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Interactions Between Social Support, Acculturationand Health Among Mexican Immigrants

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ABSTRACT

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The impact of acculturation and poor social support as potential risk factors for cardiovascular and metabolic disease amongst Mexican immigrants to the United States (U.S.) is a developing area of research. One theory is that acculturation to U.S. society is negatively associated with health due to the stress of immigration as well as the less healthy diet and lifestyle in the U.S. It is also theorized that positive social support is associated with better health during immigration due to the buffering effect relationships have on stress. Despite these theories, mixed findings have been found regarding the associations between acculturation and social support to health outcomes in this population. Some research has also noted that significant differences exist between the manner in which men and women experience social support and their acculturation patterns. Consequently, the primary purpose of this study was to test the associations between acculturation and health as well as assess gender, social support, and acculturation for potential moderator effects in a sample of Mexican immigrants in Provo, Utah. Acculturation was measured using the Acculturation Rating Scale for Mexican Americans-II (ARMSA-II) which consists of the Anglo Orientation Scale (AOS) and Mexican Orientation Scale (MOS). Social support was determined using both the Interpersonal Support Evaluation List (ISEL) and Sarason Social Support Questionnaire (SSSQ) which has two dimensions: satisfaction with support network and size of support network. Hierarchical multiple regression did not find significant associations between acculturation or social support and health outcomes as measured by ambulatory blood pressure or blood draw values including triglycerides, Hemoglobin A1c (HbA1c), low-density lipoprotein (LDL), and high-density lipoprotein (HDL). A significant association was observed between Anglo Orientation and social support as measured by the ISEL-II. A moderation effect was observed between gender and Anglo orientation with satisfaction in one's support network. No other moderation effects were observed in this study. Implications of the findings, limitations, and directions for future research are discussed.

Keywords: ambulatory blood-pressure, acculturation, social support, moderator, Acculturation Rating Scale for Mexican Americans-II (ARMSA-II), Anglo Orientation Scale (AOS), Mexican Orientation Scale (MOS), Interpersonal Support Evaluation List (ISEL), Sarason Social Support Questionnaire (SSSQ), immigrants, Mexican

Table of Contents

Interactions Between Social Support, Acculturation, and Health Among Mexican Immigrants

Social support can be defined as the perceived availability of help when it is needed (Graham et al., 2007). Berkman and Syme (1979) published one of the first analyses of the effects of social support and physical health. After controlling for factors such as socioeconomic status, health behaviors, and several other variables related to mortality, the risk of death among men and women with the fewest social ties was more than twice as high as the risk of death amongst men and women with the most social ties (1979). A meta-analysis examining 148 studies on social isolation using participants mainly from North America and Europe, as well as Asia and Australia, concluded that social relationships predicted mortality as well as smoking and alcohol consumption and even greater than physical inactivity and obesity (Holt-Lunstad, Smith, & Layton 2010). Given the association between social support and health outcomes, further investigation is warranted into the role of social support among less well-studied populations—such as Mexican immigrants to the United States.

A difference between the general U.S. population and the Mexican immigrant population is the process of acculturation. Acculturation can be described as a dynamic process in which individuals integrate the cultural norms of a new culture different than their original. (Hazuda, Haffner, Stern, & Eifler, 1988). Acculturation has made it difficult to assess the direct effects from social support among Mexican immigrants. It has been demonstrated that increased acculturation predicts poorer health outcomes (Vella, Ontiveros, Zubia, & Bader, 2011). Further, increased acculturation also has predicted increased perceived social support (Franzini & Fernandez-Esquer, 2004) which complicates the direct association between perceived social support and health outcomes. Therefore, the purpose of this study is to more

fully understand the interactions between social support, acculturation and health amongst Mexican immigrants. An understanding of these interactions should serve to shed light on the influence of social support in this population while controlling for the effects of acculturation.

The Hispanic Paradox

Although Mexican immigrants typically arrive to the U.S. at lower SES levels, they tend to have better health outcomes than those at higher SES levels, a trend known as The Hispanic Paradox (Viruell-Fuentes & Schulz, 2009). This trend is paradoxical because typically individuals of higher SES enjoy health benefits over those with a lower SES (National Center for Health Statistics, 2012). For instance, compared to U.S. born Mexicans and Whites, Mexican immigrants have demonstrated better outcomes in birth weight (Acedevo-Garcia, Soobader, & Berkman, 2007), infant mortality (Hummer, Powers, Pullum, Gossman, & Frisbie, 2007), all-cause mortality (Wei et al., 1996), and obesity (Barcenas, Wilkinson, & Strom 2007).

An alternative hypothesis to explain this paradox is called the "Salmon Hypothesis" which postulates that sick immigrants return to their country of origin thereby explaining the superior health of immigrants who stay in the United States (Crimmins, Kim, Alley, Karlamanga, & Seeman, 2007). The Salmon Hypothesis further argues that those who choose to immigrate are a healthier group of people compared to non-immigrants (Palloni & Arias, 2004). This theory maintains that it is the good health of the immigrants that allowed them to leave their former country of origin in the first place (Crimmins et al., 2007). However, these theories do not account for some important cultural differences--Mexican immigrants have stronger social ties compared to U.S. born Mexicans, which likely serve as a buffer against stress (Escarce, Morales, & Rumbaut, 2006). Although this explanation posits that social ties diminish with the

process of acculturation, studies have actually reported increased social ties with acculturation amongst Mexican immigrants and poorer health outcomes (Martinez-Schallmoser, Telleen, & MacMullen, 2003; Mulvaney-Day, Alegría, & Sribney, 2007; & Rodriguez, Mira, Paez, & Myers, 2007). An advantage of the present study is that it will control for the influence of acculturation on health.

Social Support and Biological Pathways

It has been hypothesized that social support affects health by altering biological pathways such as blood pressure or weakening the immune system response which leads to increased disease and sickness. Several studies have examined the effects of perceived isolation on blood pressure, and atherosclerosis development (Allen, 1991; Brummett, Barefoot, Siegler, Clapp-Channing & Lytle, 2001; Coussins-Read, Okun, & Nettles, 2007; Heffner, Waring, Roberts, Eaton, & Gramling, 2011; Steptoe, Willemsen, Owen, Flower, Mohamed-Ali, 2001; Uchino, Cacioppo, & Keicolt-Glaser, 1996; & Uchino, 2004). Perceived social isolation may be a negative consequence of the acculturative process for Mexican immigrants. For example, male Mexican immigrants come to the United States unaccompanied more often than women. This is often because males enter the U.S. for work and adventure whereas females tend to move with family (Curran, Shafer, Donato, & Garip, 2006; & Donato & Patterson, 2004).

Strong evidence has been found linking cardiovascular disease indicators to social support (Uchino, 2006; Brummett et al., 2001; Frasure-Smith et al., 2000). For example, Uchino (2004) discussed the role of social support with the Reactivity Hypothesis which states that individuals who experience high cardiovascular reactivity in response to stress (evidenced by high blood pressure or heart rate) will be more likely to suffer from cardiovascular disease. The

Reactivity Hypothesis further proposes that perceived social support acts as a "buffer" against stress in stressful circumstances by lowering stress. This "buffer" against stress in tense situations has been tested in various "mere presence" experiments. In these experiments participants undergo a moderately stress-provoking situation as their blood pressure is measured in the presence of other people compared to in isolation (Allen, 1991; Kamark, Manuck, & Jennings, 1990; & Uchino, 1996). The results of these studies have supported the Reactivity Hypothesis by demonstrating lower blood pressure levels when participants were in the presence of another individual.

Social support has also been linked to a reduction in cardiovascular disease risk factors such as high blood pressure (Gump, Polk, Kamarck, & Shiffman, 2001). For example, Steptoe (2000) found that when parents reported having functional support it was related to a significant reduction in systolic blood pressure. Studies have also shown an association between social support, heart rate, and the development and progression of cardiovascular disease (Uchino, 2004). Brummett et al. (2001) examined 430 patients with significant coronary artery disease (CAD) to determine the influence of social isolation on mortality rates. They found that participants who rated having three or fewer close social contacts reported an increase in cardiac mortality and an increase in all-cause mortality compared to those with more than three close social contacts. These effects held even after controlling for disease severity, age, demographics, and psychological distress. Kop et al. (2005) used electron beam tomography to assess coronary artery calcification (CAC), a risk factor in the progression of atherosclerosis, with 787 participants. Even after controlling for sex, age, systolic blood

pressure, blood glucose, and LDL an association was shown between CAC and social isolation (being single or widowed).

Further, C-reactive protein (CRP) levels (a measure of inflammation) are affected by social support. CRP is secreted by the liver in response to tissue injury, inflammation, and infection. Since cardiovascular disease has an inflammatory component CRP levels predict are useful in predicting cardiovascular disease. Additionally the CRP levels of pregnant women were found to be associated with their levels of perceived social support throughout their pregnancies (Coussins-Read et al., 2007). Heffner et al. (2011) examined the relationships between social isolation, CRP, and death amongst 2,324 community dwelling adults over age 40 without a prior history of myocardial infarction. They found that the most socially isolated individuals had 2.5 times the odds of elevated CRP levels than the most socially integrated. Further, both higher CRP levels and social isolation predicted later CVD death. Using data from the Multi-Ethnic Study of Atherosclerosis, Mezuk, Diez-Rouz, & Seeman (2010) found associations between elevated CRP and social support were moderated by age and gender.

Social Support and Health Outcomes

It is well-established that a lack of physical activity and poor dietary choices are linked to health outcomes such as cardiovascular disease and obesity. It has been estimated that nearly 600,000 deaths in the United States in 2010 were due primarily to heart disease (Murphy, Xu, & Kochanek, 2012). Since obesity is commonly connected to other illnesses it can be difficult to precisely state how many annual deaths are due primarily to obesity—although estimates range from 300,000-500,000 (McGinnis & Foege, 1999). Health behaviors refer to any activity such as exercise, smoking, risk taking etc. which affect health, disability, and mortality

(Umberson, Crosnoe, & Reczek, 2010). Our behavioral patterns and choices are responsible for a large amount of our health and sickness (McGinnis, 2002). McGinnis et al. (2002) reported that health behavior explains about 40% of premature mortality in addition to considerable morbidity and disability in the United States.

