

**Examining the Relationship between Socio-demographic factors, Perception of Health, and
Physical Activity among Hispanics with Comorbid Diabetes and Depression**

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DISSERTATION

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“I slept and dreamt that life was joy. I awoke and saw that life was service. I acted and behold, service was joy” -- Rabindranath Tagore

Abstract

With the increasing changes to healthcare administration in the United States, to deny the significance of comorbid medical and mental health conditions among the Hispanic population would be detrimental to public health systems. With the “*browning and graying*” of the US population, attention must be focused on behavioral health issues as they relate to comorbid conditions affecting minority groups. The Hispanic population is the fastest growing ethnic group in the United States and approximately 2.5 million Hispanic adults in the US have been diagnosed with Diabetes Mellitus (Diabetes). Depression affects roughly 30% of Hispanics with diabetes when compared to 7-8% of Hispanics without diabetes. Individuals with comorbid diabetes and depression generally have poor treatment adherence which makes their diagnosis a major public health problem.

Individual perception of health and level of depressive symptoms are important factors that affect whether or not a person will adhere to their treatment plan. Level of physical activity, identified in the research as key for the treatment of diabetes and depression, is proven here to be an effective way to link treatment outcomes for the two chronic conditions to improve health outcomes.

This study aims to estimate the comorbidity rate of diabetes and depression among Hispanics and examine the association among socio-demographic factors (age, gender, education, and income), perception of health, nativity, and levels of physical activity among Hispanics with comorbid diabetes and depression. It is based on secondary data analyses from the NESARC sample. Results from the study have significant implications for health-care professionals and social-service deliverers who practice with Hispanics. Analyses from this study will potentially determine the likelihood that a Hispanic adult with comorbid diabetes and

depression will adhere to his/her treatment plan. Future research and policy related to public health, community development, and medical interventions should take into account comorbidity of diabetes and depression as they relate to behavior health treatment and outcomes.

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Chapter I: Introduction

Problem Statement

At a time in which clinicians and policy makers are trying to reduce spiraling health care costs in the United States, researchers perceive that comorbidity contributes to escalating costs in serving patients. There is an epidemic of multiple health conditions within the Hispanic population which, if unattended, will continue to rapidly increase. In particular, the comorbidity of diabetes and depression coupled with the estimated growth of the Hispanic population in the US draws attention to this group's medical need. Hispanics comprise 17% of the population and are estimated to increase to 30% or 132.8 million living in the US by 2050 (US Census, 2010, American Community Survey, 2010). Examining the association between socio-demographic factors (age, gender, income, education, and nativity), perception of health, depression, and physical activity among this population can change the way professionals approach health disparities among the Hispanic community. This study will fine tune the way treatment plans are developed, shed light on the "Hispanic Health Paradox" for researchers, and support the development of public health interventions delivered to the Hispanic population maximizing positive health behaviors.

In the US, diabetes alone is the 5th leading cause of death for Hispanic adults (Center for Disease Control, National Diabetes Fact Sheet, 2011). The connection between diabetes and depression is critical. Hispanics with comorbid diabetes and depression are more likely to have poor health (Casey, 2005). Negative health behaviors, however, are less likely to occur for those who only deal with diabetes and who already adhere to diabetes management plans (Ortega, Feldman, Canino, Steinman, & Alegria, 2006). A diagnosis of major depression affects about 3-4% of the general population (Gonzalez, Safren, Delahanty, Cagliero, Wecler, Meigs, and

Grant, 2008) and depression is the leading cause of medical disability among working adults (Stewart, Ricci, Chee, Hahn, & Morganstein, 2003). Researchers estimate as high as thirty-three percent (33%) of Hispanic adults with diabetes also experience depression (Hansen & Cabassa 2012; Kilbourne, 2009; Gonzalez et. al, 2008). Examining this population is important since this number will probably grow as Hispanics are the largest and fastest growing ethnic population in the United States. The comorbidity of diabetes and depression in this population is a major public health crisis (Gross, Olfson, Gameroff, Carasquillo, Shea, Feder, & Lantigua et. al., 2005).

Significance and Innovation

The comorbidity of diabetes and depression presents a significant barrier to achieving notable treatment gains (Piette, Richardson, and Velenstein, 2004) in the Hispanic population. Socio-demographic factors such as age, gender, level of education, level of income, nativity, perception of health, and level of physical activity have been identified in the literature as important for having positive health care behaviors among Hispanic individuals (Cabassa, Blanco, Lopez-Castroman, Lin, Lui, & Lewis-Fernandez, 2011).

Nativity and perception of health matter, because they are associated with individual health behaviors such as the ability to comply with treatment plans, including level of physical activity (Dinwinddle, Zambrana, & Garza, 2014; Sewitch, Leffondre, and Dobkin, 2004; Colon, Giachello, McIver, Pacheco, 2013). Nativity is an important component of the acculturation process and is not fully examined in the medical research (Rodriguez, Hicks, and Lopez, 2012). How the acculturative process, specifically nativity, relates to chronic conditions such as the comorbidity of diabetes and depression and differences exist based on whether or not someone was born in the United States or in a foreign country (Rodriguez, Hicks, and Lopez, 2012). Poor

perceptions of health have been shown to decrease participation in health management activities such as physical activity and increase the likelihood of long-term complications associated with diabetes (Lange and Piette, 2005). Individuals with comorbid diabetes and depression who also have poor perceptions of health are less likely to be actively engaged in physical activity resulting in more long-term medical complications (Lange and Piette, 2005). Individuals with depression may not adhere to their diabetes management plans and develop further negative health behaviors including lower levels of physical activity (Colon, Giachello, McIver, Pacheco, 2013).

The issues of nativity and perception of health are significant for Hispanics with comorbid diabetes and depression because this population is less likely to seek treatment for depressive symptoms (Colon, Giachello, McIver, Pacheco, 2013) potentially sending their health conditions on a downward spiral of one complication after another. It is possible that the influence of these various socio-demographic characteristics depends on how patients perceive their own health. More research is needed to examine the potential moderating role nativity will have between perception of health and level of physical activity when controlling for socio-demographic factors (age, gender, level of education, level of income) among Hispanics with comorbid diabetes and depression (Cabassa, Blanco, Lopez-Castroman, Lin, Lui, and Lewis-Fernandez, 2011). The results of this study will potentially guide how social workers design community based interventions, public health models, medical interventions, and exercise plans to increase positive health behaviors for Hispanics suffering from these two conditions.

Specific Aims and Hypotheses

This proposed study will examine the relationship between socio-demographic factors, perception of health, nativity, and level of physical activity in a national sample of Hispanic adults with comorbid diabetes and depression. Using data previously collected from wave 2 of the National Institute on Alcohol Abuse and Alcoholism's (NIAAA) National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) (Grant & Dawson, 2006), the following specific aims and hypotheses will be studied:

Aim 1. To estimate the prevalence rate of comorbid diabetes and depression among Hispanic adults in the NESARC data set.

Hypothesis 1: Hispanics will have a higher prevalence rate of comorbid diabetes and depression than Non-Hispanic Whites.

Aim 2. To explore associations between socio-demographic factors (e.g. age, gender, level of education, level of income, and nativity) and levels of physical activity among Hispanics with comorbid diabetes and depression in the NESARC.

Hypothesis 1: Among Hispanics with comorbid diabetes and depression, there will be an inverse relationship between age and level of physical activity.

Hypothesis 2: Among Hispanics with comorbid diabetes and depression, females will have lower levels of physical activity than males.

Hypothesis 3: Among Hispanics with comorbid diabetes and depression, there will be an direct relationship between level of education and level of physical activity.

Hypothesis 4: Among Hispanics with comorbid diabetes and depression, there will be an direct relationship between level of income and level of physical activity.

Hypothesis 5: Among Hispanics with comorbid diabetes and depression, there will be a difference between US-born and foreign-born Hispanics and level of physical activity.

Aim 3. To explore associations between perceptions of health and levels of physical activity, when controlling for socio-demographic factors (age, gender, level of education, level of income, and nativity), among Hispanics with comorbid diabetes and depression.

Hypothesis 1: Among Hispanics with comorbid diabetes and depression, perception of health will have a direct relationship with physical activity.

Aim 4: To examine the potential moderating role nativity has on the relationship between perception of health and physical activity, when controlling for socio-demographic factors (age, gender, level of education, level of income), among Hispanics with comorbid diabetes and depression.

Hypothesis 1: Among Hispanic adults with comorbid diabetes and depression, nativity will have a direct moderating relationship between perception of health and their levels of physical activity.

Chapter II: Literature Review

The Hispanic Population in the United States

Although investigators realize the diversity among the Hispanic population in the US, relatively few have documented the health disparities between this growing subgroup and the general population in the United States. The United States Census Bureau defines Hispanic as a person who classifies themselves as one of the several Spanish, Hispanic, or Latino categories from several Spanish-speaking countries ranging from the US, Central America, South America, the Dominican Republic, or Spain (US Department of Commerce, US Census Bureau, 2010). Hispanics comprise 17% of the population in the United States and estimates for the year 2050 predict an increase of Hispanics to 30% accounting for 132.8 million of the US population (US Census Bureau, 2010, American Community Survey, 2010). Amidst this population growth is also what is considered the “aging” and “colorizing” of America and in particular major cities there has been a “graying” and “browning” transformation (Klineberg, 2006). Over the next 25 years, the numbers aged 65+ will double and the younger populations are disproportionately non-Anglo which includes the Hispanic population (Klineberg, 2006).

As the Hispanic population continues to grow rapidly over the next several decades, their diverse unique health care needs should be researched more to improve health outcomes overall (Kanna et al., 2008). Researching comorbidity rates of diabetes and depression is significant because the Hispanic population is increasing and has higher rates of metabolic disorders such as

Diabetes, Hypothyroidism, and Obesity thus making chronic illness in this population a public health crisis (Kanna, et al., 2008).

Nativity

One cannot discuss the Hispanic population without taking into consideration additional factors such as nativity (US-born or Foreign-born) as it relates to chronic illness, mental health, and the public health crisis of comorbidity. Chronic illnesses such as cardiovascular disease, diabetes, and hypertension as they relate to the nativity of a Hispanic individual are still needed within academic research (Dinwiddle, Zambrana, & Garza, 2014) to help explain whether health advantages exist for foreign-born populations compared to US-born. This phenomenon, the “Hispanic Health Paradox” has been documented in academic research however remains inconclusive as to whether or not factors such as nativity, gender, or time in the United States are significantly related to health outcomes for Hispanics suffering from chronic illnesses. This paradox refers to documented findings that foreign-born Hispanics often have better health than their Non-Hispanic White counterparts on morbidity and mortality outcomes (Rodriguez, Hicks, and Lopez, 2012; Salinas, Su, & Snih, 2013; Dinwiddle, Zambrana, Garza, 2014).

This paradoxical finding arises despite foreign-born Hispanic’s lower levels of education, income, and worse access to care (Rodriguez, Hicks, and Lopez, 2012). The Hispanic Health Paradox is well documented in immigrant health research (Rodriguez, Hicks, and Lopez, 2012; Su, & Snih, 2013; Dinwiddle, Zambrana, Garza, 2014). Acculturation factors such as language spoken, number of years living in the United States, and nativity (US-born or foreign-born) influence health behavior indicators; often become important in determining the way treatment plans are designed for Hispanics with diabetes and depression (Mier, Smith, Carrillo-Zuniga, Want, Garza, & Ory, 2012). Because health related behaviors of foreign-born Hispanics may

change over time through the process of acculturation, more research that includes the nativity of study participants is required (Mier, Smith, Carrillo-Zuniga, Want, Garza, & Ory, 2012).

Conducting further research to study the relationship between nativity and physical health (Mier, Smith, Carrillo-Zuniga, Want, Garza, & Ory, 2012) as well as treatment plan adherence will help to further research on health disparities (Dinwiddle, Zambrana, & Garza, 2014; Rodriguez, Hicks, and Lopez, 2012). Understanding the Hispanic population by subgroup such as Nativity is significant for planning public health interventions which include levels of physical activity. Nativity is an important factor in health care administration for minority populations, especially with comorbid conditions such as diabetes and depression.

Diabetes among the Hispanic Population

Over 20 million individuals in the United States currently have diabetes, a figure estimated to increase to 48.3 million by the year 2050 (Kilborne, 2009). Diabetes affects approximately 2.5 million Hispanics in the US. It is currently the 5th leading cause of death among Hispanics overall (CDC, 2011). According to the American Diabetes Association (2012), diabetes mellitus (diabetes) is a chronic metabolic condition characterized by variances in blood glucose levels resulting in the body's inability to process glucose from food to make energy. Left untreated, diabetes can lead to long term complications such as blindness, kidney disease, nerve damage, cardiovascular disease, and stroke (American Diabetes Association, 2012). Hispanics are twice as likely to be diagnosed with diabetes when compared to non-Hispanic Whites (Kilborne, 2009) and are just as likely to have diabetes related complications such as kidney disease, blindness, amputations and high blood pressure (Kanna et al.2008) making this population vulnerable to additional major medical conditions, increased medical costs, and a potential decrease in their life expectancy rates. If Hispanics do not receive care for diabetes, the

lack of treatment will raise the nation's health care costs. The stressors of having a chronic illness such as diabetes may lead to depressive symptoms and other mental health conditions (Ortega, Feldman, Canino, Steinman, and Alegria, 2006).

Depression within the Hispanic Population

Individuals with psychiatric disorders have poorer health overall when compared to the general population (Casey, 2005). In the United States a diagnosis of major depression affects about 3-4% of the adult population (Gonzalez, Safren, Delahanty, Cagliero, Wecler, Meigs, and Grant, 2008). National depression rates identify 7-8% of the Hispanic population as affected by depression (Riolo, Nguyen, and King, 2005; Sclar, Robinson, and Skaer, 2008). Over 30% of adults with diabetes also experience depression with rates increasing to 40% for those with type 2 diabetes. Severe symptoms of depression are present in 26-31% of individuals with diabetes (Kilbourne 2009; Gonzelez et. al, 2008). In addition, individuals with major depression are more likely to participate in risky behaviors such as alcohol consumption and smoking cigarettes; They are less likely to seek preventive health care measures (Casey, 2005). Depression coupled with diabetes may lead to less compliance to a self-care management plan, determined by patients and health-care professionals, which will in turn lead to uncontrolled blood glucose levels and the potential onset of additional major medical conditions.

Implications for Under Treatment of Diabetes and Depression

Chronic conditions like diabetes and mental health conditions such as depression greatly affect the individual and society (Jenkins, Pope, Magwood, Vandemark, Thomas, Hill, and Linnen et al, 2010). Under treatment of chronic conditions, such as diabetes and mental health, leads to multiple long-term complications and are estimated to cause approximately 70% of

deaths each year (Jenkins et al., 2010). Treatment for these conditions is estimated to account for 75% of medical care costs in the United States (Jenkins et al., 2010). Depression is considered a highly prevalent disorder associated with high economic costs and adverse consequences that negatively affect an individuals' quality of life (Carragher, Adamson, Buntin, and Mc Cann, 2009). Often untreated, ethnic minorities and individuals with low socioeconomic status are unlikely to seek traditional health care treatment (Carragher et al., 2009). This adds to the economic burden of untreated chronic conditions such as diabetes and depression.

Perception of Health

Perceptions of health is defined as individual views on the status of his/her health. The literature has shown self-perception of health to be directly related to diabetes management behaviors including level of physical activity (Lange and Piette, 2005; Kartal and Inci, 2011). Besides framing diabetes management, perception of health influences adherence to treatment plans such as level of physical activity. Psychological factors such as depression may be foster inaccurate estimates of the need to control diabetes (Lange and Piette, 2005). This is why multi-faceted analyses highlighting comorbidity must be taken into consideration when developing treatment plans.

If an individual with comorbid diabetes and depression inaccurately perceives his/her health, he/she may not believe that his/her chronic condition is severe enough to warrant action and adherence to a treatment plan (Lange and Piette, 2005; Kartal and Inci, 2011). Better perceived health is associated with less comorbidity and fewer complications from diabetes (Lange and Piette, 2005). Also related to perception of health is self-efficacy of physical activity, or whether or not an individual believes he/she can actually carry out the physical activity needed to obtain better health related outcomes (Qui, Sun, Cai, Liu, and Yang, 2012).

