



All Theses and Dissertations

2017-07-01

The Effects of Income and Ethnicity on Health Outcomes of Mexican Immigrant and Anglo Women

Andrea M. DeBarros
Brigham Young University

Follow this and additional works at: <https://scholarsarchive.byu.edu/etd>

 Part of the [Psychology Commons](#)

BYU ScholarsArchive Citation

DeBarros, Andrea M., "The Effects of Income and Ethnicity on Health Outcomes of Mexican Immigrant and Anglo Women" (2017).
All Theses and Dissertations. 6511.
<https://scholarsarchive.byu.edu/etd/6511>

This Thesis is brought to you for free and open access by BYU ScholarsArchive. It has been accepted for inclusion in All Theses and Dissertations by an authorized administrator of BYU ScholarsArchive. For more information, please contact scholarsarchive@byu.edu, ellen_amatangelo@byu.edu.

The Effects of Income and Ethnicity on Health Outcomes of
Mexican Immigrant and Anglo Women

Andrea M. DeBarros

A thesis submitted to the faculty of
Brigham Young University
in partial fulfillment of the requirements for the degree of
Master of Science

Patrick Steffen, Chair
Chad Jensen
Scott Baldwin

Department of Psychology
Brigham Young University

Copyright © 2017 Andrea M. DeBarros

All Rights Reserved

ABSTRACT

The Effects of Income and Ethnicity on Health Outcomes of Mexican Immigrant and Anglo Women

Andrea M. DeBarros
Department of Psychology, BYU
Master of Science

The Hispanic paradox is the finding that Hispanic immigrants living in the United States have better health than Anglo Americans despite being socioeconomically disadvantaged (Crespo et al., 1996; Dixon et al., 2000; Lariscy et al., 2015; Overton et al., 2015; Stern et al., 1999; Sundquist et al., 1999; Thomson et al., 2013). The literature surrounding the Hispanic paradox has studied these effects primarily in Mexican-American Immigrant populations (Dixon et al., 2000; Lariscy et al., 2015; Sundquist et al., 1999); however, additional research has found similar findings for various other Hispanic countries such as Cuba and Puerto Rico (Abraido-Lanza, A F. et al., 1999). It is not known if there is a Hispanic paradox advantage during the menopausal transition. This study compared the health outcomes of 90 Mexican immigrant women between the ages of 40-60 living in the Utah to 78 Anglo American women of the same age in order to test the hypothesis that Mexican immigrant women are healthier than their Anglo-counterparts during the menopausal transition. We compared the health of the two groups of women across various health outcomes including blood pressure, C-reactive protein, BMI, fasting glucose, and cholesterol. Contrary to our hypotheses, Anglo Americans had better health across the board on all health outcome variables. We speculate that our findings are not consistent with Hispanic paradox theory because of the religious culture in Utah that lends itself to healthier individuals who refrain from cigarette smoke and alcohol consumption.

Keywords: Hispanic paradox, health outcomes, income, ethnicity

TABLE OF CONTENTS

Abstract	ii
List of Tables	iv
The Effects of Income and Ethnicity on Health Outcomes of Mexican Immigrant and Anglo Women	1
Women's Health	2
Income and Health	5
Methods.....	7
Anglo Sample.....	7
Mexican Immigrant Sample.....	8
Results.....	10
Data Preparation.....	10
ANOVA	11
Regression.....	12
Discussion.....	13
References.....	19

LIST OF TABLES

Table 1 <i>Descriptive Statistics</i>	28
Table 2 <i>Descriptive Statistics</i>	29
Table 3 <i>Results For ANOVA Tests Comparing Health Outcomes Variables Between Mexican American Immigrant Women And Anglo Women</i>	30

The Effects of Income and Ethnicity on Health Outcomes of Mexican Immigrant and Anglo Women

Hispanic/Latino immigrants in the United States, although an economically and socially disadvantaged subpopulation, are often times healthier than native born Americans, a phenomenon referred to as the Hispanic paradox (Crespo et al., 1996; Dixon et al, 2000; Lariscy et al., 2015; Overton et al., 2015; Stern et al., 1999; Sundquist et al., 1999; Thomson et al., 2013). For example, Mexican immigrants living in the United States are healthier than native born Americans in spite of their lower socioeconomic status (Crespo et al., 1996; Dixon et al, 2000; Lariscy et al., 2015; Overton et al., 2015; Stern et al., 1999; Sundquist et al., 1999; Thomson et al., 2013). Mexican immigrants and other Hispanic/Latino immigrants living in America are less prone to cardiovascular disease and other diseases when compared to native born Americans (Overton et al., 2015; Lariscy et al., 2015; Stern et al., 1999; Sundquist et al., 1999; Thomson et al., 2013). A significant mortality advantage has also been documented with Hispanics having a significantly lower risk of mortality than other ethnic groups (Ruiz, et al., 2013).

Over time, the disparities in health outcomes between Mexican immigrant Americans and Anglo-Americans decreases (Dixon et al., 2000; Sundquist et al., 2000; Van Rompay et al., 2012; Wei et al., 1996; Winkleby et al., 1994). In other words, the longer Hispanic/Latino Americans are in America and the more they acculturate to American culture, the poorer their health (Dixon et al., 2000; Sundquist et al., 2000; Van Rompay et al., 2012; Wei et al., 1996; Winkleby et al., 1994), and the higher the level of cardiovascular disease risk factors (Dixon et al., 2000; Sundquist et al., 2000; Wei et al., 1996; Winkleby et al., 1994). Behavioral changes associated with acculturation include higher alcohol consumption and lower fiber intake (Van

Rompay et al., 2012).