Acculturation affects health behaviors in Mexican immigrants in different ways. For example, less acculturated Mexican immigrants tend to have less access to the health care system due to lower SES, education, and lack of health insurance (Gallo, 2009). Additionally, the legal status of Mexican immigrants can play a role in the health behaviors they choose such as seeing a physician. This is because undocumented immigrants tend to have lower levels of English proficiency and familiarity with U.S. culture to arrange health care services (Bustamante et al., 2012). Undocumented Mexican immigrants are at a higher risk for disease and mortality than documented Mexican immigrants (Marshall, Urrutia-Rojas, Mas, & Coggin 2005). Although the measurement of undocumented immigrants can be difficult due to the covert nature of illegal immigration, it is estimated that more than half (57%) of Mexican immigrants are undocumented (Passel & Van Hook & Bean, 2005). Bustamante et al. (2010) analyzed data from the 2007 California Health Survey and found that compared to documented Mexican immigrants, undocumented Mexican immigrants were 27% less likely to have a doctor visit in the last year and 35% less likely to have a regular source of health care compared to documented Mexican immigrants after controlling for third variables. Additionally, Hispanics have less formal schooling than any other demographic group in the United States which limits the ability to select a desirable employment (Duncan, Hotz, & Trejo, 2006). Moreover, Hispanics experience greater levels of social marginalization, poor living conditions, and low-

paying employment compared to non-Hispanic Whites (Finch & Vega, 2003; Hovey & Magana, 2000; Magana & Hovey, 2003; Perez & Fortuna, 2005). Social support also influences health behaviors such as diet and exercise (Umberson, Crosnoe, & Reczek, 2010) and increased acculturation appears to be associated with an increase in the amount of exercise in Mexican immigrants (Abraido-Lanza, Chao, & Florez, 2005). Associations have been found between social support and fruit and vegetable consumption, exercising, and smoking cessation. Emmons, Barbeau, Gutheil, Stryker & Stoddard (2007) used cross sectional data from two cancer prevention studies employing multi-ethnic adults to show an association between social influences and physical activity levels and fruit and vegetable intake. Chouinard & Robichaud-Ekstrand, (2005) found increased rates of smoking cessation among cardiovascular patients when a phone call follow-up was included at six months in their treatment protocol versus typical in-patient counseling and usual care. 41.5% of the phone call follow-up group reported smoking cessation at six months compared to 32.1% of the in-patient counseling group and 18.2% of the treatment as usual group, respectively.

Research has suggested that one's social support system can promote healthy behavior, such as jogging with a friend, or it can undermine healthy behavior such as eating unhealthy foods with a friend (Christakis & Fowler, 2007; Taylor, Repetti, and Seeman, 1997). For example, Christakis and Fowler (2007) repeatedly assessed a social network consisting of 12,067 people. Using BMI as a primary measure the authors used longitudinal statistical models to determine if weight gain with one person was related to weight gain in that individual's social network. The authors reported that having an obese friend increases one's chances of becoming obese by 57%. Similarly, if one's sibling became obese their likelihood of

obesity increased by 40% and 37% if a spouse became obese, respectively. On the other hand, social involvement in religious or community groups is associated with positive health behaviors such as exercise and a healthy diet (Musick, and Wilson, 2007; & Strawbridge, Shema, Cohen, and Kaplan, 2001). Strawbridge et al. (2001) analyzed longitudinal data from 2,676 Alameda County Study participants which tracked health behaviors such as smoking, physical activity and medical checkups among others and found that religious service attendance was related to improved positive health behaviors and decreased mortality rates.

While many studies have focused on the effect of acculturation on health, few have examined if these effects are moderated by gender (Kimbro, 2009 & Lopez-Gonzalez, Aravena, and Hummer, 2005). In the acculturative process it's been hypothesized that men are more likely to make poor health choices as they begin to feel more comfortable with U.S. culture and increase alcohol intake, smoking, and poor diet—all of which increase with acculturation (Antecol & Bedard, 2005; Lopez-Gonzalez et al., 2005). Or when females of the same age live together and encourage risky nontraditional behaviors (Curran & Saguy, 2001). Kimbro (2009) used data from the Los Angeles Families and Neighborhood Study to examine if there were differences in health behaviors between men and women amongst a sample of 2,023 Latino immigrants. Using a multilevel logistic regression analysis a large difference between binge drinking and cigarette smoking between men and women was observed. Men were four times more likely to smoke than women and five times more likely to binge drink. Interactions between gender, acculturation, and age of migration were examined and found that working increased the likelihood of binge drinking for both men and women—but the effect was much larger for men. Working also decreased the likelihood of smoking in men but not in women.

Wahl & Eitl (2010) also examined the interaction between gender and acculturation amongst 1,536 Hispanics. Bivariate analysis comparing first and third generation Hispanics found a significant difference in alcohol use with first generation Hispanics much less likely to use alcohol. Additionally, there were significant differences in alcohol use between genders with males much more likely to use alcohol. A multivariate logistic regression revealed that gender moderated level of acculturation and ethnicity on alcohol use and abuse.

In conclusion, the interactions between social support, acculturation, and health outcomes in Mexican immigrants are complex and may be moderated by gender. Only a few studies have examined these interactions and this study seeks to add evidence to what has been done previously. It is hoped that this study will be of assistance to health care professionals, especially those who routinely work with a Hispanic immigrant population, in becoming more knowledgeable regarding how the acculturative process may impact health. In order to carefully study these interactions, the present study will seek to clarify the following research questions:

1. Will higher levels of acculturation predict higher levels of perceived social support? Will this relationship differ (be moderated) by gender?
2. Will higher levels of acculturation be associated with less favorable health outcomes? Will this relationship differ (be moderated) by gender?
3. Will higher levels of perceived social support predict positive health outcomes (cholesterol, triglyceride levels, HbA1c and blood pressure)? Will these relationships differ (be moderated) by acculturation levels? Will these relationships differ (be moderated) by gender?

It is hoped that assessing these questions will allow us to clarify the influence of social support during the acculturative process as well as determine potential moderators.

Method

Participants

Participants consisted of 333 Mexican immigrants ages 18 to 75 living in the Utah County area that had already come into a research lab and completed psychosocial questionnaires, provided blood samples, and worn ambulatory blood pressure monitors for 24 hours. The sample was 56% female with an average age of 36. Exclusionary criteria included hypertension and cardiovascular disease medication usage that may affect cardiovascular measurements. Participants were recruited via radio, flyers, and word of mouth. Participants were offered $175 for their participation.

Procedure

Participants were contacted via telephone by a research assistant who scheduled an appointment with them. Research assistants were bilingual in both English and Spanish and appointments were conducted in Spanish. Participants were asked to fast for 12 hours prior to the onset of the study, including caffeine, alcohol, and tobacco products. Upon arrival participants were then briefed about the overall nature of the study and given the opportunity to read and sign an informed consent. Those who had not complied with the fast were asked to reschedule their appointment for another day.

To begin data collection participants were asked to sit in a chair as their systolic and diastolic blood pressure was taken using a mercury sphygmomanometer and stethoscope by a research assistant. Blood pressure was taken four times with the first reading being discarded and the final three averaged together. Afterwards, participants were asked to step onto a scale without shoes to measure their height and weight. Next, a phlebotomist performed a fasting blood draw. Participants were then fitted with a Suntech Accutracker II blood pressure

monitor, which records ambulatory blood pressure throughout the day. The device uses the auscultatory technique in which a microphone detects and records Korotkoff sounds from the brachial artery three times per hour during the day and twice per hour during sleep. Participants wore the monitor for 24 hours although they were allowed to remove it if it became excessively uncomfortable. Participants were also given a palm pilot to use when the Accutracker took their blood pressure. The palm pilot contained several questions for the participants to answer such as their current posture (sitting, standing, lying down), as well as their mood and location. Participants were then given various psychosocial questionnaires regarding social support, acculturation, and dietary habits to complete before returning the next day.

Measures

Acculturation. Acculturation was assessed using the Acculturation Rating Scale for Mexican Americans-II (ARMSA-II; Cuellar, Arnold, & Maldonado, 1995) which is a 30-item measure that uses a 5-point Likert scale to assess the participants' preference of Hispanic and Anglo culture. Items focus on cultural preferences in language, food, media and friends as well as cultural beliefs. Some example items are "I have difficulty accepting some ideas held by Anglos" and "I have difficulty accepting some values held by Hispanics". The ARMSA-II has been referenced as a well-established and psychometrically validated measure (Wallace, Pomery, Latimer, Martinez, & Salovey, 2009).

Perceived social support. Since prior research has suggested that social support can influence health outcomes amongst Latinos (Carbone, Rosal, Torres, Goins, & Bermudez, 2007), the Interpersonal Support Evaluation List (ISEL; Cohen & Hoberman, 1983) was used. The ISEL

consists of 12 items on a 4-point Likert scale. Sample items include: “I feel that there is no one I can share my most private worries and fears with.” And “If I decide one afternoon that I would like to go to a movie that evening, I could easily find someone to go with me”. The ISEL contains four dimensions and each one has displayed acceptable Cronbach’s alpha in previous research by Rogers, Anthony, & Lyass (2004) which reported levels of 0.84 for appraisal, 0.83 for tangible, 0.82 for both self-esteem & belonging, and 0.92 for the entire measure, respectively. The brief form of the Sarason Social Support Questionnaire (SSSQ-6; Sarason, I.G., Sarason, B. R., Shearin, & Pierce, 1987) was also utilized which consists of 6-items assessing the size of one’s social support network and their satisfaction with the network. Such an abbreviated measure, which has previously shown adequate psychometric properties (Sarason et al., 1987), was ideal for the task of conducting brief follow-up interviews with participants who may have not had the time to complete a longer assessment tool. Participants completing the abbreviated Sarason Social Support Questionnaire are asked questions such as, “who accepts you totally, both your best and worst points?” and “Who can really tell you, in a thoughtful manner, when you need to improve in some way?” The size of their social network is calculated by tallying the number of people participants wrote down. Satisfaction with social support networks is calculated as participants rate their satisfaction with members of their support network from 1-6.

Health variables. A 12-hour fasting blood draw procedure was used and blood samples were examined for the following variables:

Glycemic control. HbA1c is a test which measures the amount of glycated hemoglobin in the blood and is a good indicator of blood sugar control over various months. An average level of glycated hemoglobin may be 6% or less whereas 6.5% may indicate a diagnosis of diabetes (World Health Organization, 1999). Impaired fasting glucose is a risk factor for health conditions such as diabetes and also for complications of cardiovascular disease (Lerman et al., 1998) and higher concentrations of have been found among Mexican Americans compared to European Americans (Harris, Klein, Cowie, Rowland, & Byrd-Holt, 1998).