Self-efficacy of physical activity influences treatment compliance for individuals diagnosed with diabetes and/or depression. Self-efficacy helps to determine whether or not an individual with diabetes will accept and carry out regular physical activity as part of their treatment plan (Qui, Sun, Cai, Liu, and Yang, 2012). Due to the limitations of the previously collected data for this study, self-efficacy of physical activity will not be included in this study.

Physical activity is key to the adequate management of diabetes and modest weight loss. In high-risk populations such as Hispanics with comorbid conditions, physical activity has been shown to reduce the risk of diabetes by up to 58% (Colber, Sigal, Fernhall, Regenseiner, Blissmer, Rubin, Chasan-Taber, Alvrigh, and Fraun, 2010).

For social workers, understanding an individual's perception of health, promoting self-efficacy of physical activity, and reducing the number of depressive symptoms may help individuals with comorbid diabetes and depression comply to their treatment plans despite research that already indicates individuals with comorbid diabetes and depression typically have worse adherence to treatment plans (Katan, 2008). Insofar as educating individuals diagnosed with diabetes and depression on how to perform certain physical activities may increase their engagement in physical activity, it will also improve treatment adherence and reduce long term complications and costs associated with the two chronic health conditions. Perception is important in predicting adherence to treatment plans, which should include minimal levels of physical activity. Understanding the relationship between perceptions of health and physical activity may persuade an individual with diabetes to use medical resources consistently and is important for social workers in the treatment of Hispanic individuals with comorbid diabetes and depression.

Physical Activity

Physical activity is a treatment component for both diabetes and depression, indicating a significant basis for treating individuals affected with these comorbid conditions. Individuals with diabetes who participate in physical activity regularly report better control of their diabetes accompanied by fewer incidences of depression (Piette, Richardson, and Valenstein, 2004). Likewise, individuals with depression report better compliance with mental health treatment plans if accomplished with regular physical activity. Promoting physical activity and increasing levels of physical activity may be crucial to treating comorbid diabetes and depression in addition to raising expectation for better physiological and mental health outcomes (Piette, Richardson, and Valenstein, 2004).

Monitoring levels of physical activity has regularly been a component of treatment for various medical conditions such as obesity and cardio vascular disease. Individuals with diabetes have been prescribed physical activity as part of their treatment plan to improve health outcomes (Piette, Richardson, and Valenstein, 2004) and even though the value of physical activity is known, the treatment plans are not always carried out (Harvey and Lawson, 2008) which may result from untreated depression and a poor perception of health. Physical activity and adherence to diabetes management plans are crucial to improving health outcomes. Similar to treatment plans for other chronic health conditions, physical activity is a component of effective treatment for diabetes and is necessary for the prevention of long term complications (Mc Collum, Hansen, Ghushchyan, and Sullivan, 2007). Likewise with depression, physical activity is a component for successful treatment (Dunn, Madhukar, Trivedi, Kampert, Camillia, Clark, and Chambliss, 2005). Physical activity has been shown to improve glycemic control, overall health, and quality of life (Aylin, Arzu, Sabri, Handan, and Ridvan, 2009).

In an experiment involving a group of patients with diabetes compared to a control group, patients that participated in weekly physical activity sessions gained significant medical and psychological benefits from their treatment plan (Aylin, Arzu, Sabri, Handan, and Ridvan, 2009). Results from this pilot study reinforced the notion that level of physical activity is a crucial part of the medical treatment for individuals with comorbid diabetes and depression. Promoting physical activity may be crucial to treating comorbid diabetes and depression with the expectation of better health outcomes (Piette, Richardson, and Valenstein, 2004).

Relationship between Socio-demographic Factors and Physical Activity

Hispanics are faced with multiple barriers to achieving favorable health outcomes; numerous factors are documented that contribute to poor health outcomes (Hansen & Cabassa, 2012; Black, Markides, & Ray, 2003). Gender, age, level of education, level of income, nativity, and perception of health have been identified as contributing to health disparities among individuals diagnosed with diabetes and depression (Piette, Richardson, and Valenstein, 2004). More specifically, perception of health and nativity as a component of the acculturation process have been identified in the literature as significantly affecting health outcomes of people with chronic conditions (Molina & Alcantara, 2013; Su, & Snih, 2013; Dinwiddle, Zambrana, Garza, 2014). Hispanics with comorbid diabetes and depression may acknowledge poor perceptions of health which influences their health behaviors. Simultaneously, there is a documented inconsistency in the research regarding the significance of nativity on health related outcomes (Huh, Prause, Dooley, 2007).

Older Hispanics have been identified in the literature as being less likely to seek out treatment for depression. This makes the older subgroup more vulnerable to long-term complication and higher medical costs associated with chronic conditions (Hansen & Cabassa,

2012; Black, Markides, & Ray, 2003). As the Hispanic population ages, older adults are two times as likely to be diagnosed with diabetes (Black, Markides, & Ray, 2003). Women are more likely to be effected by their perception of well-being; poorer perceptions of health in turn may influence their health behavior outcomes (Piette, Richardson, and Valenstein, 2004).

Additionally, men are more likely to participate in physical activity than women.

Likewise, lower levels of income and education also affect treatment seeking behaviors. The acculturation process is important as the number of years in the US, nativity, and language spoken directly relates to level of income and level of education (Rodriguez & Lopez, 2012; Kimbro, Bzostek, Goldman & Rodriguez, 2008). Hispanics with lower levels of income may be less likely to adhere to a treatment plan that includes physical activity. This pattern may disproportionately affect foreign-born Hispanics at a higher rate (Sibai, Costanian, Tohme, Assad, & Hwalla, 2013). US-born Hispanics with diabetes reported attending an education class on diabetes management at significant higher rates than foreign-born Hispanics in a study conducted with participants near border towns (Mier, Smith, Carillo-Zuniga, Wang, Garza, Ory, 2012). In general, less educated Hispanics with diabetes tend to have poorer treatment plan outcomes than those with higher levels of education.

Individuals with diabetes often do not realize connection among depression, perceptions of health, nativity, and their ability to manage adequately their diabetes treatment plan (Piette, Richardson, and Valenstein, 2004). Moreover, individuals with diabetes report limited levels of physical activity which may lead to more depressive symptoms (Piette, Richardson, and Valenstein, 2004) and the cycle of poor health continues.

Guiding Theoretical Framework

With a large comorbidity study (NESARC) as a national data set, this study will focus on describing prevalence rates for comorbid diabetes and depression among the Hispanic population in the US. This study will translate data collected into usable information for shaping treatment plans for unique populations suffering from multiple medical and mental health conditions. This study aims to identify the socio-demographic and behavioral factors that influence level of physical activity among the Hispanic respondents with comorbid diabetes and depression. Conditions such as diabetes and depression are economically taxing and require a unique approach to treatment that may help to reduce the effects of depression and diabetes. Figure 1 below visually depicts the percentage of Hispanic adults living in the US and the critical breakdown of adults diagnosed with diabetes, a lifetime occurrence of major depression or dysthymia, and the comorbidity of both conditions.

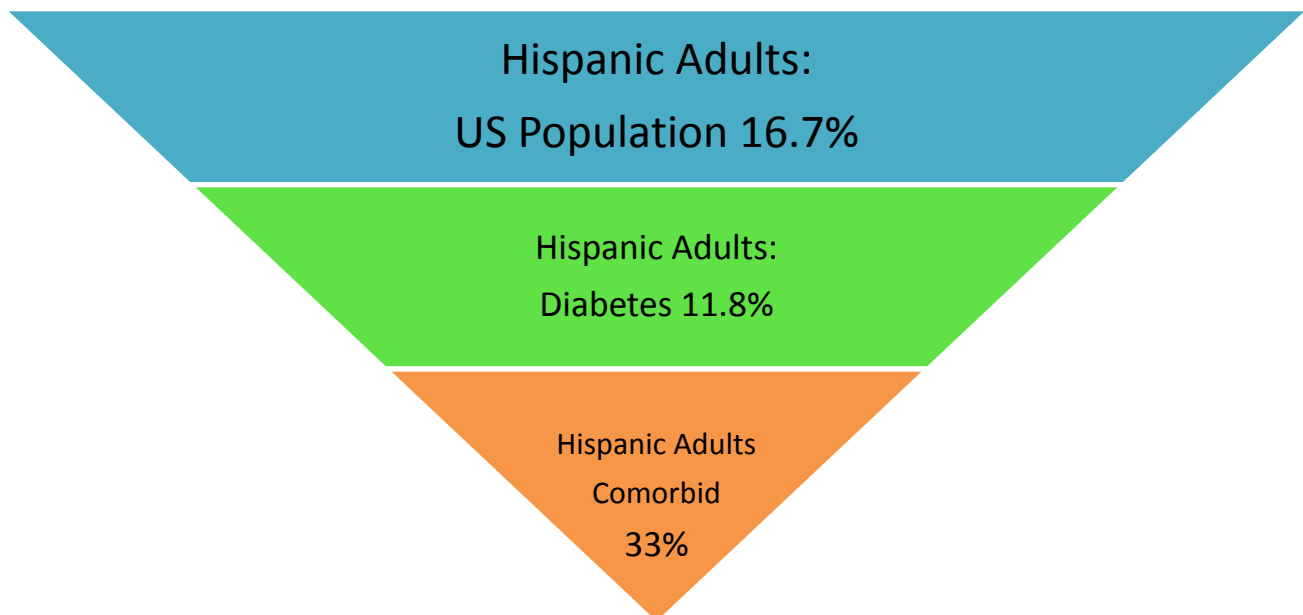


Figure 1: Comorbid Diabetes and Depression among Hispanic Adults

Hispanic adults comprise 16.7% of the US population (U.S. Census Bureau, 2010) and of that percentage approximately one tenth are diagnosed with Diabetes (National Diabetes Fact Sheet CDC, 2011). Of the Hispanic adults with Diabetes in the United States, an estimated thirty-three percent (33%) also have clinical symptoms of depression (Hansen and Cabassa, 2012; Gilmer, Walker, Johnson, Philis-Tsimikas, and Unutzer, 2008). This study seeks to examine the relationship between key factors and contribute to literature relate to this population. While information is known about comorbid conditions, more is needed specifically addressing health behaviors among Hispanics with comorbidity of diabetes and depression.

Chronic medical and mental health conditions continue to plague individuals throughout the United States. Identifying the significant socio-demographic factors, as listed in Table 1 below, which may affect changes in health behaviors such as level of physical activity, is beneficial to public health policy and the treatment of Hispanic adults with comorbid diabetes and depression. The information gained from this study can contribute to the growing body of knowledge in this field of study and be used to guide future research in the development of treatment plans that directly affect the medical, mental health, and social work professions. The Hispanic population comprises a large part of clinical social work case loads and social workers would benefit from being informed of specific factors that may be present when a client is diagnosed with comorbid depression and diabetes.

Table 1: Demographic and Sociological Factors

Demographic	Psycho-Social
Age	Level of Education
Gender	Level of Income
Race/Ethnicity: Hispanic	Perception of Health
Nativity: US-born; Foreign-born	Level of Physical Activity

For this dissertation, I examined a theoretical framework that is already well established in medical research that involves chronic medical conditions such as asthma and cardiovascular disease. The Health Belief Model has been applied to medical research examining behavioral outcomes of participants and used to assist with designs of prevention and intervention models for patients faced with various cues to action. I have modified this model to take into account the unique variables that may assist with predicting behavioral outcomes for Hispanics with comorbid diabetes and depression. This population will continue to grow in the United States and experience unique medical behaviors such as the Hispanic Health Paradox that have yet to be understood by medical professionals and social workers practicing in the field. A prediction model that may help shed some light on factors that contribute to behavior is needed for future research and intervention design. The Health Belief Model is the guiding theoretical framework that best encompassed the key independent variables, perception of health and nativity, for this dissertation study.

Health Belief Model

The *Health Belief Model* (Figure 2) displays a behavioral perspective that addresses medical issues and integrates four constructs related to the individual's perceived threats and net benefits: 1) perceived susceptibility, 2) perceived severity, 3) perceived benefits, 4) perceived barriers (Greene and Kreuter, 1999). Additional concepts in this model, not researched in this study due to limitations in secondary data, include cues to action and self-efficacy. This model has been used with various study populations having chronic conditions to try and determine why an individual chooses certain behaviors towards their treatment plans (Greene & Kreuter, 1999). For this study, the Health Behavior Model can be modified to view how an individual's self-rated perception of health (from poor to great) may influence positive health behaviors such

as level of physical activity or treatment adherence. This model, widely used in cases involving chronic conditions, is appropriate for studying comorbid diabetes and depression among Hispanics.

Perception of susceptibility, severity, benefits, and barriers have been successfully applied to individuals with chronic conditions using level of physical activity as a measure of compliance to treatment plans. The Health Belief Model has effectively been applied to research with chronic medical conditions such as cardio vascular care, thyroid conditions, and individuals with asthma. Adhering to adequate physical activity, a component of diabetes management (Katan, 2008), is viewed as a health behavior outcome influenced by self-efficacy and perception of health. This study will adapt the theory supporting the Health Belief Model and apply it to the research design to investigate the relationship among socio-demographic factors, self- rated perception of health, and level of physical activity among Hispanic adults from the NESARC data set.

For this dissertation, I modified the Health Belief Model to take into account the variables being addressed for this study. I modified the title to “Health Belief Model for Diabetes and Depression” and further describe how the model takes into consideration variables such as perception of health, nativity, and level of physical activity.

The Health Belief Model for Diabetes and Depression (Figure 3) is comprised of conceptual components such as perceived severity and self-efficacy that can be applied to the constructs of self-rated perception of health and level of level of acculturation measured by nativity, respectfully, used to help measure physical activity outcomes among Hispanic individuals with comorbid diabetes and depression. In the new, modified framework (Figure 3), Hispanics from the NESARC with comorbid diabetes and depression will be the study

population for this dissertation. Self-rated perception of health measures perceived severity of the health condition, which may act as a key independent variable to directly increase the individual's perceived threat which in turn may also change the likelihood that action will be taken in the form of physical activity. Also in this revised model, nativity is considered a measure of acculturation which may act as a moderator to influence the individual's likelihood to take action and adhere to the treatment plan including physical activity. This revised Health Belief Model will help to shape the research design that aims to predict level of physical activity outcomes among Hispanic adults with comorbid diabetes and depression.

