric characteristics. Journal of the National Black Nurses Association, 17 (2), 1-5. For the ALP-R2®, the Cronbach’s alphas are as follows: Health Responsibility (0.825), Physical Activity (0.773), Nutrition (0.648), Positive Life Perspective (0.810), Interpersonal Relations (0.769), Stress Management (0.656), Spiritual Health (0.824), Total ALP (0.929). A principal axis factor analysis supported the presence of the seven factors used as subscales.

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Best wishes in your research endeavors. Please provide us with a copy of your results, as it will assist us in assessing the efficacy of the instrument. If you have additional questions, please contact me.

Sincerely,

Constance Smith Hendricks
Constance Smith Hendricks, PhD, RN
NINR/NIH Minority Mentored Research Scientist

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REFERENCES