Triglycerides. Triglycerides are lipids which are sometimes used as a synonym for fat molecules (Sarwar et al., 2011). Approximately 30-40% of people with a diagnosis of type 2 diabetes show triglyceride levels above 200 mg / dl and 10% have triglyceride levels above 400 mg / dl (Cowie & Harris, 1995). Triglyceride measurements can be affected by several factors such as posture during data collection, fasting status, anticoagulate use, venous—capillary differences, venous occlusion, and storage conditions and shipment processes (Stein & Myers, 1995). Intra-individual variation between paired samples from 7,055 fasting persons spaced two and a half months apart was found to be approximately 25%. This suggests that large sample sizes are necessary to detect true differences between groups or time periods.

Cholesterol. Cholesterol consists of both high density lipoprotein (HDL) molecules as well as low density lipoprotein (LDL) molecules. While higher levels of HDL cholesterol are often associated with salutary health effects, higher levels of LDL are often associated with negative health effects. Glaszou, Irwig, Heritier, Simes, & Tonkin (2008) examined the cholesterol levels of 9,014 participants at six months, 12 months, and yearly thereafter for five years. The authors found a short-term variability of 7% with cholesterol levels which suggests that adequate group sizes are important to detect true changes between groups in cholesterol levels.

Blood pressure. Blood pressure was measured using the Accutracker ambulatory blood pressure device. Blood pressure is a measure of arterial pressure and consists of systolic and diastolic blood pressure. Systolic blood pressure refers to the pressure on the arteries when the heart beats and fills the arteries with blood. Diastolic blood pressure refers to the pressure in the arteries when the heart is resting. Individuals who have high blood pressure are at an increased risk of suffering from heart attack and stroke (Duke, Colagiuri, S. & Colagiuri, R., 2009).

Additionally, the use of ambulatory electronic devices which allow participants to go about their regular daily activities have been recommended because of several advantages they offer over self-report questionnaires (Fahrenberg, Myrtek, Pawlik, & Perrez, 2007). For instance, ambulatory electronic devices appear high in ecological validity since they record data during participants' regular activities. Electronic devices also give exact times and measurements and lessen the possibility of data transfer errors since they can upload data directly into a statistical program.

Data Analysis

Descriptive statistics were gathered to describe participants' age, gender, education level, and socioeconomic status. Correlational statistics were used in order to assess for the threat of multicollinearity amongst sociocultural (perceived social support and acculturation) and health variables: HbA1c, triglycerides, cholesterol levels and ambulatory blood pressure. The variance inflation factor (VIF) was also computed from a regression design matrix and a cutoff VIF score of four or above was used to represent problematic multicollinearity although no relationships exceeded that value. However, multicollinearity was assessed since prior research has suggested that some cardiovascular variables are associated with each other (Lakoski et al., 2005; Mancia et al., 2005; & Periera et al., 2006). For instance, Periera et al. (2006) reported statistically significant associations between blood pressure, lipids and LDL cholesterol—although they did not find a statistically significant association between blood pressure and HDL cholesterol. Regarding the strength of these associations Mancia et al. (2005) reported small to moderate correlations between 24-hour systolic blood pressure and glycemia ($r = 0.23$, $p < 0.0001$) and cholesterolemia ($r = 0.17$, $p < 0.0001$). Similar associations were reported between 24-hour diastolic blood pressure and glycemia ($r = 0.17$, $p < 0.0001$) and cholesterolemia ($r = 0.15$, $p < 0.0001$). Lastly, mixed findings have been reported regarding an association between CRP levels and hypertension which may be moderated by ethnicity (Lakoski, et al., 2005). Amongst Hispanics, at least two significant associations have been reported (Fernandez-Real et al., 2001 & Bautista, Vera, Arenas, & Gamarra, 2004) as well as at least one non-significant association reported (Lakoski, et al., 2005).

Each set of regression analyses examined the unique contribution of several predictor variables while controlling for the influence of several other variables. Since an association between systolic blood pressure, cholesterol, and triglyceride levels have been associated with cardiovascular disease, these were the key outcome measures for health—along with HbA1c. Additionally, social support and acculturation were analyzed as predictive variables as well as moderating roles—gender was also considered a moderator. The hierarchical multiple regression analyses proceeded in several stages by using SPSS 17. After initial data entry a dependent variable (e.g. systolic blood pressure) was selected and two blocks of independent variables were assessed. In this example, age, gender, education and body mass index (BMI), would be included in the first block of variables as controls. The second block consisted of the control variables and the predictor variable of interest (e.g. perceived social support). Measures of model fit, R^2 change, descriptive variables (means and standard deviations), and the Variable Inflation Index were considered during these analyses. The unique contribution of each predictor variable was computed with the R^2 change between the predictor variable of interest (social support) and the predictor variables in the first block. Beta weights, F-values, and significance levels were also utilized as outcome measures and significance levels were initially set at $p < .05$ before making adjustments using the procedures outlined by Benjamini & Hochberg (1995) to control for the false discovery rate.

Additional sets of regression analyses examined potential interaction effects between health and social outcomes of interest. Interaction terms were created by first centering the variables at the mean in SPSS before combining them. Interaction effects between variables (e.g. acculturation and gender) were compared against single predictor variables (e.g.

acculturation alone and gender alone) to assess R^2 change, f-values, beta-coefficients, and significance levels.

Results

Descriptive Statistics

Participants consisted of 333 participants (55.9% Female) whose mean age was 36.4 years old (SD=11.61), ranging from 18 to 75. The mean time spent in the U.S. was 7.9 years (SD=7.08) and the mean years of education was 12.73 (SD=4.18). Additional demographics are given in Table 1.

Table 1

Sample Characteristics

Variable	*N*	Mean	*SD*
Gender			
Men	146		
Women	186		
Age	332	36.44	11.61
Years in U.S.	333	7.92	7.08
Acculturation			
ARMSA score	314	2.03	1.10
Anglo orientation	317	2.18	0.82
Mexican orientation	318	3.22	0.48
Years of Education	291	12.73	4.18

(Continued)

Table 1 (continued)

Variable	*N*	Mean	*SD*
Cholesterol	292	181.94	39.00
Triglycerides	292	170.13	113.27
HDL	203	40.40	11.08
BMI	332	28.36	5.39
Systolic			
24 hour	326	116.95	14.31
Daytime	313	121.47	12.37
Night time	230	111.84	15.72
Diastolic			
24 hour	326	77.41	11.95
Daytime	313	81.41	8.12
Night time	230	63.18	10.64
Social Support			
ISEL 12-item	296	37.84	6.66
Number	282	18.34	18.31
Satisfaction	235	31.72	7.32

Twenty participants (6% of the sample) did not provide data for their nighttime blood pressure readings due to discomfort while sleeping. Fifty-one participants (15.3% of the sample) did not provide blood samples due to scheduling conflicts. Variables in which more than 10% of the sample did not provide data were assessed for demographic differences to help determine if the data was missing at random (see Table 2).

Table 2.

Significance levels of T-tests comparing participants with missing versus complete data

Variable	N	% Missing	BMI	Age	Gender	Income
HbA1c	192	42.3%	.12	<.001***	.17	.14
Cholesterol	292	12.4%	.22	.19	.33	.93
Triglycerides	292	12.4%	.22	.19	.33	.93
Sleep systolic BP	230	30.9%	.04*	.29	.10	.33
Sleep diastolic BP	230	30.9%	.04*	.29	.10	.33
ISEL-12 item	296	12.3%	.02*	.11	.67	.65
Size	282	15.3%	.17	.03*	.76	.72
Satisfaction	235	29.4%	.77	.006**	.43	.66

Note: *Size* refers to the size of participants' social network or number of people they listed as being reliable social contacts. *Satisfaction* refers to participants' satisfaction with their social support system.

T-tests for differences of means indicated that the demographic information between completers and non-completers were similar in many dimensions. However, significant differences were found between participants who did, and did not provide HbA1c samples in terms of their mean age (41.5 years for those who did not provide HbA1c samples and 35.9 years for those who did; $p < .001$). A statistically significantly higher Body Mass Index (BMI) was also found between participants not providing evening blood pressure measurements and those who did (BMI = 29.3 & 28.0, respectively; $p = .04$). Those participants not completing the ISEL-12 also had higher BMI scores than those who did (BMI = 29.8 & 28.0, respectively; p =

.02). Finally, those not completing information regarding the amount of people in their social support (p = .03) and their perception of their support system were older than those who did (mean ages=38.7 & 35.5, respectively; p = .006). However since age, gender, and BMI were included as control variables in the regression analyses these variations should be accounted for in the outcomes.

Since many of the hypotheses of this study address gender differences in outcomes, the means of key variables based upon gender are given in Table 3. Overall, men reported significantly higher orientation towards Anglo culture (p = .006) and significantly less Mexican orientation compared to women (p = .002).

Table 3

Sample Sociocultural Characteristics by Gender

Variable	Mean	*F*	*P*
Demographic Variables			
Age		2.56	.11
Women	37.30		
Men	35.30		
Annual Income		.57	.45
Women	4.00		
Men	4.20		

(Continued)

Table 3 (continued)

Variable	Mean	*F*	*P*
Years of Education		.58	.45
Women	12.60		
Men	13.00		
Years in U.S.		.16	.73
Women	7.80		
Men	8.10		
Acculturation			
Anglo-orientation		7.68	< .01**
Women	2.07		
Men	2.32		
Mexican Orientation			
Women	3.29	10.10	< .01**
Men	3.13		
Social Support			
ISEL total		.43	.51
Women	38.10		
Men	37.60		
SSSQ—Number of supports		.25	.62
Women	19.40		

(Continued)

Table 3 (Continued)

Variable	M		
Men	17.00		
SSSQ—Perception of support		1.77	.19
Women	31.40		
Men	32.10		

Significant health differences existed based upon gender. Men were found to have significantly higher total cholesterol, triglycerides, daytime and night time systolic and diastolic blood pressure, 24-hour diastolic blood pressure and significantly lower levels of HDL compared to women (See table 4).

Table 4.