Figure 2: Health Belief Model

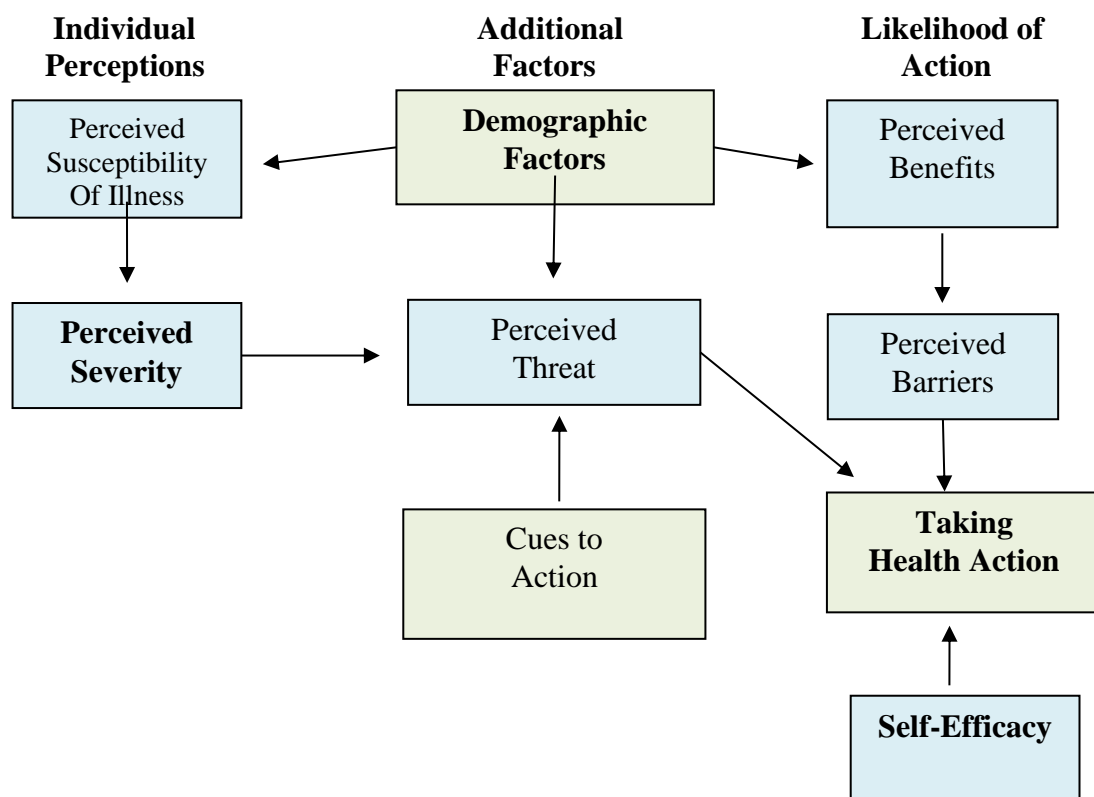
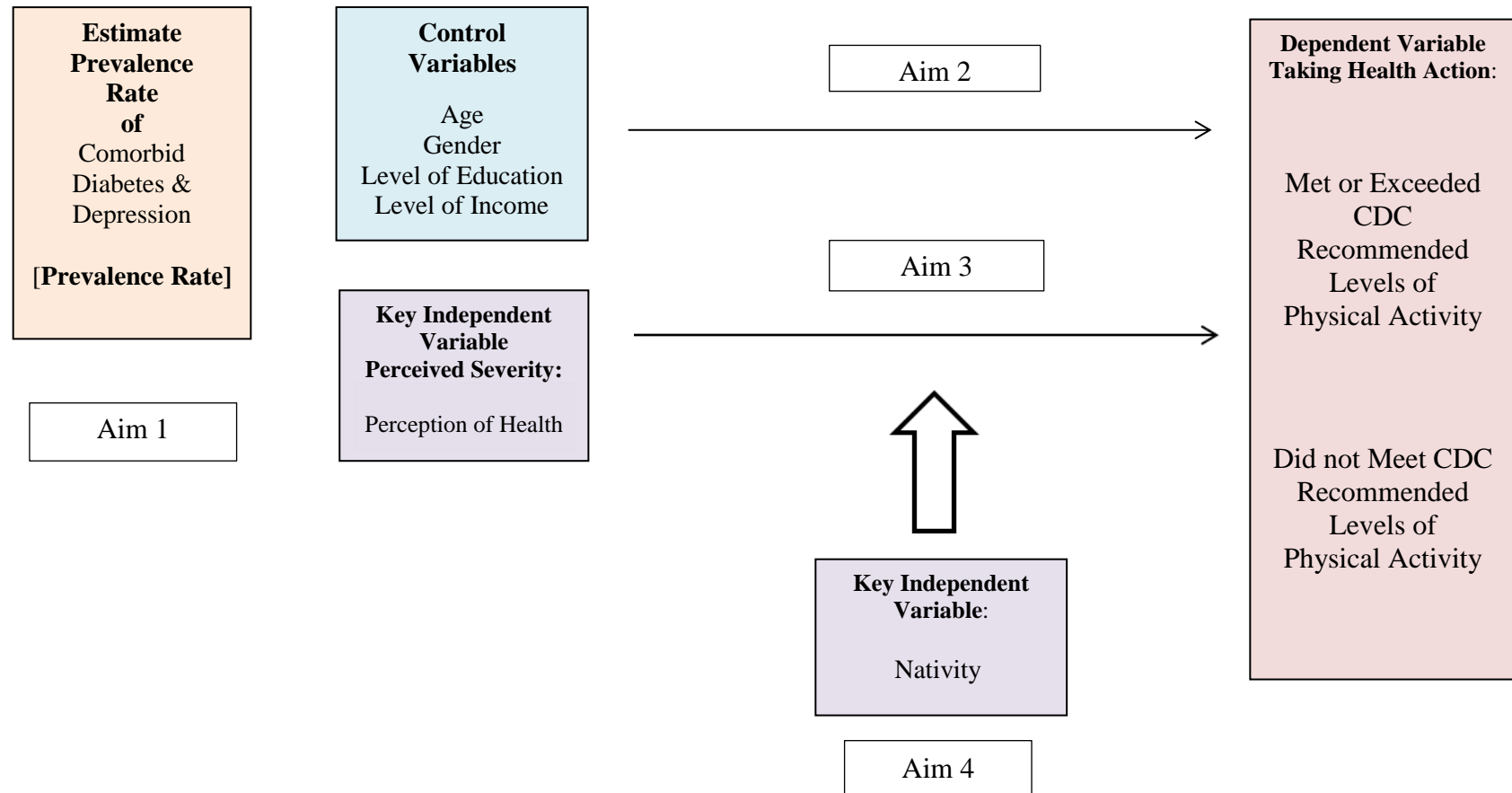


Figure 3: Health Belief Model applied to Hispanic Adults with Comorbid Diabetes and Depression among the NESARC



Chapter III: Methods

Research Design

This dissertation utilizes secondary data analysis on respondents from the NIAAA's National Epidemiologic Survey on Alcohol and Related Conditions (NESARC). This is one of the largest comorbidity studies examining drug and alcohol consumption, alcohol and substance use disorders, and the utilization of alcohol and drug treatment services (Grant & Dawson, 2006). The NESARC operationalized criteria from the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) to identify respondents with mental health concerns (Grant & Dawson, 2006). The NESARC longitudinal survey gathered data from participants in two waves: wave 1 (2001-2002; N= 43,090) and wave 2 (2004-2005; N=34,653). The NESARC used a large sample size and purposefully over sampled young adults, African-Americans and Hispanics. For this dissertation, secondary data from Hispanic adult participants in the NESARC wave 2 were examined. Wave 2 of the NESARC included several responses to questions about self-rated perception of health, level of physical activity, and medical conditions including questions about diabetes are provided in the data.

Original data were collected by Census workers using computer-assisted protocols. Potential respondents were introduced to the national study, use of the survey data, Federal laws that protect confidentiality, and the voluntary nature of their participation. The original research proposal for the NESARC received full ethical review and approval from the US Census Bureau and the US Office of Management and Budget (Grant & Dawson, 2006). Once informed consent was obtained in writing, the participants were interviewed. The original interviews were all conducted in English. For this study, data from the Hispanic respondents of wave 2 in the NESARC will be analyzed with a cross-sectional design. While this dissertation is a study of

secondary data analysis, the NESARC allows for sampling of Hispanics in larger numbers than what is possible in other national population data sets.

This research design will identify significant socio-demographic and behavioral factors that are useful in predicting level of physical activity among Hispanics with comorbid diabetes and depression. Participants for this research proposal will be determined through a cross-tabulation analysis using Predictive Analytics Software (PASW, formerly known as SPSS). Inclusion criteria consist of self-reported: identification as Hispanic, physician confirmed diagnosis of diabetes, and a lifetime occurrence of major depression or dysthymia as per NESARC algorithms.

Potential threats to internal and external validity exist when secondary data are analyzed. The NESARC data were collected by lay interviewers, and despite their training this may pose a threat to consistency in data collection (Grant & Dawson, 2006). Social desirability, self-reporting, and recall error may pose additional threats to validity of the data collected. The mood disorder diagnostic criteria in the NESARC are epidemiologic in nature and are not clinically based (Carragher et al, 2009). With secondary data analysis, missing responses affect subject size and the accuracy of analysis conducted. Missing data were imputed by NIAAA prior to the data being made available, so present day researchers are not able to see which data were missing; Nor could they go back to respondents and fill in any missing data. Data collected from wave 2 of the NESARC are a cross-sectional design and therefore will not be generalizable to the population. Finally, questions about diabetes are only asked in wave 2, which eliminates the advantage of having a longitudinal design—one cannot ascertain a temporal order to depression which was asked at both time points.

Research Setting

Original data collection for the NESARC was obtained through face-to-face computer assisted interviews conducted in respondents' homes (Grant & Dawson, 2006). The response rate for the NESARC was 81%. For the purposes of this study, secondary data analysis were conducted from the NESARC data set at the University of Houston Graduate College of Social Work.

This dissertation is designed to examine the association between perceptions of health and levels of physical activity while adjusting for demographics, socioeconomic factors, and the key independent variable of nativity. The research aims and hypotheses are listed below.

Specific Aims and Hypotheses

This proposed study will examine the relationship between socio-demographic factors, perception of health, nativity, and level of physical activity in a national sample of Hispanic adults who possess comorbid diabetes and depression. Using data previously collected from wave 2 of the National Institute on Alcohol Abuse and Alcoholism's (NIAAA) National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) (Grant & Dawson, 2006), the following specific aims and hypotheses will be studied:

Aim 1. To estimate the prevalence rate of comorbid diabetes and depression among Hispanic adults in the NESARC data set.

Hypothesis 1: Hispanics will have a higher prevalence rate of comorbid diabetes and depression than Non-Hispanic Whites.

Aim 2. To explore associations between socio-demographic factors (e.g., age, gender, level of education, level of income, and nativity) and levels of physical activity among Hispanics with comorbid diabetes and depression in the NESARC.

Hypothesis 1: Among Hispanics with comorbid diabetes and depression, there will be an inverse relationship between age and level of physical activity.

Hypothesis 2: Among Hispanics with comorbid diabetes and depression, females will have lower levels of physical activity than males.

Hypothesis 3: Among Hispanics with comorbid diabetes and depression, there will be an direct relationship between level of education and level of physical activity.

Hypothesis 4: Among Hispanics with comorbid diabetes and depression, there will be an direct relationship between level of income and level of physical activity.

Hypothesis 5: Among Hispanics with comorbid diabetes and depression, there will be a difference between US-born and foreign-born Hispanics and level of physical activity.

Aim 3. To explore associations between perceptions of health and levels of physical activity, while controlling for socio-demographic factors (age, gender, level of education, level of income, and nativity), among Hispanics with comorbid diabetes and depression.

Hypothesis 1: Among Hispanics with comorbid diabetes and depression, perception of health will have a direct relationship with physical activity.

Aim 4: To examine the potential moderating role nativity has on the relationship between perception of health and physical activity, while controlling for socio-demographic factors (age, gender, level of education, level of income), among Hispanics with comorbid diabetes and depression.

Hypothesis 1: Among Hispanic adults with comorbid diabetes and depression, nativity will have a direct moderating relationship between the perception of health and levels of physical activity.

Study participant demographic characteristics included age, sex, and self-reported ethnicity. Socioeconomic factors for study participants included self-reported household income and level of education. Key independent variables include perception of health and nativity, whether the study participant was born in the United States or a foreign country. For this study, the following variables have been identified:

Key Independent Variables:

Perception of Health: Study participants were asked a 5-point Likert-like question rating perception of health on a continuous scale ranging from lowest (poor) to highest (excellent). For this dissertation, the ratings were recoded to create a dichotomous variable of high perception of health or low perception of health.

Nativity: Study participants were asked to identify country of origin and nativity to determine ethnicity and nativity respectively. Participants were asked to indicate by writing in a blank his or her country of birth. If a participant wrote the United States they were sorted into the US-born nativity category and if a participant selected a different country, he or she was sorted into the Foreign-born category for this study.

Dependent Variable:

Levels of Physical Activity: In the originally administered (NESARC) survey, participants were asked to respond to four unique questions about the intensity of physical activity and duration of participant in physical activity. Intensity was defined based on the Center for Disease Control's recommended categories of vigorous physical activity and moderate physical activity. Survey participants were instructed to provide the number of days per week they participated in each of the two physical activity categories of intensity. Additionally, as a follow-up question to intensity, participants were instructed to indicate the number of minutes he or she participated in each category of intensity per week. This too is based on the recommendations of the Center for Disease Control's guidelines for level of physical activity. To create the variable for this study, an algorithm was created to calculate the minimum participation in either intensity for the

required number of minutes per week in order to meet the minimum standards of physical activity set by the CDC. The physical activity variable is split into two variables of: met minimum recommendations or did not meet minimum recommendations for physical activity.

Control Variables:

Age: This independent variable was a self-reported continuous variable. Study participants stated their numeric age and it was recorded at the point in time of original data collection. The variable age was kept continuous for original data analyses and for a priori analyses was categorically split at the average age for comorbidity of diabetes and depression.

Gender: This independent variable was a self-reported categorical variable. Study participants selected their gender, male or female, or chose not to make a selection. This information was recorded at the original data collection time. The variable remained categorical for data analyses purposes.

Level of Education: This independent variable was originally continuous on a 14 point scale with responses ranging from the lowest option of no formal schooling to the highest option of completed master's degree or higher graduate degree. For the purposes of this dissertation study, the variable of level of education was recoded into a categorical variable with three general categories of 1) did not complete high school or GED, 2) Completed High School or GED equivalency, and 3) Some college or completed a college degree.

Level of Income: This independent variable was originally continuous on a 17 point scale with monetary ranges in increments from \$0 annual income to \$100,000 more annual income. Study participants were asked to make a selection and self-report the range that best fit their household

income for the fiscal year 2004-2005 at the point in time of original data collection for the NESARC survey. For this study, continuous data was recoded into two categorical variables of: 1) Income at or below Federal Poverty level and 2) income at or below Average Participant Median Income Level for 2004-2005. Only the Level of Income for participants' Median Income level was used as a variable for analyses in this study.

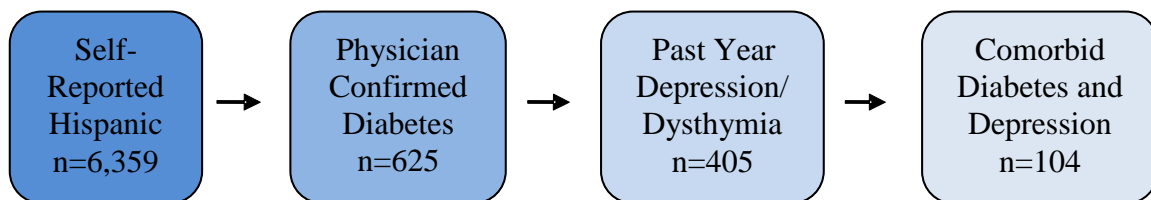
Sampling Frame

The sampling frame for the current study will be derived from the Wave 2 full data set of the NESARC (n = 34,653). Inclusion criteria consisted of: 1) self-identified as Hispanic origin, 2) participant self-reported past year diagnosis of diabetes, and 3) past year clinical diagnosis of depression as self-reported through the diagnostic survey within the NESARC survey. A sub group was created for all respondents that self-identified as Hispanic by selecting option 5 on the race/ethnicity question. From the sub group of Hispanic individuals, the respondents that reported having diabetes (Past Year Diabetes) within the past year and reported having a past year diagnosis of major depression or dysthymia made up the final study sample for this dissertation. Only Hispanic participants that met all criteria were selected for this dissertation study and considered for statistical analyses beyond prevalence rates of comorbidity, which required the full original data set.

Data analyses identified Hispanics in the NESARC consisting of n=6,359, Hispanics with diabetes consisting of n = 625, with depression consisting of n = 405, and a Hispanic comorbid study sample with both conditions consisting of n=104. A power analysis was conducted to determine that, with the number of variables considered for the proposed model, a minimum n value of 166 was needed to perform statistical analysis on this subgroup for a Multiple Regression Analysis. Figure 4 below depicts the logical flow for the sampling frame and shows

the n for the final sample size. The final n value of 104 does not meet the criteria for a large enough sample to maintain a high power for the analyses indicating that a type II error is likely to take place. Preliminary data analyses indicated that an n value of 166 would be possible, however after formal data analyses accounting for missing values for inclusion criteria and taking into consideration a clinical diagnostic definition of past year depression used to define the study population, the n value decreased to a value too small to run accurate analyses without a type II error likely to occur. Figure 4 before depicts the sampling frame for this dissertation study. Conducting analyses of the study sample of Hispanics with comorbid diabetes and depression is valuable to the contribution of information that has been gathered in the literature to this point in time. Inconsistent information is published discussing the variables being studied in this dissertation and supports the need to further examine the research questions being presented in this dissertation.