American culture is well-known for poor health-related behaviors (Rivera, 2004). For example, Americans are known for their poor eating patterns compared to other countries. These cross-country differences can have health effects on acculturated immigrants. First generation Mexican American women were at a significantly lower risk of eating a poor diet compared to second generation Mexican Americans (Guendelman, et al., 1995; Rivera, 2004). Interestingly, second generation Mexican's eating habits do not differ significantly from white non-Hispanic Americans (Guendelman, et al., 1995; Rivera, 2004). Individuals who are more accustomed to American culture adopt lifestyles similar to that of Americans resulting in poorer health.

Acculturation is particularly relevant when studying immigrant women as compared to immigrant men because acculturation has a stronger negative impact on women's health compared to men. (Lopez-Gonzalez et al., 2005). Health behaviors of immigrant women who report being more acculturated are significantly less positive than that of women who are less acculturated; however, acculturation makes little difference in the health behaviors of men (Lopez-Gonzalez et al., 2005).

Women's Health

Women's health has received significant attention in the research literature because there is a significant decline in women's overall physical and mental health post-menopause (Bromberger et al., 2011; Park et al., 2015; Pietrzak et al., 2015), with women between the ages of 40 to 60 experience a significant decline in overall health (Berry et al., 2012; He et al., 2016; Mosca et al., 2000; Sharp et al., 1997). Changes in hormone level (Izumo et al., 2016; Shin et al., 2016), body fat distribution (Park et al., 2015), and stressful life events specific to this time period (Pimenta et al., 2014) may all play a role in the decline in overall health. By comparing

women of different cultural backgrounds we were interested in exploring whether ethnicity may be another factor that plays a role in health outcomes of women peri- and post-menopause.

The incidence of cardiovascular disease is lower in women compared to men; however, studies have found that when women reach middle-age and enter menopause, risk for cardiovascular diseases increases and surpasses the risk of cardiovascular disease in men (Berry et al., 2012; He et al., 2016; Maas et al., 2011). Accordingly, coronary artery disease is rarely diagnosed in women prior to menopause but interestingly is the leading cause of death in postmenopausal women (Sharp & Conen, 1997). Despite these findings, women are overwhelming unaware of the risk to them. About 50% of women in the United States will die as the result of a heart related condition; however, most women will go undiagnosed or will receive inadequate treatment (Mosca, et al., 2000). Mosca and colleagues determined that the lack of knowledge surrounding heart disease and stroke risks was adding to this problem. Results indicated that only about 8% of women identified heart disease and stroke as a major health concern and over 70% of all respondents have never spoken about cardiovascular health risks and prevention methods with their physicians. In brief, cardiovascular health is a concern for aging women.

Currently, the bulk of the research looking to examine the differences in women's health between pre- and post-menopause has focused on a more biological level— for example, differences in the hormone production in women pre- and post-menopause has been looked at (Hulley et al., 1998; Izumo et al., 2016; Shin et al., 2016; Staren et al., 2003; Writing Group for WHII, 2002) as well as physiological variables that contribute to cardiovascular disease (Berry et al., 2012; He et al., 2016; Sharp & Conen, 1997; Mosca, et al., 2000). Transitioning women experience decreases in estrogen levels which may be to blame for the increase in cardiovascular

disease risk (Izumo et al., 2016; Shin et al., 2016). Intervention strategies following these findings have focused on increasing levels of estrogen in post-menopausal women in what is called hormone replacement therapy (Hulley et al., 1998; Staren et al., 2003; Writing Group for WHII, 2002). However, this approach has not always been shown to be effective. A randomized trial of estrogen for secondary prevention of coronary heart disease (CHD) in post-menopausal women concluded that there were no significant differences in incidence of CHD between groups who received estrogen and those who did not (Hulley et al., 1998). Another study analyzed the risk and benefit of hormone replacement therapy in healthy post-menopausal women and concluded that the overall health risk of receiving this intervention exceeded the benefit (Writing Group for WHII, 2002). A more recent study examined at the effect of hormone replacement therapy on insulin resistance because of its association with cardiovascular disease risk (Bitoska et al., 2016). However, there was no significant effect of hormone replacement therapy on insulin resistance.

Changes in women's lifestyles pre- and post-menopause may also contribute to the drastic differences in health outcomes. Entering menopause can be a major life transition for many women (Avis et al., 2009). There are many life stressors that come often accompany the start of menopause in women's lives. Women in menopause often emphasize that their symptoms are due to these life events and not due to the menopause (Ballard, et al., 2001; Pimenta et al., 2014). Some of these external stressors are changes in appearance, children leaving home, and caring for older, sick parents. The frequency of stress experiences reported is positively associated number of menopausal symptoms reported suggesting that stress and menopause are positively associated (Conboy et al., 2001).

In contrast to the life events perspective, women frequently do not differ on reported life

stressors pre- and post- menopause (Kajantie, 2006; Saab et al., 1989). For example, women of different age groups equally report that variables such motherhood, finances, and work all contribute to their daily stress (Kajantie, 2006; Saab et al., 1989). However, post-menopausal women have more exaggerated responses to stress than women who have yet to start menopause (Kajantie, 2006). That is, post-menopausal women had higher increases from baseline in heart rate when performing a lab stressor compared to pre-menopausal women (Kajantie, 2006; Saab et al., 1989). These findings suggest that physiological changes in stress response in post-menopausal women may have something to do with increase in cardiovascular disease risk. In addition, women experience other physiological changes during menopause that also contributes to the health decline (Moodithaya et al, 2009). Cardiac autonomic activity, as measured by heart rate variability (HRV) is significantly lower in postmenopausal women compared to premenopausal women (Moodithaya et al, 2009).