Health Variables by Gender

Variable	Mean	*F*	*p*
HbA1C		.23	.64
Women	5.8		
Men	5.8		
Cholesterol		8.40	< .01**
Women	175.90		
Men	189.08		
Triglycerides		9.21	< .01**

(Continued)

Table 4 (Continued)

Variable	Mean	*F*	*p*
Women	151.80		
Men	191.90		
HDL		10.29	< .01**
Women	42.70		
Men	37.80		
Body Mass Index			
Women	28.55	.53	.47
Men	28.11		
Blood Pressure			
Systolic			
24 hour		3.22	.07
Women	115.71		
Men	118.57		
Daytime		40.47	<.001***
Women	117.70		
Men	126.17		
Night time		9.81	< .01**
Women	108.92		
Men	115.31		
Diastolic			

(Continued)

Table 4 (Continued)

Variable	Mean	*F*	*p*
Women	108.92		
Men	115.31		
Daytime		23.42	<.001***
Women	75.73		
Men	79.56		
Night time		10.50	<.001***
Women	61.14		
Men	65.60		

First Set of Questions

Will higher levels of acculturation predict higher perceived social support? Will this relationship be moderated by gender? These research questions were tested using hierarchical multiple regression in which dimensions of the ARMSA-II were used as independent variables predicting scores on social support measures (see table 5). The Sarason Social Support Questionnaire (SSSQ) was used in the analysis as well as the total score of the Interpersonal Support Evaluation List (ISEL-II) to represent social support. Demographics (age, gender, education, income & BMI) were entered into SPSS to create model one and ARMSA-II scores were added to create subsequent models.

Anglo orientation and social support. The Anglo-Orientation Scale (AOS) from the ARMSA-II significantly predicted participants' ISEL scores ($\beta = .27$, $t = 4.04$, $p < .001$; see table 5). This indicates that an increase in participants' orientation towards Anglo culture in the United States is associated with

stronger social support as measured by the ISEL-II. To examine the question if the association between acculturation and social support is moderated by gender, acculturation x gender interaction variables were created and a significant interaction between gender and AOS was observed for participants' satisfaction with their support (p = .007) but not for the number of support members or ISEL-II scores (p = .60 & .88, respectively). This suggests that gender has a moderating role in relation to satisfaction with social support. Men and women in this study seem to have significantly different experiences with regards to how satisfied they are with their social networks based upon their level of orientation to Anglo culture. Higher levels of Anglo orientation were associated with significantly higher satisfaction with one's social network for women but not for men. However, no other significant differences were identified from the Anglo Orientation Scale in regards to the size or satisfaction of participants' social support network.

Mexican orientation and social support. The Mexican Orientation Scale (MOS) from the ARMSA-II was not significant in predicting ISEL-II scores, size of support networks, or participants' satisfaction with their support systems (see table 6). Similarly, an MOS x gender interaction was not significant in predicting any dimension of social support. These results suggest that participants' level of preference for Mexican cultural practices did not significantly associate with the quality of their social support as measured by size, satisfaction, and ISEL-II scores (see table 6).

Consequently, the hypothesis that increased levels of Anglo acculturation will be associated with higher levels of social support was partially supported by analyses summarized in table 5. These analyses suggest that greater Anglo acculturation for Mexican immigrants in

Utah is associated with increased social support as measured by the ISEL-II but is not significantly associated with a larger, or more satisfactory social support network from measures on the SSSQ. The significant association between the AOS and the ISEL-II social support measure, in contrast to the null findings with measures from the SSSQ, highlight the overlapping, yet unique dimensions of social support measured in this study. The ISEL-II was meant to reflect a broad social support measure consisting of questions related to satisfaction, availability, and a sense of belongingness whereas the measures from the SSSQ were meant to measure more specific dimensions of social support (size and satisfaction).

The hypothesis that gender serves as a moderating variable between Anglo acculturation and social support was also partially supported by analyses summarized in table 5. Whether or not gender moderates the relationship between acculturation and social support seems to depend on the dimension of social support and acculturation being measured. In this case, the data indicated Mexican immigrant women report higher levels of satisfaction with their social network compared to Mexican immigrant males with similar levels of Anglo acculturation. However, males and females in this study were similar in their ISEL-II scores and size of their social networks when also taking into account how those social support dimensions interact with their Anglo or Mexican cultural orientations.

Table 5

Hierarchical Multiple Regression Analysis Examining Anglo Orientation and Social Support

	Social Support Dimensions					
	ISEL-II		Size		Satisfaction	
Predictor	ΔR^2	β	ΔR^2	β	ΔR^2	β
Step 1	.03		.03		.02	
Control Variables						
Age		.05		-.05		.05
Gender		-.06		-.04		.07
Education		.11		.13		.09
Income		.09		.04		.06
BMI		-.09		-.04		.07
Step 2	.06		.03		.04	
Age		.14		.01		.03
Gender		-.09		-.06		.09
Education		.06		.11		.08
Income		.05		.00		.04
BMI		-.12		-.06		.09

(Continued)

Table 5 (continued)

	Social Support Dimensions					
	ISEL-II		Size		Satisfaction	
Predictor	ΔR^2	β	ΔR^2	β	ΔR^2	B
AOS		.27***		.18**		-.02
AOS X Gender		.06		-.01		-.20**
Total R^2	.09		.06		.03	
N	248		227		195	

Note. Control variables include age, gender, income, education and body mass index.

AOS= Anglo Orientation Scale

AOS X Gender= Anglo Orientation Scale X Gender interaction.

Size refers to the size of participants' social support network as reported in the Sarason Social Support (SSSQ). S*atisfaction* refers to participants' satisfaction with their social support network as reported in the Sarason Social Support Questionnaire (SSSQ)

** $p < .01$. ***$p < .001$

Table 6

Hierarchical Multiple Regression Analysis Examining Mexican Orientation and Social Support

	Social Support Dimensions					
	ISEL-II		*Size*		*Satisfaction*	
Predictor	ΔR^2	β	ΔR^2	β	ΔR^2	β
Step 1	.03		.03		.02	
Control Variables						
Age		.05		-.05		.05
Gender		-.06		-.04		.07
Education		.11		.13		.09
Income		.09		.04		.06
BMI		-.09		-.04		.07
Step 2	.00		.01		.02	
Age		.05		-.03		.06
Gender		-.06		-.02		.08
Education		.11		.14*		.11
Income		.09		.04		.05
BMI		-.08		-.03		.07
MOS		.02		.10		.10

(Continued)

Table 6 (continued)

	Social Support Dimensions					
	ISEL-II		*Size*		*Satisfaction*	
Predictor	ΔR^2	β	ΔR^2	β	ΔR^2	β
MOS X Gender		.00		.06		-.12
Total R^2	.03		.04		.04	
N	248		227		195	

MOS= Mexican Orientation Scale

MOS X Gender= Mexican Orientation Scale X Gender interaction.

*$p < .05$

Second Set of Questions

Will higher levels of acculturation be associated with less favorable health outcomes? Will this relationship differ (be moderated) by gender?

Hierarchical multiple regression was applied to test the question if higher acculturation levels will be associated with less favorable health outcomes. However, neither the Anglo-orientation scale (AOS) nor the Mexican orientation scale (MOS) from the ARMSA-II were significant in predicting any health outcome (see Tables 7-12). These findings are in contrast with other studies which have found negative associations between acculturation and health outcomes with immigrant populations in various parts of the United States (Daviglus et al., 2012; Mainous III, 2006; & Vella et al., 2011). These results may suggest there are unique factors among Mexican immigrants in Utah which impact their health profiles differently than

other immigrant groups in the United States. These results may also suggest there may be moderating and mediating variables which influence an association between acculturation and health.

To examine the question if gender serves as a moderating variable between acculturation and health, interaction terms were created. Interestingly, while gender in itself was a significant predictor of triglycerides, cholesterol, and dimensions of systolic and diastolic blood pressure (women had healthier profiles), no significant interactions were observed between gender and the Anglo Orientation Scale or gender and the Mexican Orientation Scale (see tables 7-12). This suggests that gender did not play a significant role in the differences between health profiles based upon acculturation in this sample. Consequently, the notion that gender serves as a moderating variable between health and acculturation was not supported with this sample.

Table 7

Hierarchical Multiple Regression Analysis Examining Anglo Orientation and Health Outcomes

	24-Hour Fasting Blood Draw							
	HbA1c		Cholesterol		Triglycerides		HDL	
Predictor	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β
Step 1	.22		.27		.12		.03	
Control Variables								
Age		.22**		.48***		.20**		-.04
Gender		.03		.20***		.19**		.06
Education		.14		-.10		-.03		-.02
Income		-.07		-.03		-.03		-.01
BMI		.40***		.04		.20**		-.13
Step 2	.01		.00		.00		.01	
Age		.22*		.49***		.19**		-.06
Gender		.03		.20**		.19**		.07
Education		.15		-.10		-.03		-.02
Income		-.08		-.03		-.03		.00
BMI		.40***		.03		.20**		-.12
AOS		.00		.02		.00		-.08

(continued)

Table 7 (continued)

	24-Hour Fasting Blood Draw							
	HbA1c		Cholesterol		Triglycerides		HDL	
Predictor	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β
AOS X Gender		-.08		.06		-.03		-.05
R^2 Total	.23		.27		.12		.04	
N	147		228		228		151	

AOS=Anglo Orientation Scale.

AOS X Gender= Interaction between Anglo orientation and gender.

Significance: *$p < .05$. ** $p < .01$. ***$p < .001$

Table 8

Hierarchical Multiple Regression Analysis Examining Anglo Orientation and Blood Pressure

	Systolic Blood Pressure					
	24-hour		Daytime		Evening	
Predictor	ΔR^2	β	ΔR^2	B	ΔR^2	β
Step 1	.25		.21		.20	
Control						
Age		.37***		.15*		.20**
Gender		.16**		.35***		.20**
Education		.04		.00		-.04
Income		.04		.08		.09
BMI		.25***		.25***		.28***
Step 2	.01		.00		.00	
Control						
Age		.35***		.14*		.20**
Gender		.17**		.35***		.20**
Education		.05		.00		-.04
Income		.04		.08		.09

(continued)

Table 8 (continued)

	Systolic Blood Pressure					
	24-hour		Daytime		Evening	
Predictor	ΔR^2	β	ΔR^2	B	ΔR^2	β
BMI		.26***		.25***		.28***
AOS		-.06		.00		-.03
AOS X Gender		-.10		-.02		.04
R^2 total	.25		.21		.20	
N	261		248		183	

AOS= Anglo Orientation Scale

AOS X Gender= Anglo orientation and gender interaction.