Figure 4: Sampling Frame Wave 2 NESARC n = 34,653, Study Sample n=104



Description of Study Sample

This dissertation focused on participants who identified themselves as Hispanics in Wave II of the NESARC resulting in a sample of 6,359 participants. For Wave II of the NESARC, Hispanics comprised 18.4% of the total sample. Diabetes and perception of health were not measured in Wave I of the NESARC. As seen in Table 2 (Sample Demographics) the majority

of the subsample (referred from this point on as “the Hispanic sample”) identified themselves as Mexican American (21.8%), Mexican (30.3%), Puerto Rican (11.9%), or Chicano (2.5%). The Hispanic sample had an age range from 20-90, the average age was 44 years old ($M=43.9$; $SD=15.84$). In the Hispanic sample, males outnumbered females 42.8% to 57.2% respectively and the majority of respondents indicated they were married or cohabitating with a partner (59.7%). For nativity, the sample was split down the middle with slightly less US-born (49.2%) respondents compared to Foreign-born (50.8%) respondents. The majority of respondents reported speaking and writing predominantly more English than Spanish (43.3%), followed by more Spanish than English (36.6%), and the smallest percentage of respondents reported speaking both languages equally (20.1%).

Table 2: Descriptive Statistics of the Full Hispanic Sample from the National Epidemiologic Survey on Alcohol and Related Conditions.

Demographic Variable	Hispanic Sample ($N=6,359$) %M, (N,SD)	Study Sample ($N= 104$) %M, (N,SD)
Age Range: 20-90	43.9 (15.84)	55.84 (14.82)
Gender		
Male	42.8 (2719)	28.8 (30)
Female	57.2 (3640)	71.2 (74)
Nativity		
Born in the U.S.	49.2 (3131)	51.9 (54)
Foreign Born	50.8 (3226)	48.1 (50)
Ave. Number of Yrs. in the U.S.	21.35 (12.75)	31.12 (13.74)
Country of Descent		
Mexican	30.3 (1929)	18.3 (19)
Mexican-American	21.8 (1384)	19.2 (20)
Puerto Rican	11.9 (755)	20.2 (21)
Chicano	2.5 (159)	5.8 (9)
Language		
Spanish Predominantly Spoken	36.6 (2322)	53.4 (55)
English Predominantly Spoken	43.3 (2741)	31.1 (32)
Both Languages Spoken	20.1 (1276)	15.5 (16)
Education		
Did not complete High School	31.2 (1983)	48.1 (50)

Completed High School/GED	24.8 (1577)	17.3 (18)
Some College/Graduated College	44.0 (2799)	34.6 (36)
Income		
Poverty Level for		
2004-2005 was \$19,481		
At or Below Poverty Level	53 (3242)	77.2 (78)
Above Poverty Level	47 (2877)	22.8 (23)
Median Income Level for		
2004-2005 was \$45,463		
At or Below Median Level	87.5 (5567)	95.2 (99)
Above Median Level	12.5 (792)	4.8 (5)
Past Year Diagnosis of Diabetes		
Yes	9.8 (625)	100 (104)
No	90.2 (5734)	
Past Year Diagnosis of Depression		
Yes	9.7 (614)	100 (104)
No	90.3 (5745)	
Perception of Health		
Higher Perception	80.8 (5141)	29.8 (31)
Lower Perception	19.1 (1213)	70.2 (73)
CDC Physical Activity		
Met/Exceeded CDC Recommendations	53.4 (3376)	38.5 (40)
Below CDC Recommendations	46.6 (2950)	61.5 (64)

Standard Deviations are given in parentheses.

Foreign-born respondents reported on average 21 years in the United States. In general, the majority of the Hispanic sample reported 24.8% having earned a High School Diploma or GED, 31.2% did not complete HS/GED, and 44% has some college or higher. The majority of respondents in this sample reported higher perceptions of health (80.8%) compared to lower perceptions (19.1%). Of all the respondents, 625 (9.8%) indicated a physician confirmed diagnosis of Diabetes in the past year while 405 (6.4%) reported a past year diagnosis of Depression and/or Dysthymia. Comorbidity of diabetes and depression was determined for a sub-group of the Hispanic population and made up the participants of interest for this dissertation.

Of the participants for this study, referred to as the “study sample” from this point on, 104 (17%) have reported comorbidity of diabetes and depression which make up the study sample for data analysis. As seen in Table 2 above, the majority of the study sample identified themselves as Mexican American (19.2%), Mexican (18.3%), Puerto Rican (20.2%), or Chicano (5.8%). The study sample had an age range from 23-85 with the mean age of 56 years old ($M=55.84$; $SD=14.81$). In the study sample, females outnumbered males 71.2% to 28.8% respectively and the majority of respondents indicated they were divorced, widowed, separated or never married (57.7%). For nativity, the sample was split down the middle with slightly more US-born (51.9%) respondents compared to Foreign-born (48.1%) respondents. The majority of respondents reported speaking and writing predominantly more Spanish than English (53.4%), followed by more English than Spanish (31.1%), and the smallest percentage of respondents reported speaking both languages equally (15.5%). Foreign-born respondents reported on average 31 years in the United States. In general, the majority of the sample reported 48.1% not having completed HS/GED, followed by 34.6% having earned some college or higher, and 17.3% having earned a High School Diploma or GED. The majority of respondents in this sample reported lower perceptions of health (70.2%) compared to higher perceptions (29.8%).

Description of NESARC Survey

Researchers for the NESARC used the Census 2000 Group Quarters Inventory to form the sampling frame of 34,653. Individuals were randomly selected from a systematic sample of group quarters to participate in the NESARC survey (Grant & Dawson, 2006). Respondents in the NESARC represent a sample of the civilian, non-institutionalized adult population of the US including people in households, military personnel living off base and people living in group quarters. All potential respondents received written informed consent in compliance with ethical

standards from the governing institutional review board. The NESARC sample was weighted to adjust for non-response at the household and personal levels. Data were adjusted to be representative of the US population for various socio-demographic variables: religion, age, sex, race, and ethnicity (Grant & Dawson, 2006).

Measures

Researchers of the NESARC used the Alcohol Use Disorder and Associated Disability Interview Schedule-IV (AUDADIS-IV) for a measurement tool. The reliability and validity of the AUDADIS-IV has been studied and documented within the general population and with clinical samples (Grant & Dawson, 2006). The AUDADIS-IV is a semi-structured diagnostic interview schedule designed to be easily administered by the interviewer (Grant & Dawson, 2006). The AUDADIS-IV includes extensive questions on quantity, frequency, and patterning of alcohol, tobacco, drug use, and lifetime occurrence of various mood disorders (Grant, Dawson, Stinson, Chou, Kay, & Pickering, 2003).

The AUDADIS-IV was tested for reliability using the test-retest design among 2,657 respondents in a subset randomly drawn from the NESARC. The axis I disorders of major depression and dysthymia showed good reliability with a Chronbach's alpha score of .71 for major depression and .57 for dysthymia. The high reliability rates suggest that the measurement tool can be used in studies of the general population (Grant et al., 2003). All diagnoses from the AUDADIS-IV version are made according to the Diagnostic and Statistical Manual-Fourth Edition, Text Revision (APA, 2000). The measurement tool is entirely standardized and relies on self-report from respondents. The diagnostic criteria in the AUDADIS-IV was highly correlated with the DSM-IV diagnostic criteria (Grant et al., 2003) demonstrating excellent construct validity.

The wave II of the NESARC included the Low Mood Questionnaire consisting of DSM-IV criteria for depression. Respondents who reported experiencing a certain number of criteria (i.e. anhedonia, appetite and weight changes, sleep changes, fatigue, psychomotor retardation or agitation, restlessness, feelings of worthlessness, excessive guilt, diminished concentration, and impaired decision-making) over a period of time as well as social/occupational dysfunction resulted in a diagnoses of Major Depression and Dysthymia. The NESARC asks several questions assessing for a diagnosis of Major Depression and Dysthymia in the past year. This dissertation operationalized depression as having a past year diagnosis of Major Depression or Dysthymia within the past year at the time the NESARC was administered. The depression variable for this dissertation was created by an algorithm combining sample estimates for past year Major Depression and past year Dysthymia for Hispanic respondents and is referred to in this study as past year depression.

Additional factors in this research study were self-reported questions not in a sub-scale such as age, gender, marital status, level of individual income, and level of education. The variable of age was continuous and remained unchanged for the initial analyses of this dissertation. After reviewing results, a priori sensitivity testing for age was conducted, this dichotomized the study sample into two groups based on age. The study sample was split at 55 years similar to previous studies conducted and published in the literature and based on the average age of the Hispanic participants in this study sample. Gender, a categorical variable, remained in its original form for this study. Level of income and education were both recoded into clinically significant variables for data interpretation based on literature related to the Hispanic population. The variable for education was recoded to create three categories that included: 1) Did not complete high school, 2) Completed high school or GED Equivalency, and

3) Some college or Graduated College. Additionally, the variable for income was recoded into two new variables based on the poverty level for 2004-05 (the year in which the NESARC was administered) and the median income level for full sample participants for the year 2004-05. The Income Poverty variable was divided into 1) above poverty level (\$19,481) and 2) at/or below poverty level. Likewise, the Income Median variable was divided into 1) above median level (\$45,463) and 2) at/or below median level.

Socio-demographic factors were self-reported in the NESARC by respondents. Factors such as nativity, language spoken/written, perception of health, diabetes, and level of physical activity were recoded for analyses purposed. The variable of Nativity was recoded into two groups 1) United States Born and 2) Foreign Born. Language spoken was recoded based on a continuum of language spoken/written and included three variables: 1) More Spanish than English, 2) More English than Spanish, and 3) Both Languages Equally. This dissertation is a study on previously collected data therefore no collection of new data took place with any of the respondents. Secondary data analysis methods will be used to explore the hypotheses for this study.

Data Analysis

Data analyses explore the relationship between socio-demographic factors, perception of health, and physical activity among Hispanics with comorbid diabetes and depression. Descriptive statistics and frequencies were used to create demographic tables to provide clinical perspective of the study sample from various perspectives. Initial data analyses included a descriptive comparison of the clinical data of the Hispanic sample and the Comorbid Hispanic Study Sample. A priori, a clinical descriptive comparison was provided of the Hispanic Study Sample stratified by key independent variables of nativity, US-born and foreign-born, and age,

55 or younger adults and older than 55 adults. These data analyses were conducted using SPSS statistical software package for descriptive statistics.

Chi-square tests were used to compare the distribution of participants' demographic and clinical characteristics to the outcome variable of physical activity. I also used the independent t-test to compare participants' mean age with the outcome variable physical activity. Main effects of control variables and key independent variables were tested for statistical significance using simple standard linear regression models. Multiple regression models were tested with the standard enter method for all variables with statistical significance, clinical significance supported by academic literature, and with key variables identified for testing such as for participants' self-reported perception of health and potential moderating effects of nativity on the outcome variable physical activity. These data analyses were also conducted using the SPSS software package for bivariate and multivariate statistics.

Because preliminary data analysis suggest that comorbidity of diabetes and depression increases with age, I decided a priori to conduct separate analyses stratifying the regression analyses by age into two groups: less than and greater than 55 years as is supported by the academic literature and is similar to the mean age of Hispanics in the dissertation study sample. Finally, additional regression analyses were conducted stratified by nativity, U.S.-born and foreign-born, given the clinical significance of nativity to health related outcomes (as part of the acculturation process) indicated in the academic literature. These data analyses were also conducted using the SPSS software package for bivariate and multivariate statistics.

This dissertation study used previously collected data from Wave 2 of the NESARC, which contains the *perception of health, nativity, and physical activity* variables of interest. The

following is a description of the research aims and hypotheses including the methodology for data analyses for each.

Aim 1: To establish the prevalence rate of comorbid diabetes and depression among Hispanic adults in the NESARC data set.

Hypothesis 1: Hispanics will have a higher prevalence rate of comorbid diabetes and depression than Non-Hispanic Whites.

Methodology: The full NESARC wave II data set was filtered by Ethnicity for this analysis. The variable of Ethnicity was coded 1= White, Non-Hispanic, 2= Black, Non-Hispanic, 3= American Indian/Alaska Native, Non-Hispanic, 4= Asian/Native Hawaiian/Other Pacific Islander, Non-Hispanic, and 5= Hispanic, Any Race. The variable diabetes was coded as 0= No past year Diabetes and 1= Yes past year Diabetes. The variable for past year depression was a combination of met criteria for a past year clinical diagnosis (based on DSM-IV screening within NESARC survey) of Major Depression and/or met criteria for a past year only clinical diagnosis of dysthymia. Likewise, the variable for past year depression was an algorithm that combined participants responses that did not over count or double count participants. Similar to past year diabetes, the past year depression variable was coded as 0= No past year Depression and 1= Yes past year Depression. For this dissertation, prevalence rates were calculated and compared by Ethnicity with non-Hispanic Whites as a reference group however all ethnicities will be reported. A descriptive table was generated to display demographic results on rates of comorbid diabetes and depression.

Aim 2: To explore associations between socio-demographic factors (e.g. age, gender, level of education, level of income, and nativity) and levels of physical activity among Hispanics with comorbid diabetes and depression in the NESARC.

Hypothesis 1: Among Hispanics with comorbid diabetes and depression, there will be an inverse relationship between age and level of physical activity.

Hypothesis 2: Among Hispanic adults with comorbid diabetes and depression, females will have lower levels of physical activity than males.

Hypothesis 3: Among Hispanic adults with comorbid diabetes and depression, there will be a direct relationship between level of education and level of physical activity.

Hypothesis 4: Among Hispanic adults with comorbid diabetes and depression, there will be a direct relationship between level of income and level of physical activity.

Hypothesis 5: Among Hispanics with comorbid diabetes and depression, there will be a difference between US-born and foreign-born Hispanics and level of physical activity.

Methodology: The dataset (NESARC wave II) was filtered so that the study sample only included Hispanic respondents with comorbid diabetes and depression. Using the statistical SPSS software package, the full Hispanic sample was first analyzed with frequency distributions for the diabetes and depression variables individually as checks and balances prior to sorting and creating a new dataset of the study sample which only contained participants with comorbid diabetes and depression. The data set then was sorted by participants based on response categories to diabetes and depression variables. Only participants that categorically were “yes” to both a past year history of diabetes and depression composed the new dataset or study sample. Bivariate statistical analyses, Chi-square and Independent t-tests, were conducted using each independent variable with the dependent variable, level of physical activity. Results of the

analyses were reviewed to determine associations between variables and whether there was a statistically significant relationship among independent and dependent variables.

Aim 3. To explore associations between perceptions of health and levels of physical activity, when controlling for socio-demographic factors (age, gender, level of education, level of income), among Hispanics with comorbid diabetes and depression.

Hypothesis 1: Among Hispanics with comorbid diabetes and depression, perception of health will have a direct relationship with physical activity.

Methodology: Correlation Matrices and Standard Linear Regression Analyses were applied to examine the main effect of the predictor variable perception of health as it relates to the outcome variable level of physical activity. Results of the analyses were reviewed to determine associations between variables and whether there was a statistically significant relationship among independent and dependent variables.

Aim 4: To examine the potential moderating role nativity has on the relationship between perception of health and physical activity, when controlling for socio-demographic factors (age, gender, level of education, level of income), among Hispanics with comorbid diabetes and depression.

Hypothesis 1: Among Hispanics with comorbid diabetes and depression, nativity will have a direct moderating relationship between the perception of health of and levels of physical activity.