Little has been done to look at these changes in women's health, pre- and post-menopause, across different cultures. Cardiovascular disease risks are higher among ethnic minorities of all types than white people (Waldstien et al., 2016; Winkleby, et al., 1998; Wu et al, 2011). This holds true after adjusting for socioeconomic status (Winkleby, et al., 1998) and has been shown to worsen because of poverty (Waldstien et al., 2016). However, the differences in women's health specifically has not been closely examined while comparing pre- and post-menopausal health.

Income and Health

Low income can lead to poor health (Dinca-Panaitescu, et al., 2012; Gaziano, et al., 2012). Specifically, low income has been associated with poorer diet, prolonged exposure to stress, and lower quality medical care (Benzeval, et al., 2000; Smith, James P., 1999). A recent

longitudinal study conducted in Canada concluded that having low income and experiencing the effects of long term low income are significant predictors to developing type two diabetes (Dinca-Panaitescu, et al., 2012). Similarly, the incidence of CHD is higher in regions of the world where poverty is a major concern such as Sub Sahara African countries (Gaziano, et al., 2012).

The relationship between low income and health is of particular interest because low income is more common in immigrant households than in Anglo families. The Center for Immigration Studies concluded in 2011 that 19.9% of immigrant families living in the United States live in poverty compared to 13.5% of natives (Center for Immigration Studies March 2001 Current Population Survey). Additional research examined this further to determine that low socioeconomic status (SES) is linked to unhealthy behaviors such as cigarette smoking and poor eating and exercise habits (Morales, 2002). This may be due to lack of understanding of health risks as low SES is also linked to less education.

Despite robust findings surrounding the Hispanic paradox, some studies have found contradictory evidence. A longitudinal study published in 2013 that compared mortality and health outcomes of Mexican Americans and European Americans concluded that Mexican Americans, despite the literature on the Hispanic paradox, are at greater risk of mortality and poor health than European Americans (Espinoza et al., 2013). This study looked at an older sample of adults than most other studies. In doing so, the authors introduce the confounding variable of age-related health decline which may explain why these findings are so different than the rest of the literature.

In conclusion, women experience a significant decline in overall health as they experience menopause. We also know that variables such as income can lead to poor health as

well. However, the Hispanic paradox has shown that Hispanic immigrants have better health than Anglo Americans despite having low income. In the present study, we will first seek to provide evidence to support the Hispanic paradox. Given the findings of previous literature surrounding both the Hispanic paradox and women's general health decline with age, we hypothesized that immigrant women, despite having lower income, will have overall better health outcomes. We also hypothesized that there would be an interaction effect between ethnicity and income on health outcomes. Specifically, having low income will predict poor health outcomes in Anglo but not Hispanic women.

Methods

To test the hypothesis that there is a Hispanic paradox advantage during the menopausal transition, we examined data from two previous studies. The first study provided sample data for an Anglo sample of women between the ages of 40-60. The second study provided data for the Mexican Immigrant sample. The methods for the two studies were similar, but differed slightly.

Anglo Sample

Participants were recruited via fliers placed throughout the community and on BYU campus. Additionally, advertisement was made over local news stations and in the local papers. The study was approved by the Brigham Young University Institutional Review Board and all participants read and signed an informed consent before participating.

Research participants were 78 Anglo American women. All participants were between the ages of 40-60 and living in Utah at the time of the study. Additionally, all women confirmed on self-report measures that they were either in a pre-, peri-, or post menopause stages (roughly one-third of the sample in each group). Exclusion criteria for this study included physiological conditions and the use of prescription medication that can affect cardiovascular measurements.

Specifically, participants diagnosed with cardiovascular disease or who were pregnant were excluded from participation in this study.

After meeting inclusion criteria and agreeing to participate, participants were first asked a series of demographics questions. Participants reported on income by indicating how many US dollars they made in the previous year. Additionally, their height and weight was collected in order to calculate a BMI. Participants were fitted with a blood pressure cuff and were asked to sit quietly while watching a relaxing nature video for 15 minutes. Blood pressure was taken 3 times, and averaged, during the final 6 minutes in order to establish a baseline measure of resting blood pressure. Participants in this study then took part in the Trier Social Stress Test (TSST) to elicit a stress response. First, they were given 5 minutes to prepare their speech for the “interviewer”, then they presented their speech as a research assistant pretended to be their interviewer. Blood pressure was taken throughout the course of the study; however, the data collected from the TSST portion of this study was not included in the present analysis. Finally, these participants were also taken to the university’s health center for their blood draw.

Mexican Immigrant Sample

Similar to the Anglo sample, participants were recruited via advertisements made over local news stations and in the local papers. The study was approved by the Brigham Young University Institutional Review Board and all participants read and signed an informed consent before participating.

The Mexican immigrant sample was equally representative of length of time in the United States after immigration (34% 5 years or less, 33% 6 to 10 years, 33% 11 years or more). The majority of the participants spoke primarily Spanish and because of this, all research assistants in charge of collecting data in the lab were Spanish speakers who were also fluent in

English. When the research assistants scheduled participants for a lab visit, they instructed participants to fast for 12 hours before coming, including abstaining from caffeine, alcohol, and tobacco products. Participants received a reminder phone call the day before their lab visit to remind them of the visit and reiterate the importance of fasting for 12 hours before coming to the lab. Participants were instructed to begin fasting at 7:00 PM. Upon arrival at the lab (usually between 7:00 AM and 8:00 AM), participants were briefed concerning the overall nature of the study. Following this, they signed a consent form describing the risks and benefits of the study and their rights as research participants. Researchers assessed for compliance with the 12-hour fast. They also questioned all participants about current medication usage. Participants not in compliance with fasting protocol were rescheduled for another testing day. Income data was collected by having participants indicate how much US dollars they made in the previous year. Data on menopause status was not collected in this sample as the data was not originally collected for this purpose; however, the participants of the Mexican sample were age matched to the Anglo sample (Table 2). The research on the menopausal transition in women suggests that the age range of 40-60 encompasses the bulk of pre-, peri, and post menopause (McKinlay, et al., 1992). Height and weight data was collected for each participant in order to calculate BMI. Blood was drawn by a trained phlebotomist and the blood samples were sent to Associated Regional and University Pathologists (ARUP) laboratories for analysis. The purpose of the blood draw was to obtain information on physiological markers related to cardiovascular disease; cholesterol (non-HDL cholesterol), C-reactive protein, and fasting glucose.