*p < .05. ** p < .01. ***p < .001

Table 9

Hierarchical Multiple Regression Analysis Examining Anglo Orientation and Blood Pressure

	Diastolic Blood Pressure					
	24-hour		Daytime		Evening	
Predictor	ΔR^2	β	ΔR^2	β	ΔR^2	β
Step 1	.18		.21		.15	
Control Variables						
Age		.29***		.28***		.20**
Gender		.19***		.32***		.22**
Education		-.06		.03		.01
Income		.02		.05		-.03
BMI		.20***		.18**		.24**
Step 2	.01		.00		.00	
Age		.25***		.28***		.21**
Gender		.20**		.32***		.22**
Education		-.05		.03		.00
Income		.03		.05		-.03

(continued)

Table 9 (continued)

	Diastolic Blood Pressure					
	24-hour		Daytime		Evening	
Predictor	ΔR^2	β	ΔR^2	β	ΔR^2	β
BMI		.21***		.18**		.24**
AOS		-.12		-.02		.01
AOS X Gender		-.04		.04		.02
R^2 total	.19		.21		.15	
N	261		248		183	

Note. Control variables include age, income, education and body mass index.

AOS= Anglo Orientation Scale

AOS X Gender = Anglo Orientation Scale X Gender interaction.

** $p < .01$. ***$p < .001$

Table 10

Hierarchical Multiple Regression Analysis Examining Mexican Orientation and Health Outcomes

	24-Hour Fasting Blood Draw							
	HbA1c		Cholesterol		Triglycerides		HDL	
Predictor	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β
Step 1	.22		.27		.12		.03	
Control Variables								
Age		.22**		.48***		.20**		-.04
Gender		.03		.20**		.19**		.06
Education		.14		-.10		-.03		-.02
Income		-.07		-.03		-.03		-.01
BMI		.40***		.04		.20**		-.13
Step 2	.02		.00		.00		.01	
Age		.20**		.47***		.19**		.07
Gender		-.01		.19**		.18**		-.02
Education		.13		-.11		-.03		.00
Income		-.08		-.03		-.03		-.12

(continued)

Table 10 (continued)

	24-Hour Fasting Blood Draw							
	HbA1c		Cholesterol		Triglycerides		HDL	
Predictor	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β
BMI		.39***		.03		.20**		-.08
MOS		-.12		-.07		-.02		-.05
MOS X Gender		-.07		.00		-.03		-.02
Total R^2	.24		.27		.12		.04	
N	147		228		228		151	

MOS= Mexican Orientation Scale

MOS X Gender= Interaction term between Mexican orientation and Gender.

** $p < .01$. *** $p < .001$

Table 11

Hierarchical Multiple Regression Examining Mexican Orientation and Health Outcomes

	Systolic Blood Pressure					
	24-Hour		Daytime		Evening	
Predictor	ΔR^2	B	ΔR^2	β	ΔR^2	β
Step 1	.25		.21		.15	
Control Variables						
Age		.37***		.15		.20**
Gender		.16**		.35***		.21**
Education		.04		.00		.01
Income		.04		.08		-.03
BMI		.25		.25***		.24***
Step 2	.01		.01		.00	
Age		.38***		.16		.20**
Gender		.16**		.35***		.21**
Education		.05		.01		.00
Income		.04		.08		-.03
BMI		.25***		.25***		.24**

(continued)

Table 11 (continued)

	Systolic Blood Pressure					
	24-Hour		Daytime		Evening	
Predictor	ΔR^2	B	ΔR^2	β	ΔR^2	β
MOS		.01		.06		-.04
MOS X Gender		-.08		-.04		-.01
R^2 total	.26		.22		.15	
N	261		248		183	

MOS= Mexican Orientation Scale.

MOS X Gender= Mexican orientation and gender interaction.

** $p < .01$. *** $p < .001$

Table 12

Hierarchical Multiple Regression Analysis Examining Mexican Orientation and Health Outcomes

	Diastolic Blood Pressure					
	24-Hour		Daytime		Evening	
Predictor	ΔR^2	β	ΔR^2	β	ΔR^2	β
Step 1	.18		.21		.15	
Control Variables						
Age		.29***		.28***		.20**
Gender		.19**		.32***		.22**
Education		-.06		.03		.01
Income		.02		.05		-.03.
BMI		.20**		.18**		.24**
Step 2	.01		.00		.00	
Age		.30***		.28***		.20**
Gender		.20**		.32***		.21**
Education		-.05		.03		.00
Income		.02		.05		-.03

(continued)

Table 12 (continued)

	Diastolic Blood Pressure					
	24-hour		Daytime		Evening	
Predictor	ΔR^2	β	ΔR^2	β	ΔR^2	β
BMI		.20**		.18**		.24**
MOS		.08		.02		-.04
MOS X Gender		-.05		.03		-.01
R^2 total	.19		.21		.15	
N	261		248		183	

MOS= Mexican Orientation Scale.

MOS X Gender= Mexican orientation and gender interaction.

** $p < .01$. ***$p < .001$

Third Set of Questions

Will higher levels of social support predict positive health outcomes? Will these relationships differ (be moderated) by acculturation levels? Will these relationships differ (be moderated) by gender?

To assess the relationship between social support and health outcomes hierarchical multiple regression analyses were performed on blood profiles and blood pressure readings and yielded the outcomes in tables 13-21. Given the body of research regarding social support and health, it was somewhat surprising that no significant associations were observed between health measures and social support as measured by the ISEL-II (see tables 11-13); size of

support network (see tables 14-17); or reported satisfaction with support network (see tables 18-21) after setting the threshold for significance at the .0008 level based upon Benjamini & Hochbert's (1995) corrections for multiple analyses. Consequently, these analyses do not support the notion that increased social support will predict more favorable health outcomes amongst Mexican immigrants in Utah. These findings are not consistent with the larger body of research which often finds social support dimensions to be related to health outcomes (Holt-Lunstad, Smith, & Layton, 2010; Thorstein & James, 1998; & Wang, Ying, & Lieu, 2003). This suggests there may be unique factors within this sample which set them apart from other samples of research participants in which significant relationships between health and social support were found. The results also suggest potential moderating and mediating variables which impact the association between social support and health.

To examine the question if gender serves as a moderator between social support and health interaction terms were created between each social support dimension but yielded no significant results (see tables 13-21). These findings do not support the notion that health outcomes during acculturation are significantly affected by a combination of their gender and social support levels amongst Mexican immigrants in Utah.

Table 13

Hierarchical Multiple Regression Analysis Examining ISEL-II Scores on Health Outcomes

	24-Hour Fasting Blood Draw							
	HbA1c		Cholesterol		Triglycerides		HDL	
Predictor	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β
Step 1	.22		.30		.12		.04	
Control Variables								
Age		.23**		.51***		.19**		-.02
Gender		.03		.19**		.15*		.09
Education		.14		-.11		-.04		.02
Income		-.09		-.03		-.05		.00
BMI		.39***		.03		.21**		-.17
Step 2	.02		.01		.01		.02	
Age		.22**		.53***		.17*		-.06
Gender		.05		.18**		.15*		.11
Education		.12		-.11		-.06		.04
Income		-.11		-.04		-.05		.00
BMI		.38***		.02		.21**		-.15

(continued)

Table 13 (continued)

	24-Hour Fasting Blood Draw							
	HbA1c		Cholesterol		Triglycerides		HDL	
Predictor	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β
Education		.12		-.11		-.06		.04
Income		-.11		-.04		-.05		.00
BMI		.38***		.02		.21**		-.15
ISEL—II		.08		-.08		.07		.04
ISEL-II X AOS		-.01		.05		-.01		-.14
ISEL-II X MOS		-.06		-.02		-.07		.02
ISEL-II X Gender		-.13		.03		-.05		-.01
Total R^2	.24		.31		.13		.06	
N	144		214		214		142	

ISEL-II= Interpersonal Support Evaluation List—2nd edition—abbreviated version.

ISEL-II X AOS = Interaction between the ISEL-II and Anglo Orientation Scale.

ISEL-II X MOS = Interaction between the ISEL-II and Mexican orientation scale.

ISEL-II X Gender= Interaction between the ISEL-II and Gender.

*p < .05. ** p < .01. ***p < .001

Table 14

Hierarchical Multiple Regression analysis Examining ISEL-II Scores and Health Outcomes

	Systolic Blood Pressure					
	24-Hour		Daytime		Evening	
Predictor	ΔR^2	β	ΔR^2	β	ΔR^2	β
Step 1	.24		.21		.18	
Control Variables						
Age		.37***		.14*		.17*
Gender		.13*		.34***		.18*
Education		.03		-.01		-.06
Income		.03		.06		.08
BMI		.25***		.27***		.29***
Step 2	.01		.01		.03	
Age		.35***		.15*		.12
Gender		.14*		.34***		.20**
Education		.05		-.02		-.07
Income		.05		.06		.06
BMI		.26***		.27***		.32***
ISEL-II		.00		.03		.12

(continued)

Table 14 (continued)

	Systolic Blood Pressure					
	24-Hour		Daytime		Evening	
Predictor	ΔR^2	β	ΔR^2	β	ΔR^2	β
ISEL-II X AOS		-.06		.02		-.05
ISEL-II X MOS		.04		.09		.00
ISEL-II X Gender		.03		-.01		-.14
R^2 total	.25		.22		.21	
N	244		233		173	

ISEL-II= Interpersonal Support Evaluation List—2nd edition—abbreviated version.

ISEL-II X AOS = Interaction between the ISEL-II and Anglo Orientation Scale.

ISEL-II X MOS = Interaction between the ISEL-II and Mexican orientation scale.

ISEL-II X Gender= Interaction between the ISEL-II and Gender.

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

Table 15

Hierarchical Multiple Regression Analysis Examining ISEL-II Scores and Health Outcomes

	Diastolic Blood Pressure					
	24-Hour		Daytime		Evening	
Predictor	ΔR^2	β	ΔR^2	β	ΔR^2	β
Step 1	.17		.21		.14	
Control Variables						
Age		.25***		.29***		.16*
Gender		.17**		.31***		.22**
Education		.06		.01		.02
Income		.02		.05		-.02
BMI		.21**		.16*		.25**
Step 2	.02		.03		.02	
Age		.25***		.31***		.12
Gender		.18**		.31***		.24**
Education		-.03		.01		.01
Income		.05		.05		-.04
BMI		.21**		.17**		.28**
ISEL-II		-.04		.05		.09

(continued)

Table 15 (continued)

	Diastolic Blood Pressure					
	24-Hour		Daytime		Evening	
Predictor	ΔR^2	β	ΔR^2	β	ΔR^2	β
ISEL-II X AOS		-.10		.02		-.02
ISEL-II X MOS		.05		.17**		-.02
ISEL-II X Gender		.04		.06		.14
R^2 total	.19		.24		.16	
N	244		233		173	

ISEL-II= Interpersonal Support Evaluation List—2nd edition—abbreviated version.