Methodology: An interaction variable was created with perception of health and nativity in the study sample data set using the SPSS software package. This variable was created and used to help determine if a potential moderating role existed for nativity on the relationship between

perception of health and physical activity. Correlation Matrices and Standard Linear Regression Analyses were applied to examine the direct effects of predictor variables and the potential interaction effects of moderating variables as they relate to the dependent variable of level of physical activity.

Chapter IV: Results

Comorbidity of diabetes and depression among Hispanics disproportionately affects females compared to males (see Table 2). The study sample, on average, has resided in the United States 10 additional years compared to the full Hispanic sample which may be due to the acculturative process. Hispanics with comorbidity are predominantly Spanish-speaking and on average 12 years older than their non-comorbid counterparts. When compared to the full Hispanic sample, the comorbid study sample is less educated and is living in poverty (see Table 2). Opposite the non-comorbid sample, Hispanics with comorbidity have a lower perception of their health. These factors may influence their health and mental health seeking behaviors and treatment outcomes.

Following preliminary analysis, it was evident that the sample differed based on age. While initial chi-square tests in this study resulted in non-significant findings, academic literature supports some variables, such age, gender, nativity, and perception of health, maintain relevance to treatment outcomes and were included in the logistic regression models for analyses. Independent t-tests for age in this study resulted in significant findings suggesting that age is an important factor in determining participation levels of physical activity. These preliminary findings indicated that while the study sample shared a similar background in ethnicity, they may not be as homogeneous as expected therefore the analyses for this dissertation was conducted on those who reported a comorbidity of diabetes and depression, and

then stratified for Nativity (US born and Foreign born Hispanics separately) as well as stratified by age (older adults and young adults).

Univariate Descriptive Statistics

Full Sample: Hispanics

Hispanics comprise 6,359 or 18.7% respondents from the wave II of the NESARC dataset. Of the comorbid Hispanic study sample derived from wave II, females outnumber males 71.2% to 28.8%. Slightly more than half of the sample was US-born Hispanics (50.8%) and 53.4% reported speaking more Spanish than English while only 15.5% said they equally spoke both languages. The majority of the study sample did not complete high school with 48.1% reporting having not completed high school or a receiving a GED. Additionally, more than half (77.2%) reported an income at or below the national poverty level in 2004-05; the year at which the NESARC survey was administered. In the study sample, a large number of Hispanic respondents, 70.2% reported having Low perceptions of health while only 38.5% reported meeting the CDC's recommendation for aerobic levels of physical activity.

Table 11: Descriptive Statistics of the Study Sample Nativity and Age Sub Groups from the National Epidemiologic Survey on Alcohol and Related Conditions.

	Study Sample (N= 104) %M, (N,SD)	US Born /Foreign Born			Older/Younger Adults
Demographic Variable					
N=104					
Age Range:	20-90 55.84 (14.82)	23-83 51.76 (15.826)	34-85 60.24 (12.34)	56-85 66.98 (7.93)	23-55 42.83(9.31)
Gender					
Male	28.8 (30)	31.5 (17)	26 (13)	28.6 (16)	29.2 (14)
Female	71.2 (74)	68.5 (37)	74 (37)	71.4 (40)	70.8 (34)
Language					
Spanish Predominantly Spoken	53.4 (55)	24.5 (13)	84 (42)	69.1 (38)	35.4 (17)
English Predominantly Spoken	31.1 (32)	22.6 (12)	8 (4)	14.5 (8)	50 (24)
Both Languages Spoken	15.5 (16)	52.8 (28)	8 (4)	16.4 (9)	14.6 (7)
Education					
Did not complete High School	48.1 (50)	37.0 (20)	60 (30)	62.5 (35)	31.3 (16)
Completed High School/GED	17.3 (18)	20.4 (11)	14 (7)	10.7 (6)	25 (12)

Some College/Graduated Col.	34.6 (36)	42.6 (23)	26 (13)	26.8 (15)	43.8 (21)
Income					
Poverty Level for 2004-2005 was \$19,481					
At or Below Poverty Level	77.2 (78)	65.4 (34)	89.9 (44)	87.3 (48)	65.2 (30)
Above Poverty Level	22.8 (23)	34.6 (18)	10.2 (5)	12.7 (7)	34.8 (16)
Median Income Level for 2004-4005 was \$45,463					
At or Below Median Level	95.2 (99)	94.4 (51)	96 (48)	98.2 (55)	91.7 (44)
Above Median Level	4.8 (5)	5.6 (3)	4 (2)	1.8 (1)	8.3 (4)
Perception of Health					
Higher Perception	29.8 (31)	35.2 (19)	24 (12)	19.6 (11)	41.7 (20)
Lower Perception	70.2 (73)	64.8 (35)	60 (38)	80.4 (45)	58.3 (28)
CDC Physical Activity					
Met/Exceeded CDC Rec.	38.5 (40)	38.9 (21)	38 (19)	30.4 (17)	47.9 (23)
Below CDC Rec.	61.5 (64)	61.1 (33)	62 (31)	69.6 (39)	52.1 (25)

Standard Deviations are given in parentheses.

On average foreign-born Hispanics with comorbid diabetes and depression were 9 years older and less educated having not completed a high school diploma. Older Hispanic adult with comorbidity spoke more Spanish than English, were also less educated, and maintained lower perceptions of their health and had lower measure of physical activity. There was no difference of perception of health based on nativity (see Table 11).

Comorbid Diabetes and Depression Rates

Comorbid diabetes and depression for non-Hispanic Whites, reference group, in the NESARC full data set is at 10.30%. When compared to other minority groups in the NESARC this prevalence rate is lower than all ethnic groups with the exception of Asian/Native Hawaiian/Other Islander, Non-Hispanic (7.41%). Additionally, Non-Hispanic Black participants had a comorbid diabetes and depression rate of almost 18%, higher than all ethnic groups listed in Table 3 below. For this dissertation study, Hispanics with comorbid diabetes and depression were a subgroup of interest and their rate of comorbidity was 16.94%, greater than their Non-

Hispanic White counterparts, but not as high as Non-Hispanic Blacks. American Indian/Alaska native, Non-Hispanics had a rate of 12.68%.

Table 3 : Rates for Comorbid Diabetes and Depression by Ethnicity, NESARC

Race/Ethnicity	Comorbidity%	(N)
White, Non-Hispanic	10.30	(191)
Black, Non-Hispanic	17.95	(110)
American Indian/Alaska Native, Non-Hispanic	12.68	(9)
Asian/Native Hawaiian/Other Islander, Non-Hispanic	7.41	(4)
Hispanic, Any Race	16.94	(104)

NESARC, Wave II

Comorbid diabetes and depression disproportionately affect minority populations when compared to their non-Hispanic White counterparts.

Bivariate Statistics

Independent (Predictor) Variables: Socio-demographic Factors and Level of Physical Activity

Bivariate analyses were conducted to determine if a difference in level of physical activity based on the variable being tested. Chi square analyses were used for key independent and control variables that were categorical in nature. Independent t-tests were conducted for the variable that was continuous. Table 4 below displays a summary of the results from the bivariate analyses. Results indicating a statistical significance between the independent variable and the dependent variable, marginal significance between the independent variable and the dependent variable, and clinical significance of an independent variable as supported by academic literature

will be entered into a standard multiple regression model for analyses in the next steps of the data analyses plan.

Table 4: Bivariate Chi Square Analyses for Level of Physical Activity, Study Sample

Variable	Value	Level of Physical Activity	
		Below CDC Recommendations	Met CDC Recommendations
*Gender	$X^2 (1) = 1.275, p<.259$		
Male		70%	30%
Female		58.1%	41.9%
Nativity	$X^2 (1) = .009, p<.926$		
US-Born		61.1%	38.9%
Foreign-Born		62.0%	38.0%
Level of Income	$X^2 (1) = .029, p<.865$		
At or Below Poverty		62.8%	37.2%
Above Poverty		60.9%	39.1%
Level of Education	$X^2 (2) = .361, p<.835$		
Did not Complete High School		62.0%	38.0%
Completed High School/GED		66.7%	33.3%
Some College/Graduated College		58.3%	41.7%
*Perception of Health	$X^2 (1) = .838, p<.360$		
High Perception		54.8%	45.2%
Low Perception		64.4%	35.6%

***Approaching Clinical Significance**

Results from the chi-square test conducted with gender and physical activity indicate there was not a statistically significant difference between groups $X^2 (1) = 1.275, p<.259$. The difference in the level of physical activity between Hispanic male and female participants is not significant. Hispanic men with comorbid diabetes and depression have a lower percentage of participation in clinically significant levels of aerobic physical activity than their female counterparts.

A second chi-square test was conducted with nativity and physical activity. The results were not statistically significant ($X^2(1) = .009, p < .926$) indicating that foreign born and US born Hispanics' participation level in physical activity was about the same and not significantly different.

A chi-square test was conducted to determine the relationship between the key independent variable of self-rated perception of health and physical activity. There is not a statistically significant ($X^2(1) = .838, p < .360$) difference by level of perception of health in the level of physical activity reported. There were roughly 10% more participants with higher perceptions of health that also met or exceeded the CDC's recommended levels for physical activity.

Similarly, chi-square tests were conducted with the variables of education and income with physical activity. Results of both tests indicated there was not a statistically significant difference. In other words, participants who reported different levels of income and different levels of education did not show a difference in level of participation in level of physical activity outcomes.

There is a statistically significant difference by age in the level of physical activity reported. Participants who met or exceed the CDC clinically recommended guidelines for physical activity are, on average, 7.5 years older (Mean Age = 58.7 vs 51.25; $t = 2.563, df = 104, p < .05$).

Table 5: Bivariate Independent T-test Analysis for Age by Physical Activity, Study Sample

Variable	n	Mean (SD)	t	df	p	95% Confidence Interval Lower-Upper
Met CDC Standard	40	51.25(14.018)				

Did not meet 64 58.7(14.679)
CDC Standard

Total 104 55.84(14.815) 2.56 102 .012* 1.684-13.222

*p<.05 Statistical Significance

An chi-square test was applied to the potential moderating variable of nativity ($X^2(1) = .151$, $p < .698$) and those results were also insignificant indicating that Nativity may not have a moderating role or an interaction effect between perception of health and the outcome variable of physical activity. These results may also be in part due to a type 2 error and low power.

Multivariate Statistics

A logistic regression was performed to understand the main effects and potential interaction effects of the key independent variables and the control variables on the likelihood that participants have significant levels of physical activity as recommended by the Center for Disease Control. Table ## displays the results of the univariate statistical analyses for main effects tested for all 7 variables of interest. The results from these analyses will determine which variables will be entered into the multivariate logistic regression to test the final model.

Table 6: Linear Regression Analyses of Level of Physical Activity, Independent Variables

Level of Physical Activity Study Sample, CDC Recommendations

Variable Tested	X²	B (SE)	p	R Square
Gender	1.125	.119 (.106)	.263	.012
Age	-2.563	-.008 (.003)	.012*	.060
Nativity	-.092	-.009 (.096)	.927	.000
Income Poverty	.168	.020 (.116)	.867	.000
Education	.307	.016 (.054)	.759	.001
Perception of Health	.910	.095 (.106)	.365	.008

Statistical Significance *p<.05

The results from the standard linear regression analyses indicate that 1 of the 6 variables, age, are statistically significant and has a main effect on the dependent variable, physical activity. Therefore, age will be used for further multiple regression analyses. Other variables

that were approaching significance, may have clinical significance, or are supported by the academic literature will be used for further multiple regression analyses and tested in models. Also important to note in the results of the analyses is the small R Square values, or the effect size, of the change in unit variable for outcome variable change. This may also be due in part to a type 2 error.

Table 7: Linear Regression Analyses of Level of Physical Activity, Moderating Variable

Level of Physical Activity Study Sample, CDC Recommendations

Variable Tested	X ²	B (SE)	p	R Square
Moderator Nativity	-.385	-.058 (.151)	.701	.001

Statistical Significance *p<.05

Next, the interaction effect of the key independent variable, perception of health and nativity was tested in a standard regression analyses. Table 7 displays the results of the univariate statistical analyses for possible interaction effects between key independent variable, the potential moderating effects of nativity on perception of health and the dependent variable. The results of these analyses were not significant indicating that nativity may not have an interaction effect with perception of health on the outcome variable physical activity. It is important to note that the n value for this dissertation study is 104 with is determined to be too small for power analyses for regression models therefore the results for these analyses may not be accurate and may in fact be inconclusive. Also important to note in the results of these analyses is the small R Square values, or the effect size, of the change in unit variable for outcome variable change. This may also be due in part to a type 2 error.

Multivariate Logistic Regression Analyses

A multivariate logistic regression analysis was performed to understand the effects of the variables age, gender, nativity, perception of health, education, and income on the likelihood that

participants have clinically significant levels of physical activity as recommended by the Center for Disease Control. Three models were created and tested using a block standard enter method which included variables of interest, significant variable, and potential moderating variable. In each model, the only variable to remain significant was age and therefore any model that included additional variables resulted in a statistically insignificant p value. In each model, older adults were more likely to participate in higher levels of physical activity than younger adults. The three tables, 8-10, listed below are the models that were tested which include the variable of interest. With each model, age was the only variable with statistically significant results.

Table 8: Model 1 Multivariate Logistic Regression Analysis of Level of Physical Activity, Enter Method

Level of Physical Activity Study Sample, CDC Recommendations				95% CI for Odds Ratio		
Variable Tested	X ²	B (SE)	Odds Ratio	p	Lower	Upper
(Constant)	1.812	.645 (.356)	--	.073	-.062	1.352
Age	-2.460	-.009 (.004)	.276	.016*	-.016	-.002
Gender	1.292	.141 (.109)	.129	.200	-.076	.359
Nativity	.934	.112 (.120)	.116	.353	-.126	.350
Perception of Health	1.077	.157 (.146)	.147	.284	-.132	.447
Level of Income	-.388	-.056(.146)	-.049	.701	-.347	.234
Level of Education	-.214	-.014 (.066)	-.026	.831	-.145	.117

P<.05

Model 1, included all variables of interest to test for significance among Hispanics with comorbidity to predict levels of physical activity. The standard enter method was used and age was the only variable proven statistically significant in this analysis indicating that as age increases the likelihood of participating in CDC recommended levels of physical activity decreases. No other variables tests were proven statistically significant in model 1.

Table 9: Model 2 Multivariate Logistic Regression Analysis of Level of Physical Activity, Enter Method

Level of Physical Activity Study Sample, CDC Recommendations				95% CI for Odds Ratio		
Variable Tested	X ²	B (SE)	Odds Ratio	p	Lower	Upper
(Constant)	1.933	.511 (.264)	--	.056	-.014	1.035
Age	-2.438	-.008 (.003)	.255	.017*	-.015	-.002
Gender	1.370	.148 (.108)	.135	.174	-.066	.362

Nativity	1.075	.125 (.117)	.129	.285	-.106	.357
Perception of Health	1.038	.148 (.143)	.138	.302	-.135	.431
Moderator Nativity	-1.234	-.262 (.212)	-.175	.220	-.683	.159

P<.05

Level of income and level of education were removed from the next analysis and the moderating variable of nativity was added. The inclusion of age, gender, nativity, and perception of health are supported by the academic literature therefore a second model was created and tested.

Similar to Model 1, a multivariate logistic regression analysis was conducted using the standard enter method and age was proven statistically significant indicating that as the participant grows older, their likelihood to meet the CDC recommended guidelines for physical activity decrease.

No other factors were proven statistically significant in this analysis.

Table 10: Model 3 Multivariate Logistic Regression Analysis of Level of Physical Activity, Enter Method

Level of Physical Activity Study Sample, CDC Recommendations				95% CI for Odds Ratio		
Variable Tested	X ²	B (SE)	Odds Ratio	p	Lower	Upper
(Constant)	1.899	.502 (.264)	--	.061*	-.023	1.026
Age	-2.231	-.007 (.003)	.225	.028*	-.014	-.001
Gender	1.468	.158 (.107)	.144	.145	-.056	.371
Perception of Health	.692	.092 (.133)	.086	.491	-.172	.356
Moderator Nativity	-.784	-.141 (.180)	-.094	.435	-.500	.217

P<.05

Model 3 was also designed to test key variables in a multivariate logistic regression analysis using the standard enter method. This model included variables age, gender, perception of health and the moderating variable of nativity. Once more, age was proven statistically significant while other variables did not indicating that there is a difference between Hispanic older adults and young adults with comorbid diabetes and depression.