The latent outcome variable that was measured was called Health Outcomes. This variable was measured through a variety of health measures that include: cholesterol measures, C-reactive protein, and fasting glucose (all via blood draw sample). Additionally, blood pressure

was measured for each participant. All participants were also weighed and height measurements were taken in order to compute BMI. We created this health outcome variable in order to be consistent with existing literature that looked at health outcomes as an overall concept instead of separate health indices (Sundquist et al., 1999; Dixon et al, 2000; Lariscy et al).

Data on ethnicity was collected through participant's self-identification. In the Mexican Immigrant sample, the Acculturation Rating Scale for Mexican Americans- II (ARMSA-II) (Cuellar et al., 1995) was utilized to assess to extent of Mexican Cultural Identity. This scale is a 30-item measure that uses a 5-point Likert scale. Questions on the scale assess for cultural (Hispanic vs Anglo) preferences. Questions targeted elements of cultural identity that include language, food, media, and friends. A higher score is indicative of a stronger preference for one of the two cultural identities. The Mexican and Anglo sub scale scores obtained from the measure have both been shown in the literature to have good internal consistency (Cronbach's α = .88 and .86, respectively). The scale has also been shown to have good validity. In our sample, Mexican American women scored very high on the Hispanic orientation (mean of 3.54 (.8) with a range of 0 to 4) and a bit lower on Anglo orientation (mean of 1.51 (1.1) with a range of 0 to 4) indicating that our sample had a stronger preference for Mexican culture; however, there is quite a wide range of acculturation within our sample.

Results

Data Preparation

All analyses were calculated using Stata, version 14.0. Descriptive statistics of the variables used in the analysis can be found in Table 1 and Table 2.

Before testing the hypotheses, the data was examined in order to determine whether or not the data met the underlying assumptions necessary. First, the data was assessed for

missingness. In this step, we determined that missing data was minimal. Assessment of the amount of missing data on the outcome variables was as follows: Blood Pressure N = 156 (8.2%), C-Reactive Protein N = 150 (10.8%), Fasting Glucose N = 150 (10.8%), Cholesterol N = 148 (12.0%) BMI N = 163 (3.0%). We then examined the pattern of missingness within the data to conclude that the data was missing completely at random. We did not find any significant correlations between missing data on any of the outcome variables to the independent variable. This meant that missingness was likely not related to values on the independent variable. We also tested for correlations between missing of the outcome variables and the moderator variables in our model. This assessment also concluded that missingness on the outcomes measurements was not significantly correlated to the moderator variables. Given that missingness was minimal and that it was missing completely at random, values for missing data were generated per Stata's regression based imputation for missing values generator¹.

Tests for univariate normality concluded that the distributions for all health outcome variables except BMI met assumptions and were therefore normally distributed. Assessment of the BMI variable across the sample concluded that this variable was not normally distributed. The BMI variable was transformed using a square root transformation, after which point discrimination appeared to be normally distributed. Descriptive statistics for the dependent variables can be found in Table 1.

ANOVA

First, a series of ANOVA tests were conducted to test whether Mexican immigrants had overall better health outcomes on the latent variable and also on each of the separate health

¹ This is done by Stata's 'mi estimate' command that uses linear regression imputation to create values for MAR variables.

outcome variables collected in this study. This initial analysis was prompted by the literature on the Hispanic paradox that concludes that Mexican immigrants have better health than their Anglo counterparts despite being less educated and having less income. We conducted this analysis in order to find evidence to support these findings. The results of these tests did not go as predicted. Anglo women were significantly healthier than Mexican immigrants on out health outcome latent variable ($F(154, 7) = 1.18, p = .04$). As a follow-up exploratory analysis, we looked at each of the health outcome variables separately and found that Anglo Americans were healthier on each of these outcomes as well (C-Reactive Protein; $F(117, 31) = 9.05, p = .003$; Cholesterol; $F(50, 96) = 43.51, p = .000$; Blood Pressure; $F(103, 58) = 43.32, p = .000$; Fasting Glucose; $F(44, 104) = 3.63, p = .050$; BMI; $F(101, 41) = 12.25, p = .001$) (see Table 3).

Regression

A series of logistical regressions were run on our sample to examine the effect of ethnicity and income on each of the health outcomes variables. A multiple regression was run to predict BMI from ethnicity and income. These variables did not statistically significantly predict BMI, $F(2, 101) = 1.40, p = .25, R^2 = .027$. Similarly, ethnicity and income did not predict cholesterol levels, $F(2, 88) = 15.63, p = .40, R^2 = .26$. When examining blood pressure, ethnicity and income also did not yield a significant result $F(2, 102) = 5.15, p = .74, R^2 = .009$. C-reactive protein could also not be predicted by ethnicity and income $F(2, 88) = 2.91, p = .60, R^2 = .041$. Lastly, fasting glucose was also not predicted by ethnicity and income $F(2, 88) = 3.23, p = .44, R^2 = .053$. Overall, our analysis could not support the findings of previous literature and our hypothesis that Mexican immigrants would have better health outcomes despite having lower income.