ISEL-II X AOS = Interaction between the ISEL-II and Anglo Orientation Scale.

ISEL-II X MOS = Interaction between the ISEL-II and Mexican orientation scale.

ISEL-II X Gender= Interaction between the ISEL-II and Gender.

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

Table 16

Hierarchical Multiple Regression Analysis Examining Size of Social Network on Health Outcomes

	24-Hour Fasting Blood Draw							
	HbA1c		Cholesterol		Triglycerides		HDL	
Predictor	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β
Step 1	.19		.27		.12		.04	
Control Variables								
Age		.22*		.47***		.17*		-.01
Gender		.04		.21**		.18**		.06
Education		.18*		-.11		-.04		.03
Income		-.05		-.04		-.05		.00
BMI		.36***		.04		.22**		-.17
Step 2	.02		.02		.01		.01	
Age		.23*		.47***		.18*		-.03
Gender		.04		.19**		.17*		.07
Education		.18*		-.11		-.04		.04
Income		-.03		-.05		-.06		.01
BMI		.38***		.03		.21**		-.17

(continued)

Table 16 (continued)

	24-Hour Fasting Blood Draw							
	HbA1c		Cholesterol		Triglycerides		HDL	
Predictor	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β
Size		.04		-.06		-.09		.03
Size X AOS		-.05		.10		.05		-.08
Size X MOS		-.14		.00		.00		.07
Size X Gender		-.02		-.03		-.02		-.05
Total R^2	.21		.28		.13		.05	
N	129		200		200		127	

Size= Self-report of amount of people who would be readily available to help participant when requested.

Size X AOS= Interaction between the size of participant's social support network and Anglo Orientation Scale

Size X MOS= Interaction term between the size of participant's social support network and Mexican orientation.

Size X Gender= Interaction term between the size of participant's social support network and gender.

*p < .05. ** p < .01. ***p < .001

Table 17

Hierarchical Multiple Regression Analysis Examining Size of Social Network and Health Outcomes

	Systolic Blood Pressure					
	24-Hour		Daytime		Evening	
Predictor	ΔR^2	β	ΔR^2	β	ΔR^2	β
Step 1	.25		.19		.19	
Control Variables						
Age		.37***		.14*		.14**
Gender		.17**		.34***		.21**
Education		.08		.05		.03
Income		.02		.10		.12
BMI		.27***		.24***		.25**
Step 2	.01		.01		.04	
Age		.35***		.15		.18*
Gender		.17**		.32***		.19*
Education		.08		.04		.04
Income		.02		.08		.11
BMI		.29***		.24***		.27***

(continued)

Table 17 (continued)

	Systolic Blood Pressure					
	24-Hour		Daytime		Evening	
Predictor	ΔR^2	β	ΔR^2	β	ΔR^2	β
Size		.01		.00		.11
Size X AOS		-.07		.05		-.07
Size X MOS		-.07		.01		.11
Size X Gender		-.06		-.07		-.15*
R^2 total	.26		.20		.23	
N	223		214		155	

Size= Self-report of amount of people who would be readily available to help participant when requested.

Size X AOS= Interaction between the size of participant's social support network and Anglo Orientation Scale

Size X MOS= Interaction term between the size of participant's social support network and Mexican orientation.

Size X Gender= Interaction term between the size of participant's social support network and gender.

*p < .05. ** p < .01. ***p < .001

Table 18

Hierarchical Multiple Linear Regression Analysis Examining Size of Social Network and Health Outcomes

	Diastolic Blood Pressure					
	24-Hour		Daytime		Evening	
Predictor	ΔR^2	β	ΔR^2	β	ΔR^2	β
Step 1	.19		.19		.16	
Control Variables						
Age		.31***		.29***		.21**
Gender		.18**		.29***		.26**
Education		-.03		.00		.07
Income		.02		.02		.01
BMI		.23***		.18**		.20*
Step 2	.02		.01		.03	
Age		.27***		.29***		.17*
Gender		.19**		.28***		.25**
Education		-.03		.00		.09
Income		.03		.02		.00
BMI		.25***		.17**		.22**

(continued)

Table 18 (continued)

	Diastolic Blood Pressure					
	24-Hour		Daytime		Evening	
Predictor	ΔR^2	β	ΔR^2	β	ΔR^2	β
Size		.02		.02		.01
Size X AOS		-.11		.02		-.05
Size X MOS		-.04		.07		.06
Size X Gender		-.08		-.03		-.14
R^2 total	.21		.20		.19	
N	223		214		155	

Size= Self-report of amount of people who would be readily available to help participant when requested.

Size X AOS= Interaction between the size of participant's social support network and Anglo Orientation Scale

Size X MOS= Interaction term between the size of participant's social support network and Mexican orientation.

Size X Gender= Interaction term between the size of participant's social support network and gender.

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

Table 19

Multiple Regression Analysis Examining Satisfaction with Support Network reports on Health Outcomes

	24-Hour Fasting Blood Draw							
	HbA1c		Cholesterol		Triglycerides		HDL	
Predictor	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β
Step 1	.22		.24		.13		.05	
Control Variables								
Age		.22*		.45***		.18*		-.04
Gender		.04		.17*		.19*		.06
Education		.21*		-.11		.10		.06
Income		-.05		-.05		-.04		.05
BMI		.40***		.06		.24**		-.17
Step 2	.06		.03		.01		.08	
Age		.20		.46***		.18*		-.02
Gender		.01		.19**		.18*		.09
Education		.19*		-.14		.09		.06
Income		-.05		-.05		-.05		.05
BMI		.40***		.05		.24**		-.16

(continued)

Table 19 (continued)

	24-Hour Fasting Blood Draw							
	HbA1c		Cholesterol		Triglycerides		HDL	
Predictor	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β
Satisfaction		.18		.10		.13		-.15
Satisfaction X AOS		.29		.05		.06		.15
Satisfaction X MOS		-.18		.10		.02		.02
Satisfaction X Gender		.11		-.18*		.01		.02
Total R^2	.28		.27		.14		.13	
N	109		170		170		110	

Satisfaction= Self-reported satisfaction in participants' social support network from the Sarason Social Support Questionnaire.

Sat. X AOS= Interaction between social support satisfaction and the Anglo Orientation Scale.

Sat. X MOS= Interaction between social support satisfaction and the Mexican Orientation Scale.

Sat. X Gender= Interaction between social support satisfaction and gender.

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

Table 20

Hierarchical Multiple Regression Analysis Examining Satisfaction with Support System and Health Outcomes

	Systolic Blood Pressure					
	24-Hour		Daytime		Evening	
Predictor	ΔR^2	β	ΔR^2	β	ΔR^2	β
Step 1	.27		.20		.18	
Control Variables						
Age		.38***		.13		.25**
Gender		.14*		.34***		.20*
Education		.06		.04		.01
Income		.02		.16*		.13
BMI		.27***		.23**		.21*
Step 2	.01		.02		.06	
Age		.38***		.12		.26**
Gender		.15*		.36***		.23**
Education		.06		.02		-.03
Income		.02		.16*		.13

(continued)

Table 20 (continued)

	Systolic Blood Pressure					
	24-Hour		Daytime		Evening	
Predictor	ΔR^2	β	ΔR^2	β	ΔR^2	β
BMI		.28***		.21**		.17
Satisfaction		.00		.14		.29
Satisfaction X AOS		-.03		.05		.01
Satisfaction X MOS		.03		.11		.13
Satisfaction X Gender		-.09		-.11		-.27
R^2 total	.27		.22		.24	
N	192		182		133	

Satisfaction= Self-reported satisfaction in participants' social support network from the Sarason Social Support Questionnaire.

Satisfaction X AOS= Interaction between social support satisfaction and the Anglo Orientation Scale.

Satisfaction X MOS= Interaction between social support satisfaction and the Mexican Orientation Scale.

Satisfaction X Gender= Interaction between social support satisfaction and gender.

*p < .05. ** p < .01. ***p < .001

Table 21

Hierarchical Multiple Regression Analysis Examining Satisfaction with Support System and Health Outcomes

	Diastolic Blood Pressure					
	24-Hour		Daytime		Evening	
Predictor	ΔR^2	β	ΔR^2	β	ΔR^2	β
Step 1	.19		.19		.13	
Control Variables						
Age		.29***		.30***		.23**
Gender		.17*		.27***		.21*
Education		-.08		-.01		.02
Income		.02		.06		.01
BMI		.23		.16		.18*
Step 2	.01		.02		.02	
Age		.29***		.31***		.23**
Gender		.16*		.30***		.23**
Education		-.08		-.02		.01
Income		.02		.06		.01
BMI		.23**		.15*		.16

(continued)

Table 21 (continued)

	Diastolic Blood Pressure					
	24-hour		Daytime		Evening	
Predictor	ΔR^2	β	ΔR^2	β	ΔR^2	β
BMI		.23**		.15*		.16
Satisfaction		-.07		.12		.19
Satisfaction X AOS		-.10		.13		.04
Satisfaction X MOS		.04		.09		.09
Satisfaction X Gender		.00		-.07		-.12
R^2 total	.20		.21		.15	
N	192		182		133	

Satisfaction= Self-reported satisfaction in participants' social support network from the Sarason Social Support Questionnaire.

Satisfaction X AOS= Interaction between social support satisfaction and the Anglo Orientation Scale.

Satisfaction X MOS= Interaction between social support satisfaction and the Mexican Orientation Scale.

Satisfaction X Gender= Interaction between social support satisfaction and gender.

*p < .05. ** p < .01. ***p < .001

Discussion

The purpose of this study was to assess the impact of acculturation and social support on health outcomes and to examine potential moderators among these relationships in a

sample of Mexican immigrants in Utah. The first set of research questions explored whether acculturation would predict higher levels of social support and if this relationship would be moderated by gender. A second set of research questions asked if higher levels of acculturation would be associated with less favorable health outcomes and if this relationship would be moderated by gender. Finally, a third set of questions asked if higher levels of social support would predict positive health outcomes and if this relationship would be moderated by acculturation levels or gender.