To observe differences between US born and Foreign-born Hispanics I created a dichotomous variable, Nativity (0=Foreign Born, 1=US Born) and subsequently a stratified data set. With the Nativity data set, bivariate and multivariate analyses were also conducted with

similar results. Age was the only variable found to be statistically significant with the US born data set. See tables 13 below.

Table 13: Bivariate Independent T-test Analysis for Age by Physical Activity, Study Sample US Born

Variable	n	Mean (SD)	t	df	p	95% Confidence Interval Lower-Upper
Met CDC Standard	21	45.24(14.973)				
Did not meet CDC Standard	33	55.91(15.133)				
Total	54	51.76(15.826)	2.536	52	.014*	2.228-19.113

*p<.05 Statistical Significance

To observe differences between Older Hispanic adults and Younger Hispanic adults, I created a dichotomous variable, Age (0=55 or Younger, 1=56 or Older) and subsequently a stratified data set for analyses. The results indicated that Age was a significant variable with the Older Adults sub group while all other variables did not meet significance. This is likely due to a type 2 error with low power. Reference tables 16-19 in the appendix.

Chapter IV: Discussion

Discussion

This dissertation examines the relationship between perception of health and level of physical activity among the Hispanic comorbid study sample within the NESARC. Findings indicate that older Hispanics with comorbid diabetes and depression are more likely to have lower levels of physical activity resulting in exercise activity levels that do not meet the standards set by the Center for Disease Control. Results from this dissertation suggest that this

particular group of Hispanics, age 56 or older, may not be adhering to an important component of their treatment plans, sufficient physical activity needed to help regulate blood sugars. Additionally, other factors such as gender, poverty, nativity, and perception of health were not proven significance; however may still be significant in a clinical setting. For medical practitioners and social workers in clinical settings, such as a primary care doctor's office, a diabetes specialty clinic, or community-based Hispanic serving health organizations, attention should be given to behavioral health services and mental health screening to take into consideration socio-demographic factors where there was a difference in percentages of comorbidity of diabetes and depression. Practitioners would afford higher quality care to patients if they were to take note when engaging with clients in non-research environments especially with high-minority and high-immigrant populations as comorbidity of diabetes and depression affected males and females differently depending on nativity.

The mental health help-seeking behaviors of the Hispanic population has lower instances when compared to their counterparts, non-Hispanic Whites, so in a medical clinical environment it may be key to screen for depressive symptoms for foreign-born female clients already diagnosed with diabetes as they may benefit from concurrent treatment options. Results from the demographic data suggest that the Hispanic comorbid diabetes and depression population in the United States may consist of more females than males and that nativity is not a significant moderating variable at this time. These results are in alignment with immigration research and the inconsistent results of the Hispanic Health Paradox in the literature. While the Hispanic Health Paradox continues to elude researchers it remains worthy of investigation when mental health diagnoses and treatment are crucial to behavior health outcomes of patients.

Recently the literature has begun to recognize the importance of the acculturation process, specifically nativity, as it relates to health behaviors of Hispanics and this is also important in studying the behavioral health outcomes of those affected by comorbidity of diabetes and depression. This dissertation considered nativity as one measure of the acculturation process and it is important to recognize that limitations in power may have contributed to type 2 errors in some analyses there is valuable information to gather from the differences in demographic characteristics presented in this research study. While non-significant results may indicate a rejection of the hypothesis, some may actually have clinical significance for practitioners such as recognizing that minority populations, Non-Hispanic Black and Hispanics, have higher rates of comorbidity than their Non-Hispanic White counterparts. The rate is higher by at least 7% in this study indicating that comorbidity of diabetes and depression is a minority issues that disproportionately affects Hispanics due to their lack of mental health help-seeking behaviors and due to the variability in immigration populations. Behavioral health treatment and outcomes of the Hispanic population has not been researched enough and given their growing numbers and increasing age comorbidity research will continue to be a high priority for the medical and social work fields.

The NESARC data set, of which the Hispanic comorbid diabetes and depression study sample derived from, is a population sample and not a clinical sample which presents a limitation to this research and dissertation. Additionally, with an n value of 104 there are power limitations for the multiple regression models when you take into consideration the amount of variables being considered for research. While one variable, age, was found to be statistically significant, the clinical significance of this research should not go unnoticed. Research on this particular population is not as readily available as it should be understood that Hispanics are the fastest

growing demographic in the United States and account for over 17% of the population. Future research conducted in a medical setting such as a community-based clinic specifically addressing Hispanic patients with diabetes would provide a more clinical sample more suitable for this type of research design. Researching factors that may predispose someone to favorable or poor health behavior outcomes is valuable information needed by professionals in the medical and social work field. Identifying early on, whether in community-based interventions or medical-based office visits, which clients may be experiencing comorbidity and the negative outcomes that are likely to come from having multiple chronic conditions will eventually save the client, the community, and society as a whole a great deal of financial resources and of course unnecessary pain and suffering.

Conclusion

Preliminary findings suggest that one crucial socio-demographic factor, age, has a significant role in determining whether or not a Hispanic individual will participate in high or low levels of physical activity as recommended by the Center for Disease Control. Clinically significant is the factor of gender, indicating that females tend to make up more of the population in this study sample of Hispanics with comorbid diabetes and depression. While this demographic variable proved not statistically significant, it is approaching significance meaning that if a type II error did not exist that perhaps the finding would be significant at $p < .05$ level. This difference in gender make up in the study sample is worth noting for professional practice and further investigation through additional research.

The academic literature on Hispanic Health Paradox indicating that foreign-born Hispanics often have better health than their Non-Hispanic White counterparts on morbidity and mortality outcomes remains at the forefront of future research. Behavioral health outcomes

related to Hispanics with comorbidity of diabetes and depression as well as other chronic conditions may suggest that there are multiple factors to take into consideration and potential confounding environmental, cultural, and economic characteristics influencing someone's decision to take action towards a treatment plan such as physical activity or exercise. While this dissertation study used nativity as a measure of the acculturation process, future investigations should consider taking into account other variables such as number of years in the US and English language skills simultaneously for a more representative measure of acculturation.

The results for this study indicate that age is statistically significant and other variables are inconclusive. This finding is consistent with already existing research in the area of Hispanic Health Paradox, there is valuable clinical information gathered from the NESARC data set on the demographic profile of the Hispanic population with comorbid diabetes and depression. As such it can be used to guide social work practice, to frame future research, and to help to shape public health interventions. There is a need for more information on how to predict health outcomes for Hispanics, especially with comorbid conditions. Diabetes and depression combined already are a public health crisis that must be addressed if practitioners and research are going to alter and improve treatment models for this ever changing population.

Possible Limitations to the Research

The NESARC data set is comprised of a large sample size ($n = 34,653$) and over sampled select populations to give insight to health disparities among Hispanic individuals. The NESARC currently represents the largest representative survey of the United States population to date. The NESARC also has a high survey response rate of 81% and used a randomly selected sample making this data set ideal for determining national prevalence rates among vulnerable populations.

While the NESARC study has its strengths, secondary data analyses have certain limitations. The NESARC data set was administered by staff interviewers (ie. without formal research background) and the administration of the survey cannot be supervised by current researchers for quality and consistency of data collection. The data collected is retrospective in nature and relies on self-reporting of respondents which may lead to socially desirable responses. The most significant limitation of this dissertation study is the low n value resulting in reduced power for a multiple regression analysis and a type II error. This error will cause researchers to reject the hypothesis when in fact it may be true but due to the low study participant numbers, the results will not be determined accurately for all the variables entered into the analyses.

Social Work Implications

Implications for Policy, Research, and Practice

Identifying factors that predict level of physical activity among Hispanic adults with comorbid diabetes and depression should have a direct effect on social work policy, research, and practice. *Social Work Policy* will benefit from the results of this study to continue guiding health care reform and shape standards for treatment protocols across the medical and behavioral science fields. Medical social workers will be able to address unique needs for this population when implementing a diabetes education program within a hospital settings or outpatient centers. Medical social workers could potentially identify patients who may be more likely to have negative health behaviors due to a diagnosis of both diabetes and depression.

The findings from this study will also affect future *social work research*. Qualitative and Quantitative researchers will benefit from the research design, the demographic information gathered, and the information presented from these results and continues to examine characteristics related to this unique, vulnerable population from a multicultural perspective.

Large research projects already underway could possibly gather information related to other comorbid conditions among the Hispanic population that would shed light on a subject that needs more development in the literature. The Hispanic Health Paradox is an area of study that future researchers will benefit from reviewing this dissertation. The demographic profile information from a national sample shed some light on how the Hispanic comorbid diabetes and depression population varies and will guide future studies.

Wave III of the NESARC should provide opportunities to study this topic among Hispanics longitudinally and take into account additional measures of the acculturation process. Additionally, future researchers should continue examining large data sets of previously collected medical information to guide additional primary research tailored to the diverse needs of the Hispanic population. Another example of social work research implications is the recent chronic medical and mental health issues related to Adverse Childhood Experiences and trauma work related to populations that face multiple adversities in life. These topics combined seem to fit well together when addressing the multitude of adversities that the Hispanic population face immigrating to and living in the United States.

Social work practice should greatly benefit from the results of this study from a micro and macro perspective. Hispanic individuals and community organizations alike would benefit from learning more about how comorbid diabetes and depression will influence the likelihood a person will carry out the physical activity component of his/her treatment plan. The findings from this current study and future research would influence how diabetes education classes are offered to the Hispanic population and promote changes to course development. Community centers and local medical clinics would be able to incorporate physical activity education to diabetes plans and classes that are offered within the community. With health care reform a

reality for current and future generations, this information will help create awareness of the importance of the Hispanic population and help to shape policies that inform practice for individuals with diabetes and depression.

Appendixes

Appendix A

Figures listed in the dissertation document.

Appendix B

Data Analyses results in table format.

Appendix C

University of Houston Institutional Review Board approval letter.

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CURRICULUM VITAE

ROBERTA M. LEAL

EDUCATION

Ph.D.	Summer 2015	Social Work University of Houston
M.S.W.	Spring 2005	Social Work University of Houston
B.S.	Spring 1999	Psychology University of Houston

CERTIFICATIONS

Nonprofit Certified	Spring 1999	American Humanics University of Houston
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RESEARCH EXPERIENCE

2010-2013 Communities In Schools Southeast Harris County & Brazoria County, TX
21st Century Afterschool Centers on Education (ACE) Program Evaluator. Duties as the lead for the process evaluation team include quantitative data analyses via IBM SPSS; development of focus group manuals; data collection via facilitator interviews, program observation, participant observation, student participant focus groups and analyses of associated qualitative data; conducting literature reviews; scholarly writing for progress reports to funding agencies such as Texas Education Agency; communicating with community stakeholders and preparation of project-related presentations to area school districts and program facilitators.

1999 Office of Community Projects, G.C.S.W. University of Houston, Houston, TX
Non-Profit Leadership Alliance Intern for the Ryan White Council's HIV Community Needs Assessment. Duties as a research intern included recruiting participants for the HIV/AIDS research project; administering surveys; preparation for focus groups with participants; viewing and coding videos of focus groups for qualitative research.

TEACHING EXPERIENCE

2014-2015 ***Assistant Clinical Professor.*** Graduate College of Social Work, University of Houston, Houston, TX.

Committee Participation: Admissions, Evaluation, and Foundation Committee

Service to the College: SW with Latinos Specialization Work Committee; Independent Study for two MSW Students; Curriculum mapping-SW with Latinos Specialization; Mentor PhD student for teaching in higher education course; Field Education Liaison.

Courses Taught:

- Human Behavior in Social Environment
- Brief Targeted Interventions: Psychodynamic, Crisis Intervention, and Solution-Focused Brief Therapy
- Cognitive Behavioral Interventions: Cognitive and Dialectical Behavioral Therapy
- Strategies for Community Development
- Advanced Social Policy Analysis
- Community Practice with Latinos
- Social Work Interventions in Schools
- Fiscal Management & Budgeting of Nonprofits (Graduate/Undergraduate)

2009 – 2014 **Adjunct Professor.** Graduate College of Social Work, University of Houston.

Courses Taught:

- Fiscal Management & Budgeting of Nonprofits (Graduate/Undergraduate)
- Assessment
- Social Work Practice Skills Lab
- Social Work Interventions in Schools and Anti-Bullying

2007 -- 2008 **Teaching Assistant.** Graduate College of Social Work, University of Houston.

Course Taught:

- Introduction to Social Work (Undergraduate)

CONFERENCE PRESENTATIONS

Leal, R. (May, 2015). Finding the Silver (Sky)Lining in Neighborhoods. 40th Annual Neighborhoods, U.S.A. Conference: Houston, Texas.

Leal, R. (May, 2015). Adults and Youth Together are Awesome! 40th Annual Neighborhoods, U.S.A. Conference: Houston, Texas.

Leal, R. (February, 2015) Understanding Poverty to Engage Families Better. Texas Family Engagement Conference: Building Hispanic and African-American Engagement. Houston, Texas.

Leal, R. (August, 2013). Facing the classroom with confidence: A behavior management approach for afterschool programs. [Refereed]. 21st Century Afterschool Centers on Education Annual State Conference: Austin, Texas.

Leal, R. (August, 2013). How to handle difficult situations: Best practices for crisis intervention in schools. [Refereed]. Communities In Schools National Conference: Dallas, Texas.

Leal, R. & Smith, A. (October 2012). How committed are you? Integrating the developmental asset approach and learning styles to maximize success in school. Link Up Greater Houston Sixth Annual Conference: Houston, Texas.

Balkan, B., Cummings, T., **Leal, R.**, Pappadis, M., Rose, A., & Wallijarvi, C. (March, 2009).

Interdisciplinary and multidisciplinary research: Concepts and practice. [Peer Reviewed] Fifth Annual Doctoral Social Work Research Symposium of the University of Houston G.C.S.W. Doctoral Program & G.C.S.W. Alumni Association: Houston, Texas.

Lopez, S., **Leal, R.**, San, T., Foster, C., Reyna, D., Rich, B., & Cisneros, D. (October, 2004). A model for promoting self-care through a support group experience. [Peer Reviewed] National Association of Social Workers Texas Chapter Annual Conference: Austin, Texas.

RECOGNITIONS AND AWARDS

- Outstanding Faculty Award 2014-15. Graduate College of Social Work, University of Houston, Houston, TX.
- Humanitarian of the Year 2012-13; 2014-15. Graduate College of Social Work, University of Houston, Houston, TX.
- Mexican-American Emerging Leader Award 2009. Mexican Consulate, Houston, TX.

SERVICE TO THE COMMUNITY

- Advisory Board Member and Community Leadership Network Representative, Neighborhood Centers Inc. Cleveland-Ripley Center, Pasadena, TX (2009-2015).
- Invited Journal Reviewer, *Perspectives in Social Work*, doctoral student edited online journal, Graduate College of Social Work, University of Houston, Houston, TX (2009-2012).
- Planning Committee Member, Fifth Doctoral Social Work Student Research Symposium, Graduate College of Social Work, University of Houston, Houston, TX (2009).