Discussion

We hypothesized that Mexican immigrant women living in the United States would have better cardiovascular health compared to their Anglo American counterparts during the menopausal transition (ages 40 to 60). Because of the compelling research in favor of the Hispanic paradox, we expected to find that Mexican Immigrant women living in Utah would have better health, despite having lower income than the Anglo American sample (Table 1). The findings of our analysis were not as expected and differed significantly from the current literature. Overall, the Anglo-American women were significantly healthier than the Mexican women across all health outcome variables. We were also unable to confirm an interaction between the effects of income and ethnicity on any of the health outcome variables collected in this study. In the following section, we explore further direction for this research as well as discuss the differences in our sample and methods compared to other changes that may have contributed to our findings.

The Hispanic paradox is considered to be a rather robust finding in the literature surrounding Hispanic health and culture (Crespo et al., 1996; Dixon et al, 2000; Lariscy et al., 2015; Overton et al., 2015; Stern et al., 1999; Sundquist et al., 1999; Thomson et al., 2013). Out all of the studies on the topic, only a very few of research studies had results similar to our own (Borrell, et al., 2012; Espinoza et al., 2013; Lerman-Garber, 2004). Borrell and colleagues (2012) examined the Hispanic paradox with regards to mortality in a sample of 45-65 year-olds. The authors examined a variety of Hispanic subgroups and found that the Hispanic paradox may not be as robust a finding as was thought (Lariscy et al., 2015; Overton et al., 2015; Thomson et al., 2013). Findings suggested that the Cubans and “other” Hispanics in their sample were twice as likely to die when compared to their white American sample (Borrell, et al., 2012). They did find

that US-born Hispanics and Hispanics from Puerto Rico were less likely to die compared to their non-Hispanic sample, however this effect was not as strong (Borrell, et al., 2012). These findings suggest that researchers must take a closer look at the Hispanic paradox examining nativity as a variable that may contribute to the strength of this effect. They speculate that population growth and the growing diversity of Hispanics within American culture may be making it so that its effects are not as strong as they once were. The argument is that American culture is becoming more like the culture Hispanic immigrants leave behind and therefore we do not see the differences in health outcomes between immigrants and whites. Additionally, we found one other meta-analysis whose conclusions were not in favor of the Hispanic paradox (Lerman-Garber et al., 2004). Lerman-Garber and colleagues conducted a 140-journal article literature review and meta-analysis of the Hispanic paradox in which they conclude that the recent articles used in their meta-analysis do not confirm lower mortality rates in immigrant populations compared to native, white populations. Also, the data does not suggest that Hispanics have lower mortality rates from cardiovascular disease than their white counterparts. Like Borrell and colleagues, Lerman-Garber argues that with the current era of globalization, where we see major changes in socioeconomic status and cultural identities has led to a decline in the effect of the Hispanic paradox. Again, they argue that immigration and growing diversity has made it so the distinctions between Hispanic immigrants and native born white Americans are not as clear.

While the justification proposed by Lerman-Garber seems reasonable, there is an overwhelming body of recent literature that would conclude otherwise, with two meta-analyses strongly supporting the Hispanic paradox. The first meta-analysis included 17 publications and concluded that there is a significant association between Hispanic identity and both lower incidences of cardiovascular mortality and lower all-cause mortality (Cortes Bergoderi et al.,

2013). The second meta-analysis included 58 studies and concluded that Hispanics had lower overall risk of mortality than did non-Hispanic Whites (Ruiz, et al., 2013). Despite including fewer studies, these meta-analyses are more methodologically sound than the Lerman-Garber study. For example, Ruiz and colleagues were careful to include only articles that examined mortality as the outcome measure and therefore were able to effectively compare the findings of all the studies in their meta-analysis. Lerman-Garber and colleagues were not as strict in their inclusion criteria and included many different studies that included different outcome variables.

In contrast to our findings as well, the interaction between income and health outcomes have been demonstrated in the literature. Low income in the Hispanic immigrant populations acts as a buffer to poor health and tends to lead to better health outcomes (Lariscy, et al., 2015). Lariscy and colleagues used data from 2009's National Health Interview Survey Linked Mortality Files (NHIS-LMF) to run their analysis. The first part of their analysis looked to compare mortality rates of US-born whites and foreign-born Hispanics. In this initial analysis, they concluded that Hispanics have favorable mortality estimates compared to whites. Secondly, the researchers adjusted for socioeconomic status (SES) to assess its influence on mortality rate ratios. When examining the effects of SES on this relationship, researchers demonstrated that there is in fact a relationship between income and health. The authors concluded that if it were not for Hispanic's socioeconomic disadvantage, their mortality levels would be even better. This suggests that despite having lower SES, Hispanics still have better health than whites, but that their health would be even better if they were less financially disadvantaged (Lariscy, et al., 2015).

Low income is also associated with poorer education. When comparing women of different ethnic backgrounds, research has found that and their awareness and knowledge

surrounding heart disease differs across groups (Mosca, et al., 2004). In this study, participants were asked questions about cardiovascular disease prevention, risk factors, warning signs, treatment options, etc. Results suggest that Hispanic women fell well behind both white and black women in overall awareness of cardiovascular disease risk, prevention and intervention. These findings highlight another important cultural and ethnic differences in health outcomes that may have contributed to our findings. Because immigrants often have less education compared to native born Americans (Mosca, et al., 2004), future direction would be to control for the effects of education in the analyses.

Interestingly, while Lariscy and his colleagues provided evidence for the Hispanic paradox, they also point out that the effects of this phenomenon are may not persist. They argue that the older adult Hispanic immigrant population in United States will double in the next fifty years. Age is a huge consideration in mortality and health outcome estimates and this change in demographics coupled with the current socioeconomic disadvantage of immigrant people will likely produce higher mortality rates in the years to come.