In the first set of questions an association between acculturation level and social support was partially supported. A significant association between participants' level of Anglo orientation and their ISEL-II total score was found. This suggests Hispanic immigrants who adopt more Anglo-American customs reported higher levels of social support as measured by the ISEL-II which incorporated social support questions related to participants' perception of the availability of people to spend time with, to talk to, and material social support. However, significant associations were not observed between participants' Anglo orientation and the size of their support network or their satisfaction with their support network.

Other studies have found positive associations between acculturation and social support in various Latino immigrant populations such as pregnant women (Dunn & O'brien, 2009; & Harley & Eskenazi, 2006) and Latino immigrants in Miami ([primarily from Cuba]; Rivera, 2007). The measurement of acculturation across these studies has also varied from time in the United States (Harley & Eskenazi, 2006), the Short Acculturation Scale for Hispanics (Marin, G., Sabogal, Marin, B.,V., Otero-Sabogal, & Perez-Stable, 1987 & Rivera, 2007) and the Bicultural Involvement Questionnaire (BIQ: Smokowski, Rose & Bacallao, 2008; & Szapocznik, 1980), a

modified ARMSA focused on language preference behavior (Franzini & Fernandez-Esquer, 2004) and the Multidimensional Acculturation Rating Scale (MRA; Rodriguez, Myers, Bingham-Mira, Flores, & Garcia-Hernandez, 2002). These measures were similar to the ARMSA in that they each assessed language preference. However, the Short Acculturation Scale contained significantly fewer items compared to the ARMSA (12 & 30 items, respectively). Also, the measure employed by Franzini & Fernandez-Esquer (2004) was a modified version of the ARMSA which focused on language preference behavior combined with nativity. Another difference from the ARMSA was that the Bicultural Involvement Questionnaire was normed on a sample of Cuban-Americans rather than Mexican Americans.

Social support measures in these studies have consisted of The Functional Social Support Questionnaire (Broadhead, Gehlbach, de Gruy, & Kaplan, 1988; Harley & Eskenazi, 2006), an adapted social support scale for family support (Turner & Marino, 1994; Rivera, 2007), the Social Support Scale (Berkman & Syme, 1979; Franzini & Fernandez-Esquer, 2004) and the Perceived Social Support from Family (PSS-Fa) Scale (Procidano & Heller, 1983; Rodriguez, Mira, Paez, & Myers, 2007). It should be noted that these questionnaires differ in important ways than the instruments used in this study to assess social support. The total score of the ISEL-12 was employed in this study to track general social support as well as the Sarason measures which examined the size support networks along with participants' satisfaction in them. In comparison with other measures, only the Social Support Scale provided a dimension regarding the size of participants' networks (Berkman & Syme, 1979) and the Perceived Social Support Scale contained a measure of participants' satisfaction in their support networks (Procidano & Heller, 1983). Additional social support dimensions assessed by

other questionnaires and not included in this study were affective support & confidant support (Broadhead, Gehlbach, de Gruy, & Kaplan, 1988) family support (Turner & Marino, 1994; Rivera, 2007) and frequency of visits and geographical proximity of support members (Berkman & Syme, 1979). The focus on different dimensions of social support across the literature make comparisons more difficult when assessing general social support. A lack of uniformity in the way in which social support is defined and measured likely contributes to mixed findings in the literature regarding the impact of social support on various outcomes. More uniformity in the way social support is measured would likely lead to more consistent findings as well as facilitate comparisons between studies.

The significant association between Anglo orientation and the ISEL-II scores, and the lack of significance with the other social support measures is likely due to the overlapping, yet distinct, dimensions of social support they are meant to measure. While the ISEL-II measures tangible support, appraisal of support, and a sense of belongingness the other social support variables focus on number of people in one's social support system as well as their satisfaction with the system. The correlations suggest that these social support measures share some overlap. This supports the assertion of Gottliebb & Bergen (2011) that social support dimensions are interrelated and future studies should be mindful of the dimension of social support they are measuring.

Significant associations were not found between participants' level of Mexican orientation and their ISEL scores, size of their social support network, or satisfaction with their social support system. This suggests that the level of participants' preference for Mexican culture does not significantly relate to the dimensions of social support investigated in this

study. However, Edwards & Lopez (2006) found the Mexican Orientation Scale (MOS) to be positively correlated with perceived family support using the Multidimensional Scale of Perceived Social Support (MSPSS; Zimet, Dahlem, Zimet, & Farley, 1988) in a sample of 266 Mexican American adolescents. Castillo & Hill (2004) did not find significant associations between the total acculturation score from the ARMSA-II and perceived social support from family and friends as measured by the Perceived Social Support Scale (PSS; Procidano & Hiller, 1983) in a sample of 247 female college students of Mexican ancestry. The different outcomes regarding the association between the MOS and social support are likely due, in part, to the populations under investigation as well as the measurements selected to represent social support. These outcome differences highlight the need future research designs to be thoughtful in selecting appropriate social support variables based upon the research questions, as has been recommended previously (Gottlieb & Bergin, 2010).

The research question whether gender served as a moderator between acculturation and social support was partially supported by the data. A significant interaction was found between Anglo acculturation and being female with the satisfaction dimension of social support from the SSSQ (Sarason Social Support Questionnaire). This interaction suggests that female Mexican immigrants obtain more satisfaction in their support networks as their preference for Anglo culture increases compared to males. A study assessing differences between Mexican men and women on social support and acculturation could not be found for comparison purposes. However, an all-female sample of 269 Mexican American women revealed a similar positive association between acculturation and social support (Balcazar, Krull & Peterson, 2001) using the 5-item General Acculturation Index (GAI; Balcazar, Castro & Krull, 1995) and a 12-item

social support measure created by the authors from factor-analysis (2001). On the other hand, Castillo & Hill (2004) did not find significant associations between acculturation levels and social support using a sample of 247 females of Mexican ancestry and employing the ARMSA-II and Perceived Social Support scale as instruments. The mixed findings could be due to the populations under investigation as well as the instruments selected for measuring acculturation and social support. An all-male sample which addresses the relationship between acculturation and social support for comparison purposes appears to be lacking. But given the mixed findings from the previous female samples it would be difficult to interpret results from an all-male sample regarding whether gender serves as a moderator between acculturation and social support for Mexican immigrants.

Possible explanations for the gender interaction between acculturation and satisfaction with one's social support network in the current study could be that higher acculturation to U.S. society is related to more comfort in one's surroundings and less stress which associates with more enjoyment of social support groups much more for women than men. Another potential explanation could be that female Mexican immigrants with higher Anglo acculturation levels have been in the United States for longer periods of time and have friendships which are more established compared to newer immigrants who are just beginning to find new social connections. Future research in this area could provide some clarification regarding why increased Anglo acculturation appears to relate to higher social support satisfaction for women than it does for men amongst Mexican immigrants. More knowledge in this area would help clinicians and policy makers to better understand how the acculturative process can differ between men and women and tailor interventions accordingly.

A second set of research questions explored whether higher levels of acculturation would be associated with less favorable health outcomes. No significant associations between acculturation and health variables were found in this study. While some similar studies have also failed to find significant associations between acculturation and health in Mexican immigrants (Kandula et al., 2008 & Moayad, Balcázar, Pedregón, Velasco, & Bayona, 2006) most studies find poorer health profiles with increased acculturation (Daviglus et al., 2012; Mainous, 2006; Moran et al., 2007; Steffen, 2006; Vaeth & Willett, 2005; & Vella et al., 2011). Some studies have also reported better health profiles with increased acculturation (González, Tarraf, & Haan, 2011 & Monteros, Gallo, Elder, & Talavera, 2008). These mixed findings may be due in part to the varied ways acculturation has been represented. For example, the two studies which found better health with increased U.S. acculturation (González, Tarraf, & Haan, 2011; Monteros et al., 2008) employed the ARMSA-II as their principle measures of acculturation similar to the present study which found no associations between acculturation and health. Steffen (2006) also employed the ARMSA-II as an acculturation measure but found higher acculturation was related to poorer health outcomes. However, the Steffen (2006) study differed from Gonzalez et al. (2011) and Monteros et al. (2008) in that it focused on ambulatory blood pressure using a younger, and more male sample than the other studies which focused on predicting the metabolic syndrome via acculturation. Studies which found poorer health with increased acculturation employed different measures than the ARSMA-II such as nativity (Vella et al., 2009; Daviglus et al., 2012; & Moran et al., 2007) language preference (Daviglus et al., 2012; Mainous, 2006; & Moran, 2007) years in the U.S. (Moran et al., 2007), or different questionnaires (Daviglus et al. 2012; Vaeth & Willett, 2005; & Vella et al., 2009). Since data

from the present study suggest that years in the U.S. holds only a moderate correlation with acculturation as measured by the ARSMA-II, mixed findings should be expected when different measures of acculturation are employed. More uniformity in the selection of acculturation variables would make interpretation more reliable. An advantage of using the ARMSA-II is that it yields a measurement of Anglo acculturation as well as Mexican orientation in addition to evaluating language preference and years spent in the U.S.

Another potential explanation for the non-significant association between acculturation and health may be that this sample of Mexican immigrants is significantly different in some characteristics than other samples of Mexican immigrants which have been studied. The current study offered a somewhat novel population of Mexican immigrants in Utah, as well employment of the ARMSA-II to measure acculturation and the ISEL-II and SSSQ to represent social support. A potentially significant difference between this sample and other samples of Mexican immigrants is religious affiliation. This sample consisted of a large amount of Latter Day Saints (63%) as well as many Catholics (26%) and 11% classified as "other". The large proportion of Latter Day Saints is not representative of the religious affiliation of Mexican immigrants in the United States. Latter day Saints are encouraged to practice a particular health code which does not allow for alcohol or tobacco, it could be speculated that these cultural health practices may have influenced the association between acculturation and health although a more in-depth investigation of this is outside of the scope of this study. However, Steffen & Merrill (2011) also found Latter Day Saints in this sample to be higher in their Anglo orientation, overall social support, and educational attainment compared to other religious groups. Walker (2014) noted that this sample was significantly different in terms of

socioeconomic status compared to a more normative sample of Mexican immigrants. Since socioeconomic status has been shown to be an important predictor of health for Latinos (Zambrana & Carter-Pokras, 2010), future research in this area should account for potential moderating and mediating variables, such as SES and religious affiliation, which could significantly influence the relationship between acculturation and health outcomes. Additionally, increased knowledge regarding moderating and mediating variables would allow us to understand more fully under which circumstances acculturation and social support are likely to be influential upon health and to take preventive action.