PROFESSIONAL WORK

2013-Present	<i>Program Consultant</i> for Neighborhood Centers, Inc. Offer expertise in program design, curriculum development, staff growth and development for community based after-school youth programs. Provide custom, comprehensive professional development, individual coaching, and leadership training on program planning, engaging youth, activity implementation, center management, and program evaluation.
2000-2013	<i>Director of Program Development/Consultant</i> for Communities In Schools-Southeast Harris Co. & Brazoria Co. Texas. Provide crisis intervention services to youth in special education programs and leadership services to college bound adolescents. Develop workshop/program curriculum and provide training for social workers/professionals on program planning, implementation, cultural fluency and direct practice with diverse populations in a school setting. Consult for multi-million dollar federal, state, and local grants for during school and after school program interventions.
2004-2005	<i>Program Facilitator</i> for Children's Center for Self-Esteem, Houston, TX. Provide social skills groups for court ordered youth in a faith-based setting. Consult with facilitators on curriculum and interventions for adults working with youth in gang-related situations.
1998-2000	<i>Youth Program Specialist</i> for Neighborhood Centers, Inc. Cleveland-Ripley Center, Pasadena, TX. Facilitate services for Juvenile Mentoring Program utilizing a developmental asset approach; assist with coordinating volunteer projects, donor

solicitations, and fund raising events. Assist with maintenance of all youth programs in a community center setting.

HONOR SOCIETIES AND PROFESSIONAL MEMBERSHIPS

- Latino Social Workers of Greater Houston, Founding Board Member
- Phi Alpha Honor Society-Mu Lambda Chapter, Co-Founder and Member
- National Hispanic Professional Organization, Member
- Nonprofit Leadership Alliance, Nonprofit Certified

Appendix A

Figure 1. Comorbidity of Diabetes and Depression among Hispanic Adults in US population.

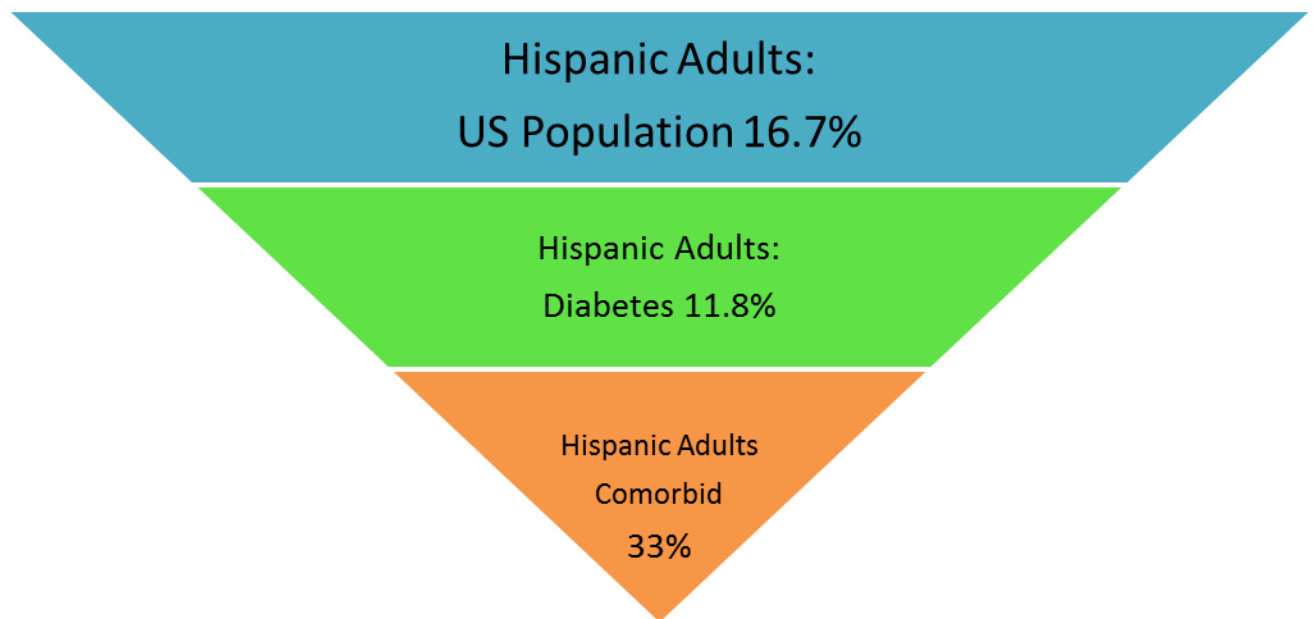


Figure 2. Health Belief Model

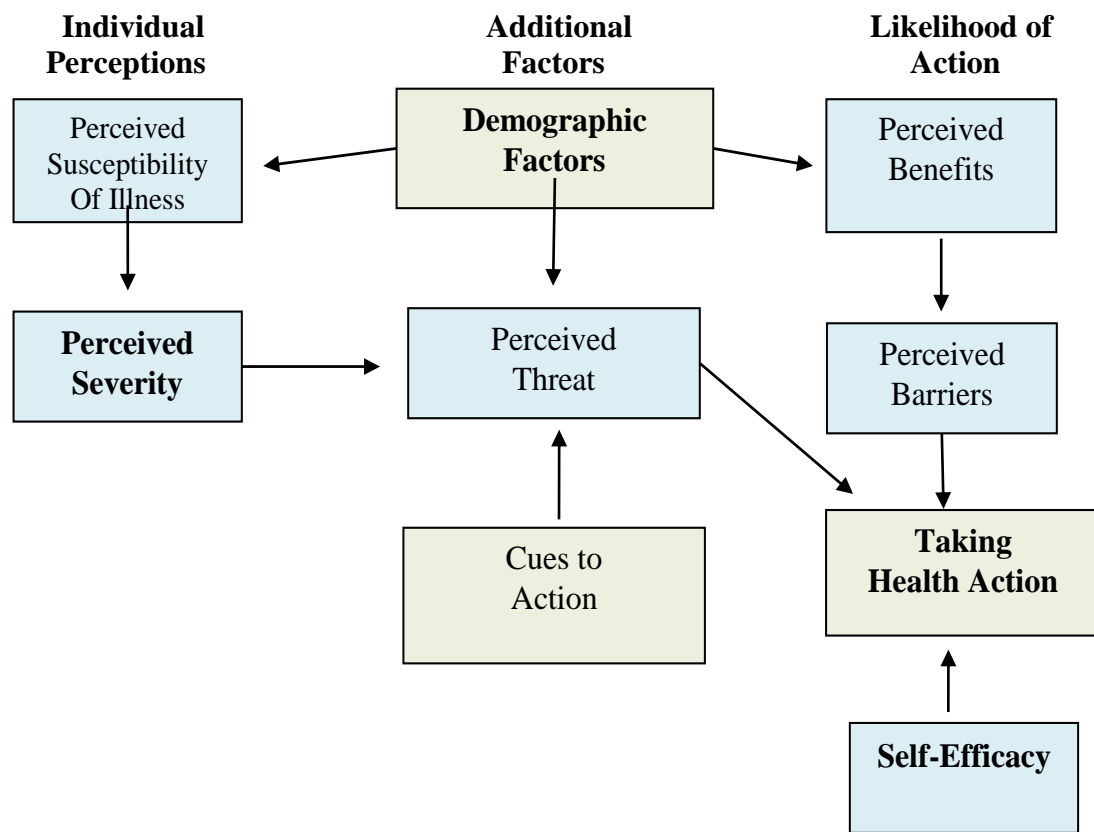


Figure 3. Guiding Theoretical Framework: Health Belief Model for Hispanic Adults with Comorbid Diabetes and Depression

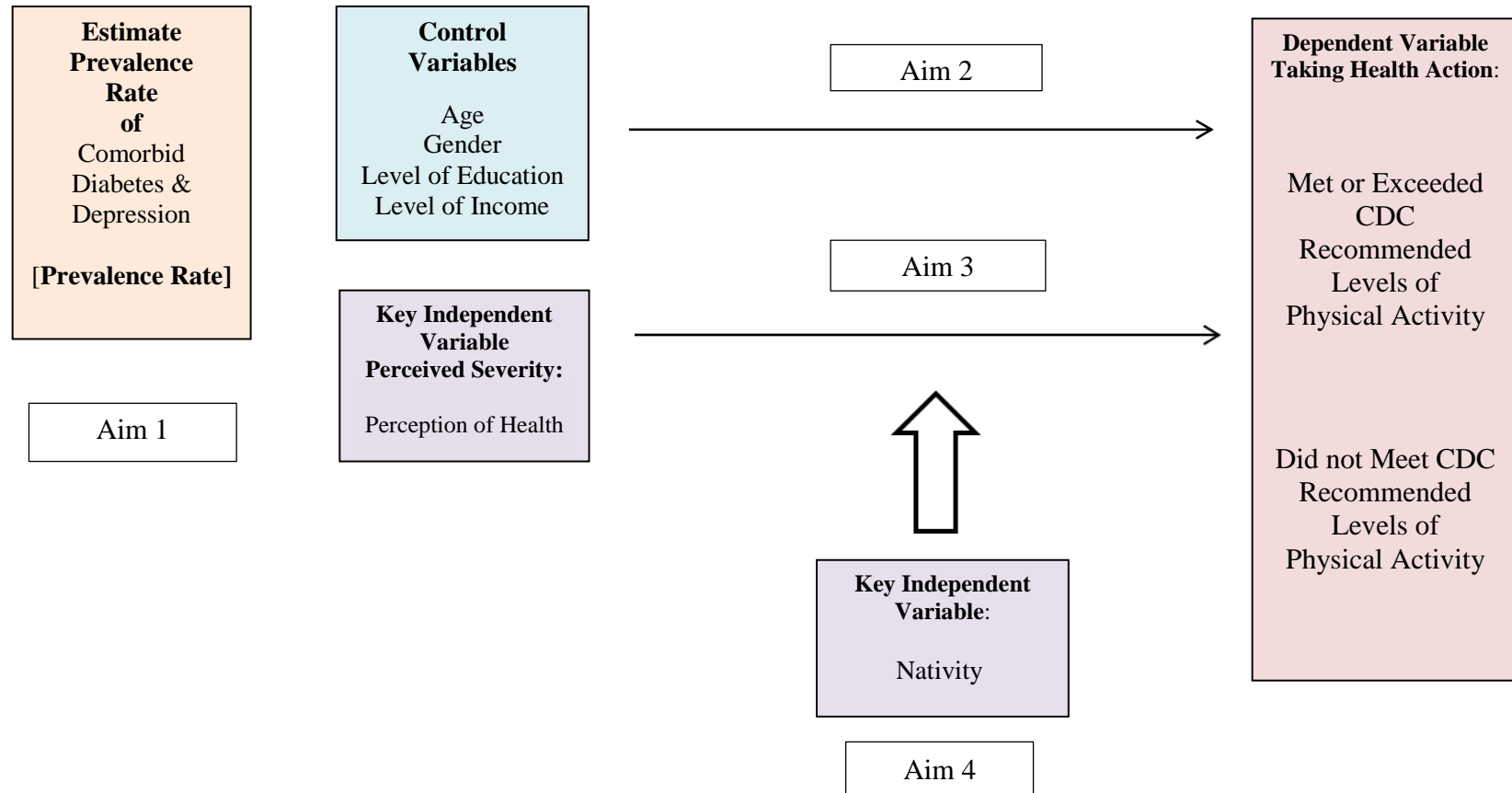


Figure 4: Sampling Frame Wave 2 NESARC n = 34,653, Study Sample n=104

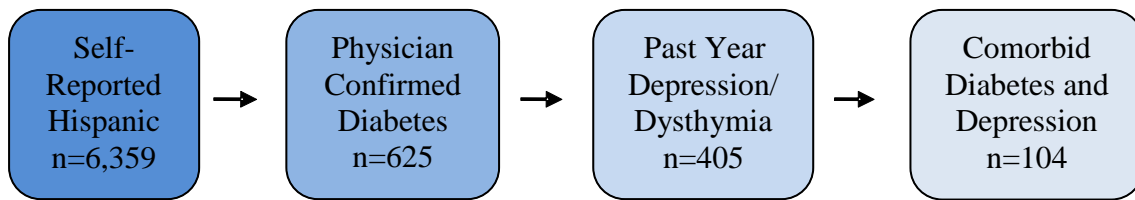


Figure 5: NESARC Past Year Self-Report Diabetes Survey Question

NESARC Survey Question	Response
1. (You) Had diabetes or sugar diabetes in the PY (Past Year)	1 Yes
	2 No
	9 Unk

Figure 6: NESARC Past Year Depression DSM-IV Diagnostic Criteria

DSM-IV Diagnostic Criteria	Response
Criteria 1: Depressed Mood	
1. Since your LAST interview in (MO/YR), have you ever had a time when you felt sad, blue, depressed, or down most of the time for at least 2 weeks?	0 No 1 Yes
Criteria 2: Diminished Interest	
2. Since your LAST interview, have you ever had a time, lasting at least 2 weeks, when you didn't care about the things that you usually cared about, or when you didn't enjoy the things you usually enjoyed?	0 No 1 Yes
Criteria 3: Significant weight changes when no dieting, appetite changes	
3. Lose at least 2 pounds a week for several weeks or at least 10 pounds altogether within a month, other than when you were physically ill or dieting?	0 No 1 Yes
4. Lose your appetite nearly every day for at least 2 weeks?	0 No 1 Yes
5. Gain at least 2 pounds a week for several weeks or at least 10 pounds altogether within a month other than when you were growing (or pregnant)?	0 No 1 Yes
6. Find that you wanted to eat a lot more than usual for no special reason, most days for at least 2 weeks?	0 No 1 Yes
Criteria 4: Insomnia or Hypersomnia nearly every day	
7. Have trouble falling asleep nearly every day for at least 2 weeks?	0 No 1 Yes
8. Wake up too early nearly every day for at least 2 weeks?	0 No 1 Yes
9. Sleep more than usual nearly every day for at least 2 weeks?	0 No 1 Yes
Criteria 5: Psychomotor Agitation or Retardation nearly every day	
10. Move or talk MUCH more slowly than usual, most days for at least 2 weeks?	0 No 1 Yes
11. Become so restless that you fidgeted or paced most of the time for at least 2 weeks?	0 No 1 Yes
12. Become so restless that you felt uncomfortable for at least 2 weeks?	0 No 1 Yes
Criteria 6: Fatigue or loss of energy nearly every day	
13. Feel tired nearly all the time or get tired easily most days for at least 2 weeks, even though you weren't doing more than usual?	0 No 1 Yes
Criteria 7: Feelings of worthlessness or excessive or inappropriate guilt	
14. Feel worthless nearly all the time for at least 2 weeks?	0 No 1 Yes
15. Feel guilty about things you normally wouldn't feel guilty about, most of the time for at least 2 weeks?	0 No 1 Yes
Criteria 8: Diminished ability to think or concentrate, or indecisiveness nearly every day	
16. Have trouble concentrating or keeping your mind on things, most days for at least 2 weeks?	0 No 1 Yes
17. Find it harder than usual to make decision, most of the time for at least 2 weeks?	0 No 1 Yes
Criteria 9: Recurrent thoughts of death, recurrent suicidal ideation without a specific plan, or a suicide attempt or a specific plan for committing suicide	
18. Attempt suicide?	0 No 1 Yes
19. Think about committing suicide?	0 No 1 Yes
20. Feel like you wanted to die?	0 No 1 Yes
21. Think a lot about your own death?	0 No 1 Yes

Figure 7: Variables Included in Regression Analysis

Outcome Variable:

Level of Physical Activity

Predictor Variables:

Age

Gender

Perception of Health

Nativity

Additional Variables:

Level of Education

Level of Income (Poverty Level)

Appendix B

Table 1: Key Demographic and Sociological Factors

Demographic	Psycho-Social
Age	Level of Education
Gender	Level of Income
Race/Ethnicity: Hispanic	Perception of Health
Nativity: US-born; Foreign-born	Level of Physical Activity

Table 2: Descriptive Statistics of the Full Hispanic Sample from the National Epidemiologic Survey on Alcohol and Related Conditions.