There are a series of limitations to our data collection and analysis that may have contributed to our results. First, our sample was comprised of strictly Utah residents. Utah culture may contribute to the fact that Anglo Americans have overall better health. Certain aspects of the predominant religious culture in Utah prohibits the use of alcohol, drugs, etc. We have religious affiliation from one sample; however, we couldn't access this hypothesis because we don't have it for the other sample. An interesting follow-up could involve comparing the results of this study to a similar study where data was collected in another part of the country with a different culture. Differences in results would suggest that Utah culture may have influenced the results we received. Further studies would be needed to identify the mechanisms

mediating this effect. Also, as mentioned, many of the studies used national samples to conduct their analyses. National databases are more representative of the entire immigrant women population and therefore are more generalizable. Additionally, the data analyzed in this study was comprised of two samples of data taken at two different time points. Further analysis could be done to test Mexican immigrants with Anglo populations at the same time using identical protocols.

Another important variable in the Hispanic paradox that we did not consider in our final analysis is acculturation. In our study, we initially used the ARSMA to determine level of acculturation for our participants. We used an entire immigrant sample as opposed to using a mix of immigrants and American born Mexican Americans. We were not concerned about the effects of acculturation given that our sample had only lived in the United States for an average of 8 years; however, levels of acculturation did differ within our sample of immigrant women. In future studies, it would be ideal to include women who score low on the acculturation scale, or control for the level of acculturation within our sample statistically.

Overall, we were ultimately unable to find evidence to support the paradox with our sample. We speculate that the specifics of this study, such as the conservative, religious culture of our sample, may have contributed to these findings. Our sample was an entirely comprised of women living in the state of Utah at the time of the study. Utah's conservative culture lends itself to healthier life habits such as the absence of alcohol consumption and cigarette smoking. Therefore, our sample is likely healthier than other samples in the country. This may have skewed our results. Based on the existing research literature, we do believe that there is a Hispanic paradox contributing to the health of Hispanic/Latino immigrants living in America.

Having a better understanding of the differences in health pre-and post-menopause can

ultimately help in determining effective preventative and interventions strategies. By comparing Mexican-American immigrant women to Anglo-American women we hoped to determine if a subgroup of women experience these changes differently. Our study did not support the rest of the findings in the literature and the results of our study are somewhat of an anomaly. Given that the literature does see difference, there is likely some merit in exploring what behavioral differences exist between the two groups.

References

- Abraido-Lanza, A. F., Dohrenwend, B. P., Ng-Mak, D. S., & Turner, J. B. (1999). The Latino mortality paradox: A test of the "salmon bias" and healthy migrant hypotheses. *American Journal of Public Health, 89*(10), 1543-1548.
- Armstead, C. A., Lawler, K. A., Gorden, G., Cross, J., & Gibbons, J. (1989). Relationship of racial stressors to blood pressure responses and anger expression in black college students. *Health Psychology, 8*(5), 541.
- Avis, N. E., Colvin, A., Bromberger, J. T., Hess, R., Matthews, K. A., Ory, M., & Schocken, M. (2009). Change in health-related quality of life over the menopausal transition in a multiethnic cohort of middle-aged women: Study of Women's Health Across the Nation (SWAN). *Menopause, 16*(5), 860.
- Ballard, K. D., Kuh, D. J., & Wadsworth, M. E. (2001). The role of the menopause in women's experiences of the "change of life". *Sociology of Health & Illness, 23*(4), 397-424.
- Bauman, S. (2005). The reliability and validity of the Brief Acculturation Rating Scale for Mexican Americans-II for children and adolescents. *Hispanic Journal of Behavioral Sciences, 27*(4), 426-441.
- Beck, A. T., Steer, R. A., & Carbin, M. G. (1988). Psychometric properties of the Beck Depression Inventory: Twenty-five years of evaluation. *Clinical Psychology Review, 8*(1), 77-100.
- Benzeval, M., Taylor, J., & Judge, K. (2000). Evidence on the relationship between low income and poor health: Is the government doing enough? *Fiscal Studies, 21*(3), 375-399.
- Berry, J. D., Dyer, A., Cai, X., Garside, D. B., Ning, H., Thomas, A., ... & Lloyd-Jones, D. M. (2012). Lifetime risks of cardiovascular disease. *New England Journal of*

- Medicine*, 366(4), 321-329.
- Bitoska, I., Krstevska, B., Milenkovic, T., Subeska-Stratrova, S., Petrovski, G., Mishevaska, S. J., ... & Todorova, B. (2016). Effects of hormone replacement therapy on insulin resistance in postmenopausal diabetic women. *Open Access Macedonian Journal of Medical Sciences*, 4(1), 83.
- Borrell, L. N., & Lancet, E. A. (2012). Race/ethnicity and all-cause mortality in US adults: Revisiting the Hispanic paradox. *American Journal of Public Health*, 102(5), 836-843.
- Bromberger, J. T., Kravitz, H. M., Chang, Y. F., Cyranowski, J. M., Brown, C., & Matthews, K. A. (2011). Major depression during and after the menopausal transition: Study of Women's Health Across the Nation (SWAN). *Psychological Medicine*, 41(09), 1879-1888.
- Conboy, L., Domar, A., & O'Connell, E. (2001). Women at mid-life: Symptoms, attitudes, and choices, an internet based survey. *Maturitas*, 38(2), 129-136.
- Cortes-Bergoderi, M., Goel, K., Murad, M. H., Allison, T., Somers, V. K., Erwin, P. J., ... & Lopez-Jimenez, F. (2013). Cardiovascular mortality in Hispanics compared to non-Hispanic whites: A systematic review and meta-analysis of the Hispanic paradox. *European Journal of Internal Medicine*, 24(8), 791-799.
- Crespo, C. J., Loria, C. M., & Burt, V. L. (1996). Hypertension and other cardiovascular disease risk factors among Mexican Americans, Cuban Americans, and Puerto Ricans from the Hispanic health and nutrition examination survey. *Public Health Reports*, 111(Suppl 2), 7.
- Cuellar, I., Arnold, B., & Maldonado, R. (1995). Acculturation rating scale for Mexican Americans-II: A revision of the original ARSMA scale. *Hispanic Journal of Behavioral*