Another research question addressed whether the relationship between acculturation and health outcomes would be moderated by gender. The baseline health differences between genders in the current study (see Table 4) which favored women was consistent with the general finding that women have lower blood pressure than men except for later in life (Oparil & Miller, 2005). With regards to a potential interaction between acculturation and gender on health outcomes, hierarchical multiple regression showed no significant differences when comparing acculturation versus an acculturation and gender interaction with blood pressure or blood draw values. Other studies of Hispanic immigrants have found acculturation to interact with gender (Kaplan, Huguet, Newsom, & McFarland, 2004; Koya & Egede, 2007; & Vaeth & Willett, 2005) in health outcomes such as hypertension (Koya & Egede, 2007 & Vaeth & Willett, 2005), hyperlipidemia and diabetes (Koya & Egede, 2007), as well as obesity (Kaplan et al., 2004) with males reporting less favorable health profiles. The manner in which acculturation was measured is a potential explanation for why the present study did not corroborate previous findings related to how gender and acculturation influence health outcomes. The

present study employed the ARSMA-II to measure acculturation whereas the aforementioned studies used length of residence (Kaplan et al., 2004 & Koya & Egede, 2007) or a 12-item questionnaire (Vaeth & Willet, 2005) for measurement. The sample selected for the current study which consisted solely of Mexican immigrants was also different than these other studies which included a broader sample of Hispanic immigrants from several countries (Kaplan et al., 2004; Koya & Egede, 2007; & Vaeth & Willett, 2005). Therefore, the finding that gender and acculturation did not significantly interact to predict health outcomes suggests Mexican immigrant men and women experience similar health consequences regardless of their acculturation levels in regards to blood pressure and blood profiles. This can be helpful information to inform policy makers and clinicians on the predictive factors which are most useful to predict adverse cardiovascular outcomes. Future research with this population could investigate potential gender and acculturation interactions with different types of health outcomes (e.g. BMI; dietary practices, etc.).

With regards to investigating acculturation and health amongst Mexican immigrants the present study provided a contribution by utilizing ambulatory blood pressure monitors to assess hypertension rather than traditional methods of taking three blood pressure measures in a clinic or lab from participants. Ambulatory blood pressure monitors take three measurements per hour as the participant goes about their day which increases ecological validity and the sample size of blood pressure readings. The present study also tested interactions between gender and acculturation as they relate to HDL which appears to be novel information for this population.

A third set of research questions examined the impact of social support upon health outcomes and did not find any significant associations. Earlier meta-analyses investigating the association between social support and health have reported mixed findings (Schwarzer & Leppin, 1989 & Smith, Fernengel, Holcroft, & Gerald, 1994) although a more recent meta-analysis found significant associations between social support and several health outcomes (Wang, Ying, & Lieu, 2003). Meta-analyses have also reported positive associations between health and social support in experimental studies (Thorsteinson & James, 1998) and mortality (Holt-Lunstad, Smith, & Layton, 2010). The present study, however, yielded no significant associations between social support with any health outcome. It is likely that differences moderators and mediators help explain differences between studies regarding the impact of social support upon health. The population under investigation, as well as the health outcome, likely contribute to the disparate findings in the literature. The present study made a contribution to the small but growing body of research focused on the health effects of social support on Mexican immigrants. The current study was consistent with most other studies of Hispanic populations which have found weak or non-significant associations between social support and self-rated physical health (Finch, Hummer, Kol, & Vega, 2001 & Mulvaney-Day & Alegria, Sribney, 2007), or diabetes self-management (Gleeson-Kreig, Bernal, & Woolley, 2002). However, since Harley & Eskenazi (2006) found social support to be associated with a healthier diet in a sample of 568 pregnant women born in Mexico, this suggests that there are mediating and moderating variables between social support and health outcomes. A contribution made to this growing body of research from the current study consists of the use of ambulatory blood pressure as a health outcome.

This study also examined acculturation to Anglo culture as a potential moderator between social support and health outcomes. However, no significant interactions were found between social support and acculturation on any health outcome. While previous research has found interactions between acculturation and social support on mental health outcomes (Contreras, López, Rivera-Mosquera, Raymond-Smith, & Rothstein, 1999 & Crockett et al., 2007), research appears to be lacking regarding the influence of social support and acculturation interactions upon physical health outcomes. Consequently, this study provided a unique contribution in that area. Since associations and interactions between social support, gender, and health tend to produce mixed results, more research regarding the influence of acculturation and social support upon physical health could discover important moderators and mediators. More clarity in the research findings could assist clinicians and policy makers in making more efficient plans to accommodate the growing population of Hispanic immigrants to the United States.

Finally, this study examined gender as a potential moderator between social support and health outcomes. No significant interactions were found between social support and gender on any health measure in this study. Previous research has supported both null and alternative hypotheses related to gender as a moderator between social support and physical health (Bellman, Forster, Still, & Cooper, 2003; Pinquart & Sörensen, 2006; & Wohlgelmuth & Betz, 1991) For example, gender was found to moderate the association between social support and physical strain amongst college students (Wohlgelmuth & Betz, 1991), between social support interventions and occupational stress (Bellman et al., 2003) and social support and caregiver health (Pinquart & Sörensen, 2006). Gender differences have also been found

regarding social support and health in terms of spousal survival following the death of the other spouse (Martikainen & Valkonen, 1996). Alternatively, gender was not found to moderate the association between social support and cardiovascular response during an impromptu laboratory speech task (Glynn, Christenfeld & Gerin, 1999), or when measuring the association between quality of support from participants' closest four social supports on health (Fuhrer & Stansfeld, 2002). It is likely that differences in measurement and populations have contributed to mixed findings regarding the moderating role of gender between social support and health. Replication studies in this area of research could clarify the moderating role of gender between social support and health in various contexts. Extension studies could continue to investigate under which circumstances, if any, gender and social support interactions may apply. Such information could be helpful to clarify the conditions under which health is affected differently between men and women based upon the strength of their social support. Such knowledge could be beneficial to policy makers and clinicians to design gender sensitive interventions, if research indicates gender differences are significant.

Limitations

There are limitations to this study which should be taken into account for interpretation as well as to plan for future research and interventions. First, this study was cross-sectional which does not allow for a causal analysis of how the variables relate to each other. Future research employing longitudinal designs would be helpful to elucidate potential causal relationships amongst social support, acculturation and health. Identifying causal relationships between variables would allow for more information to design strategies to potentially prevent negative health outcomes by addressing contributory factors to poorer health.

A second limitation to this study was that the sample used differed in potentially important ways than other samples of Mexican immigrants in the United States. This study consisted of participants with significantly higher socioeconomic status, and a higher proportion of Latter Day Saints than other studies on Mexican immigrants in the United States. Since socioeconomic status has been associated with health outcomes in Latino immigrants (Steffen, Smith, Larson, & Butler, 2006; & Zambrana & Carter-Pokras, 2010), this difference in SES could make it difficult to compare this sample to other samples of Mexican immigrants in the United States with lower SES. Further, it could be speculated that the high proportion of Latter Day Saints in the sample could influence health outcomes as LDS culture and doctrine discourages use of tobacco and alcohol. Additionally, participants were not randomly selected but rather recruited through community organizations and radio advertisements and a cash stipend was offered for participation. This approach sought to reach a large, diverse sample while providing sufficient incentive to create an adequate sample size although participation was not randomized. Consequently, there may be some limitations on the generalizability of the results of this study to other groups of Mexican immigrants.

Finally, some variables contained a large amount of missing data which should be taken into account. Regarding health variables, 42% of participants did not provide a HbA1c sample and 31% did not provide reliable data at night despite having worn the monitors. Additionally, 29% of participants did not complete the questionnaire measuring satisfaction with their support networks. This missing data may affect the generalizability of the results as it is possible that there were important differences between participants who provided certain types of data and those that did not which related to the dependent variables (see Table 2 for demographic

differences between completers and non-completers). Furthermore, the lower sample size on these variables may have reduced statistical power in some cases and increased the risk of type II error.

Conclusions

In conclusion, this study sought to build upon previous research (Contreras et al., 1999; Pinquart & Sörensen, 2006; Zambrana & Carter-Pokras, 2010; & Lopez-Gonzalez et al., 2005) examining the relationships between social support, acculturation and health. This study also sought to provide novel information regarding gender, acculturation, and social support as potential moderators between social support, acculturation, and health.

A significant association was observed between participants' level of Anglo acculturation with social support as measured by the ISEL-II, but not on the other dimensions of social support such as size of support network and satisfaction with network. The ISEL-II provided a measure of general social support whereas the size of one's support network and their satisfaction measured more specific dimensions of social support. This suggests the more acculturated to Anglo culture that Mexican immigrants in Utah are, the more general social support they report. A significant interaction was observed between participants' level of Anglo orientation and their gender—higher Anglo orientation predicted higher satisfaction in one's social network for females, but not for males. This suggests that female Mexican immigrants who are more acculturated to Anglo culture in the United States have higher satisfaction with their support networks than Mexican immigrant males with similar levels of Anglo acculturation. Besides the aforementioned significant association and interaction, the other research questions returned null results. That is, significant associations were not

observed between acculturation and social support or health outcomes. Further, gender was not found to moderate the relationships between acculturation and health or social support and health. Social support did not have a significant association with health outcomes and this relationship was not moderated by acculturation levels or gender.

Since many studies in the area of acculturation, social support, gender, and health amongst Mexican or Hispanic immigrants return mixed findings, future research should consider potential moderators and mediators for these associations. Further, the literature has a variety of methods to measure acculturation and social support which makes it more difficult to compare studies. More cohesion in the selection of key variables would be more productive towards accurate interpretation of this body of research. Further, more longitudinal studies with this population regarding the themes of this study would help clarify any causal relationships which may exist between these variables and assist policy makers and health care workers in making informed decisions and practices regarding how to best serve this population. The finding that gender and Anglo orientation moderated the outcome of satisfaction with social support could contribute to the body of knowledge regarding gender differences during acculturation and assist policy makers and clinicians develop gender sensitive interventions for this population.

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