Demographic Variable	Full Sample (N=6,359) %M, (N,SD)	Study Sample (N= 104) %M, (N,SD)
Age Range: 20-90	43.9 (15.84)	55.84 (14.82)
Gender		
Male	42.8 (2719)	28.8 (30)
Female	57.2 (3640)	71.2 (74)
Nativity		
Born in the U.S.	49.2 (3131)	51.9 (54)
Foreign Born	50.8 (3226)	48.1 (50)
Ave. Number of Yrs. in the U.S.	21.35 (12.75)	31.12 (13.74)
Country of Descent		
Mexican	30.3 (1929)	18.3 (19)
Mexican-American	21.8 (1384)	19.2 (20)
Puerto Rican	11.9 (755)	20.2 (21)
Chicano	2.5 (159)	5.8 (9)
Language		
Spanish Predominantly Spoken	36.6 (2322)	53.4 (55)
English Predominantly Spoken	43.3 (2741)	31.1 (32)
Both Languages Spoken	20.1 (1276)	15.5 (16)
Education		
Did not complete High School	31.2 (1983)	48.1 (50)
Completed High School/GED	24.8 (1577)	17.3 (18)
Some College/Graduated College	44.0 (2799)	34.6 (36)
Income		
Poverty Level for 2004-2005 was \$19,481		
At or Below Poverty Level	53 (3242)	77.2 (78)
Above Poverty Level	47 (2877)	22.8 (23)
Median Income Level for 2004-4005 was \$45,463		
At or Below Median Level	87.5 (5567)	95.2 (99)
Above Median Level	12.5 (792)	4.8 (5)
Past Year Diagnosis of Diabetes		
Yes	9.8 (625)	100 (104)
No	90.2 (5734)	
Past Year Diagnosis of Depression		
Yes	9.7 (614)	100 (104)
No	90.3 (5745)	
Perception of Health		
Higher Perception	80.8 (5141)	29.8 (31)
Lower Perception	19.1 (1213)	70.2 (73)

CDC Physical Activity

Met/Exceeded CDC Recommendations	53.4 (3376)	38.5 (40)
Below CDC Recommendations	46.6 (2950)	61.5 (64)

Standard Deviations are given in parentheses.

Table 3 : Estimated prevalence rate of comorbid diabetes and depression among Hispanics in the NESARC.

Race/Ethnicity	Comorbidity%	(N)
White, Non-Hispanic	10.30	(191)
Black, Non-Hispanic	17.95	(110)
American Indian/Alaska Native, Non-Hispanic	12.68	(9)
Asian/Native Hawaiian/Other Islander, Non-Hispanic	7.41	(4)
Hispanic, Any Race	16.94	(104)

NESARC, Wave II

Table 4: Bivariate Chi Square Analyses for Level of Physical Activity, Study Sample (n=104)

Variable	Value	Level of Physical Activity	
		Below CDC Recommendations	Met CDC Recommendations
Gender	$X^2 (1) = 1.275, p<.259$		
Male		70%	30%
Female		58.1%	41.9%
Nativity	$X^2 (1) = .009, p<.926$		
US-Born		61.1%	38.9%
Foreign-Born		62.0%	38.0%
Level of Income	$X^2 (1) = .029, p<.865$		
At or Below Poverty		62.8%	37.2%
Above Poverty		60.9%	39.1%
Level of Education	$X^2 (2) = .361, p<.835$		
Did not Complete High School		62.0%	38.0%
Completed High School/GED		66.7%	33.3%
Some College/Graduated College		58.3%	41.7%
Perception of Health	$X^2 (1) = .838, p<.360$		
High Perception		54.8%	45.2%
Low Perception		64.4%	35.6%
Moderator Nativity	$X^2 (1) = .151, p<.698$		

Table 5: Bivariate Independent T-test Analysis for Age by Physical Activity, Study Sample

Variable	n	Mean (SD)	t	df	p	95% Confidence Interval Lower-Upper
Met CDC Standard	40	51.25(14.018)				
Did not meet CDC Standard	64	58.7(14.679)				
Total	104	55.84(14.815)	2.56	102	.012*	1.684-13.222

*p<.05 Statistical Significance

Table 6: Simple Linear Regression Analyses of Level of Physical Activity, Independent Variables**Level of Physical Activity Study Sample, CDC Recommendations**

Variable Tested	X²	B (SE)	p	R Square
Gender	1.125	.119 (.106)	.263	.012
Age	-2.563	-.008 (.003)	.012*	.060
Nativity	-.092	-.009 (.096)	.927	.000
Income Poverty	.168	.020 (.116)	.867	.000
Education	.307	.016 (.054)	.759	.001
Perception of Health	.910	.095 (.106)	.365	.008

Statistical Significance *p<.05

Table 7: Simple Linear Regression Analyses of Level of Physical Activity, Moderating Variable
Level of Physical Activity Study Sample, CDC Recommendations

Variable Tested	X²	B (SE)	p	R Square
Moderator Nativity	-.385	-.058 (.151)	.701	.001
Statistical Significance *p<.05				

Table 8: Model 1 Logistic Regression Analysis of Level of Physical Activity, Standard Enter Method

Level of Physical Activity Study Sample, CDC Recommendations				95% CI for Odds Ratio		
Variable Tested	X ²	B (SE)	Odds Ratio	p	Lower	Upper
(Constant)	1.812	.645 (.356)	--	.073	-.062	1.352
Age	-2.460	-.009 (.004)	.276	.016*	-.016	-.002
Gender	1.292	.141 (.109)	.129	.200	-.076	.359
Nativity	.934	.112 (.120)	.116	.353	-.126	.350
Perception of Health	1.077	.157 (.146)	.147	.284	-.132	.447
Level of Income	-.388	-.056(.146)	-.049	.701	-.347	.234
Level of Education	-.214	-.014 (.066)	-.026	.831	-.145	.117

P<.05

Table 9: Model 2 Logistic Regression Analysis of Level of Physical Activity, Standard Enter Method

Level of Physical Activity Study Sample, CDC Recommendations					95% CI for Odds Ratio	
Variable Tested	X ²	B (SE)	Odds Ratio	p	Lower	Upper
(Constant)	1.933	.511 (.264)	--	.056	-.014	1.035
Age	-2.438	-.008 (.003)	.255	.017*	-.015	-.002
Gender	1.370	.148 (.108)	.135	.174	-.066	.362
Nativity	1.075	.125 (.117)	.129	.285	-.106	.357
Perception of Health	1.038	.148 (.143)	.138	.302	-.135	.431
Moderator Nativity	-1.234	-.262 (.212)	-.175	.220	-.683	.159

P<.05

Table 10: Model 3 Logistic Regression Analysis of Level of Physical Activity, Standard Enter Method

Level of Physical Activity Study Sample, CDC Recommendations				95% CI for Odds Ratio		
Variable Tested	X ²	B (SE)	Odds Ratio	p	Lower	Upper
(Constant)	1.899	.502 (.264)	--	.061*	-.023	1.026
Age	-2.231	-.007 (.003)	.225	.028*	-.014	-.001
Gender	1.468	.158 (.107)	.144	.145	-.056	.371
Perception of Health	.692	.092 (.133)	.086	.491	-.172	.356
Moderator Nativity	-.784	-.141 (.180)	-.094	.435	-.500	.217

P<.05

Table 11: Descriptive Statistics of the Study Sample Nativity and Age Sub Groups from the National Epidemiologic Survey on Alcohol and Related Conditions.

	Study Sample (N= 104) %M, (N,SD)	US Born /Foreign Born		Older/Younger Adults	
Demographic Variable					
N=104					
Age Range:	20-90 55.84 (14.82)	23-83 51.76 (15.826)	34-85 60.24 (12.34)	56-85 66.98 (7.93)	23-55 42.83(9.31)
Gender					
Male	28.8 (30)	31.5 (17)	26 (13)	28.6 (16)	29.2 (14)
Female	71.2 (74)	68.5 (37)	74 (37)	71.4 (40)	70.8 (34)
Language					
Spanish Predominantly Spoken	53.4 (55)	24.5 (13)	84 (42)	69.1 (38)	35.4 (17)
English Predominantly Spoken	31.1 (32)	22.6 (12)	8 (4)	14.5 (8)	50 (24)
Both Languages Spoken	15.5 (16)	52.8 (28)	8 (4)	16.4 (9)	14.6 (7)
Education					
Did not complete High School	48.1 (50)	37.0 (20)	60 (30)	62.5 (35)	31.3 (16)
Completed High School/GED	17.3 (18)	20.4 (11)	14 (7)	10.7 (6)	25 (12)
Some College/Graduated Col.	34.6 (36)	42.6 (23)	26 (13)	26.8 (15)	43.8 (21)
Income					
Poverty Level for 2004-2005 was \$19,481					
At or Below Poverty Level	77.2 (78)	65.4 (34)	89.9 (44)	87.3 (48)	65.2 (30)
Above Poverty Level	22.8 (23)	34.6 (18)	10.2 (5)	12.7 (7)	34.8 (16)
Median Income Level for 2004-4005 was \$45,463					
At or Below Median Level	95.2 (99)	94.4 (51)	96 (48)	98.2 (55)	91.7 (44)
Above Median Level	4.8 (5)	5.6 (3)	4 (2)	1.8 (1)	8.3 (4)
Perception of Health					
Higher Perception	29.8 (31)	35.2 (19)	24 (12)	19.6 (11)	41.7 (20)
Lower Perception	70.2 (73)	64.8 (35)	6 (38)	80.4 (45)	58.3 (28)
CDC Physical Activity					
Met/Exceeded CDC Rec.	38.5 (40)	38.9 (21)	38 (19)	30.4 (17)	47.9 (23)
Below CDC Rec.	61.5 (64)	61.1 (33)	62 (31)	69.6 (39)	52.1 (25)

Standard Deviations are given in parentheses.

Table 12: Bivariate Chi Square Analyses for Level of Physical Activity, Study Sample US Born

Variable	Value	Level of Physical Activity	
		Below CDC Recommendations	Met CDC Recommendations
Gender	$X^2 (1) = .938, p<.333$		
Male		70.6%	29.4%
Female		56.8%	43.2%
Nativity	$X^2 (1) = .009, p<.926$		
US-Born		61.1%	38.9%
Foreign-Born		62.0%	38.0%
Level of Income	$X^2 (1) = 1.549, p<.213$		
At or Below Poverty		67.6%	32.4%
Above Poverty		50%	50%
Level of Education	$X^2 (2) = 1.467, p<.480$		
Did not Complete High School		70%	30%
Completed High School/GED		63.6%	36.4%
Some College/Graduated College		52.2%	47.8%
Perception of Health	$X^2 (1) = 2.330, p<.127$		
High Perception		47.4%	52.6%
Low Perception		68.6%	31.4%

Table 13: Bivariate Independent T-test Analysis for Age by Physical Activity, Study Sample US Born

Variable	n	Mean (SD)	t	df	p	95% Confidence Interval Lower-Upper
Met CDC Standard	21	45.24(14.973)				
Did not meet CDC Standard	33	55.91(15.133)				
Total	54	51.76(15.826)	2.536	52	.014*	2.228-19.113

*p<.05 Statistical Significance

Table 14: Bivariate Chi Square Analyses for Level of Physical Activity, Study Sample Foreign-Born

Variable	Value	Level of Physical Activity	
		Below CDC Recommendations	Met CDC Recommendations
Gender	$X^2 (1) = .390, p<.532$		
Male		69.2%	30.8%
Female		59.5%	40.5%
Nativity	$X^2 (1) = .009, p<.926$		
US-Born		61.1%	38.9%
Foreign-Born		62.0%	38.0%
Level of Income	$X^2 (1) = 3.233, p<.072$		
At or Below Poverty		59.1%	40.9%
Above Poverty		100%	0%
Level of Education	$X^2 (2) = .915, p<.633$		
Did not Complete High School		56.7%	43.3%
Completed High School/GED		71.4%	28.6%
Some College/Graduated College		69.2%	30.8%
Perception of Health	$X^2 (1) = .146, p<.702$		
High Perception		66.7%	33.3%
Low Perception		60.5%	39.5%

Table 15: Bivariate Independent T-test Analysis for Age by Physical Activity, Study Sample Foreign-Born

Variable	n	Mean (SD)	t	df	p	95% Confidence Interval Lower-Upper
Met CDC Standard	19	57.89(9.374)				
Did not meet CDC Standard	31	61.68(13.802)				
Total	50	60.24(12.343)	1.053	48	.298	-3.440-11.005

*p<.05 Statistical Significance

Table 16: Bivariate Chi Square Analyses for Level of Physical Activity, Study Sample – Older Adults

Variable	Value	Level of Physical Activity	
		Below CDC Recommendations	Met CDC Recommendations
Gender	$X^2 (1) = .304, p<.581$		
Male		75%	25%
Female		67.5%	32.5%
Nativity	$X^2 (1) = .570, p<.450$		
US-Born		75%	25%
Foreign-Born		65.6%	34.4%
Level of Income	$X^2 (1) = .021, p<.886$		
At or Below Poverty		68.8%	31.1%
Above Poverty		71.4%	28.6%
Level of Education	$X^2 (2) = .141, p<.932$		
Did not Complete High School		71.4%	28.6%
Completed High School/GED		66.7%	33.3%
Some College/Graduated College		66.7%	33.3%
Perception of Health	$X^2 (1) = .062, p<.804$		
High Perception		72.7%	27.3%
Low Perception		68.9%	31.1%

Table 17: Bivariate Independent T-test Analysis for Age by Physical Activity, Study Sample Older Adults

Variable	n	Mean (SD)	t	df	p	95% Confidence Interval Lower-Upper
Met CDC Standard	17	63.12(6.864)				
Did not meet CDC Standard	39	68.67(7.848)				
Total	56	66.98(7.930)	2.522	54	.015*	1.138-9.960

*p<.05 Statistical Significance

Table 18: Bivariate Chi Square Analyses for Level of Physical Activity, Study Sample – Young Adult

Variable	Value	Level of Physical Activity	
		Below CDC Recommendations	Met CDC Recommendations
Gender	$X^2 (1) = 1.179, p<.278$		
Male		64.3%	35.7%
Female		47.1%	52.9%
Nativity	$X^2 (1) = .139, p<.709$		
US-Born		50%	50%
Foreign-Born		55.6%	44.4%
Level of Income	$X^2 (1) = .036, p<.850$		
At or Below Poverty		53.3%	46.7%
Above Poverty		56.3%	43.8%
Level of Education	$X^2 (2) = 1.901, p<.387$		
Did not Complete High School		40%	60%
Completed High School/GED		66.7%	33.3%
Some College/Graduated College		52.4%	47.6%
Perception of Health	$X^2 (1) = .689, p<.406$		
High Perception		45%	55%
Low Perception		57.1%	42.9%

Table 19: Bivariate Independent T-test Analysis for Age by Physical Activity, Study Sample Young Adult

Variable	n	Mean (SD)	t	df	p	95% Confidence Interval Lower-Upper
Met CDC Standard	23	42.48(11.172)				
Did not meet CDC Standard	25	43.16(7.426)				
Total	48	42.83(9.311)	.251	56	.803	-4.788-6.152

*p<.05 Statistical Significance

Appendix C

UNIVERSITY of **HOUSTON**
DIVISION OF RESEARCH

June 1, 2015

Prof. Roberta Leal
c/o Dr. Andrew W. Achenbaum
Dean, Social Work

Dear Prof. Roberta Leal,

Based upon your request for exempt status, an administrative review of your research proposal entitled "Examining the relation between socio-demographic factors, perception of health, and physical activity among Hispanic adults with comorbid Diabetes and Depression." was conducted on March 26, 2015.

At that time, your request for exemption under Category 4 was approved pending modification of your proposed procedures/documents.

The changes you have made adequately respond to the identified contingencies. As long as you continue using procedures described in this project, you do not have to reapply for review. * Any modification of this approved protocol will require review and further approval. Please contact me to ascertain the appropriate mechanism.

If you have any questions, please contact Alicia Vargas at (713) 743-9215.

Sincerely yours,



Kirstin Rochford, MPH, CIP, CPIA
Director, Research Compliance

*Approvals for exempt protocols will be valid for 5 years beyond the approval date. Approval for this project will expire May 31, 2020. If the project is completed prior to this date, a final report should be filed to close the protocol. If the project will continue after this date, you will need to reapply for approval if you wish to avoid an interruption of your data collection.

Protocol Number: 15341-EX

316 E. Cullen Building Houston, TX 77204-2015 (713) 743-9204 Fax: (713) 743-9577

COMMITTEES FOR THE PROTECTION OF HUMAN SUBJECTS.