- Sciences*, 17(3), 275-304.
- Dinca-Panaitescu, M., Dinca-Panaitescu, S., Raphael, D., Bryant, T., Pilkington, B., & Daiski, I. (2012). The dynamics of the relationship between diabetes incidence and low income: Longitudinal results from Canada's National Population Health Survey. *Maturitas*, 72(3), 229-235.
- Dixon, L. B., Sundquist, J., & Winkleby, M. (2000). Differences in energy, nutrient, and food intakes in a US sample of Mexican-American women and men: Findings from the Third National Health and Nutrition Examination Survey, 1988–1994. *American Journal of Epidemiology*, 152(6), 548-557.
- Espinoza, S. E., Jung, I., & Hazuda, H. (2013). The Hispanic paradox and predictors of mortality in an aging biethnic cohort of Mexican Americans and European Americans: The San Antonio Longitudinal Study of Aging. *Journal of the American Geriatrics Society*, 61(9), 1522-1529.
- Gaziano, T. A., Bitton, A., Anand, S., Abrahams-Gessel, S., & Murphy, A. (2010). Growing epidemic of coronary heart disease in low- and middle-income countries. *Current Problems in Cardiology*, 35(2), 72–115.
- Guendelman, S., & Abrams, B. (1995). Dietary intake among Mexican-American women: Generational differences and a comparison with white non-Hispanic women. *American Journal of Public Health*, 85(1), 20-25.
- He, L., Tang, X., & Hu, Y. H. (2016). Relationship of menopause with cardiovascular disease and related metabolic disorders. *Beijing Da Xue Xue Bao. Yi Xue ban= Journal of Peking University. Health Sciences*, 48(3), 448.
- Hemingway, H., & Marmot, M. (1999). Evidence based cardiology-Psychosocial factors in the

- aetiology and prognosis of coronary heart disease: Systematic review of prospective cohort studies. *Western Journal of Medicine*, 318(7196), 1460-1467.
- Hulley, S., Grady, D., Bush, T., Furberg, C., Herrington, D., Riggs, B., & Vittinghoff, E. (1998). Randomized trial of estrogen plus progestin for secondary prevention of coronary heart disease in postmenopausal women. *JAMA*, 280(7), 605-613.
- Izumo, N., Ishibashi, Y., Ohba, M., Morikawa, T., & Manabe, T. (2012). Decreased voluntary activity and amygdala levels of serotonin and dopamine in ovariectomized rats. *Behavioural Brain Research*, 227(1), 1-6.
- Kajantie, E., & Phillips, D. I. (2006). The effects of sex and hormonal status on the physiological response to acute psychosocial stress. *Psychoneuroendocrinology*, 31(2), 151-178.
- Kawachi, I., Kennedy, B. P., & Glass, R. (1999). Social capital and self-rated health: A contextual analysis. *American Journal of Public Health*, 89(8), 1187-1193.
- Kim, R. E., Lau, A. S., & Chorpita, B. F. (2016). The impact of Latino caregiver acculturation on treatment engagement in children's community mental health services. *Journal of Child and Family Studies*, 25(3), 891-901.
- Krantz, D. S., & McCeney, M. K. (2002). Effects of psychological and social factors on organic disease: A critical assessment of research on coronary heart disease. *Annual Review of Psychology*, 53(1), 341-369.
- Lariscy, J. T., Hummer, R. A., & Hayward, M. D. (2015). Hispanic older adult mortality in the United States: New estimates and an assessment of factors shaping the Hispanic paradox. *Demography*, 52(1), 1-14.
- Lerman-Garber, I., Villa, A. R., & Caballero, E. (2004). Diabetes and cardiovascular disease. Is there a true Hispanic paradox? *Revista de Investigacion Clinica; Organo del Hospital de*

- Enfermedades de la Nutricion*, 56(3), 282-296.
- Lopez-Gonzalez, L., Aravena, V. C., & Hummer, R. A. (2005). Immigrant acculturation, gender and health behavior: A research note. *Social Forces*, 84(1), 581-593.
- Maas, A. H., van der Schouw, Y. T., Regitz-Zagrosek, V., Swahn, E., Appelman, Y. E., Pasterkamp, G., ... & Eizema, K. (2011). Red alert for women's heart: The urgent need for more research and knowledge on cardiovascular disease in women. *European Heart Journal*, 32(11), 1362-1368.
- Markides, K. S., & Coreil, J. (1986). The health of Hispanics in the southwestern United States: An epidemiologic paradox. *Public Health Reports*, 101(3), 253.
- Markides, K. S., & Eschbach, K. (2005). Aging, migration, and mortality: Current status of research on the Hispanic paradox. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, 60(Special Issue 2), S68-S75.
- McKinlay, S. M., Brambilla, D. J., & Posner, J. G. (1992). The normal menopause transition. *Maturitas*, 14(2), 103-115.
- Moodithaya, S. S., & Avadhany, S. T. (2009). Comparison of cardiac autonomic activity between pre and post menopausal women using heart rate variability. *Indian Journal of Physiological Pharmacology*, 53(3), 227-234.
- Mosca, L., Ferris, A., Fabunmi, R., & Robertson, R. M. (2004). Tracking women's awareness of heart disease: An American Heart Association national study. *Circulation*, 109(5), 573-579.
- Mosca, L., Jones, W. K., King, K. B., Ouyang, P., Redberg, R. F., & Hill, M. N. (2000). Awareness, perception, and knowledge of heart disease risk and prevention among women in the United States. *Archives of Family Medicine*, 9(6), 506.

- Overton, T. L., Phillips, J. L., Moore, B. J., Campbell-Furtick, M. B., Gandhi, R. R., & Shafi, S. (2015). The Hispanic paradox: Does it exist in the injured? *The American Journal of Surgery*, *210*(5), 827-832.
- Park, J. K., Lim, Y. H., Kim, K. S., Kim, S. G., Kim, J. H., Lim, H. G., & Shin, J. (2013). Changes in body fat distribution through menopause increase blood pressure independently of total body fat in middle-aged women: The Korean National Health and Nutrition Examination Survey 2007–2010. *Hypertension Research*, *36*(5), 444-449.
- Pietrzak, A., Czuczwar, P., Mosiewicz, J., Paszkowski, T., Chodorowska, G., Bartosinska, J., ... & Cohen, A. D. (2015). Cardiovascular disease in psoriatic post-menopausal women. *Journal of the European Academy of Dermatology and Venereology*, *29*(6), 1231-1234.
- Pimenta, F., Maroco, J., Ramos, C., & Leal, I. (2014). Predictors of weight variation and weight gain in peri-and post-menopausal women. *Journal of Health Psychology*, *19*(8), 993-1002.
- Rivera, J. A., Barquera, S., González-Cossío, T., Olaiz, G., & Sepúlveda, J. (2004). Nutrition transition in Mexico and in other Latin American countries. *Nutrition Reviews*, *62*(suppl 2), 149-157.
- Rozanski, A., Blumenthal, J. A., & Kaplan, J. (1999). Impact of psychological factors on the pathogenesis of cardiovascular disease and implications for therapy. *Circulation*, *99*(16), 2192-2217.
- Saab, P. G., Matthews, K. A., Stoney, C. M., & McDonald, R. H. (1989). Premenopausal and postmenopausal women differ in their cardiovascular and neuroendocrine responses to behavioral stressors. *Psychophysiology*, *26*(3), 270-280.

- Sharp, P. C., & Konen, J. C. (1997). Women's cardiovascular health. *Primary Care, 24*(1), 1-14.
- Shin, Y. A., & Lee, K. Y. (2016). Low estrogen levels and obesity are associated with shorter telomere lengths in pre-and postmenopausal women. *Journal of Exercise Rehabilitation, 12*(3), 238.
- Smith, J. P. (1999). Healthy bodies and thick wallets: The dual relation between health and economic status. *The Journal of Economic Perspectives: A Journal of the American Economic Association, 13*(2), 144.
- Staren, E. D., & Omer, S. (2004). Hormone replacement therapy in postmenopausal women. *The American Journal of Surgery, 188*(2), 136-149.
- Stern, M. P., & Wei, M. (1999). Do Mexican Americans really have low rates of cardiovascular disease? *Preventive Medicine, 29*(6), S90-S95.
- Sundquist, J., & Winkleby, M. A. (1999). Cardiovascular risk factors in Mexican American adults: A transcultural analysis of NHANES III, 1988-1994. *American Journal of Public Health, 89*(5), 723-730.
- Sundquist, J., & Winkleby, M. (2000). Country of birth, acculturation status and abdominal obesity in a national sample of Mexican–American women and men. *International Journal of Epidemiology, 29*(3), 470-477.
- Thomson, E. F., Nuru-Jeter, A., Richardson, D., Raza, F., & Minkler, M. (2013). The Hispanic paradox and older adults' disabilities: Is there a healthy migrant effect? *International Journal of Environmental Research and Public Health, 10*(5), 1786-1814.
- Turra, C. M., & Goldman, N. (2007). Socioeconomic differences in mortality among US adults: Insights into the Hispanic paradox. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences, 62*(3), S184-S192.

- Van Rompay, M. I., McKeown, N. M., Castaneda-Sceppa, C., Falcón, L. M., Ordovás, J. M., & Tucker, K. L. (2012). Acculturation and sociocultural influences on dietary intake and health status among Puerto Rican adults in Massachusetts. *Journal of the Academy of Nutrition and Dietetics*, *112*(1), 64-74.
- Waldstein, S. R., Moody, D. L. B., McNeely, J. M., Allen, A. J., Sprung, M. R., Shah, M. T., ... & Zonderman, A. B. (2016). Cross-sectional relations of race and poverty status to cardiovascular risk factors in the Healthy Aging in Neighborhoods of Diversity across the Lifespan (HANDLS) study. *BMC Public Health*, *16*(1), 1.
- Wei, M., Valdez, R. A., Mitchell, B. D., Haffner, S. M., Stern, M. P., & Hazuda, H. P. (1996). Migration status, socioeconomic status, and mortality rates in Mexican Americans and non-Hispanic whites: The San Antonio Heart Study. *Annals of Epidemiology*, *6*(4), 307-313.
- Winkleby, M. A., Albright, C. L., Howardpitney, B., Lin, J., & Fortmann, S. P. (1994). Hispanic/white differences in dietary fat intake among low educated adults and children. *Preventive Medicine*, *23*(4), 465-473.
- Winkleby, M. A., Kraemer, H. C., Ahn, D. K., & Varady, A. N. (1998). Ethnic and socioeconomic differences in cardiovascular disease risk factors: Findings for women from the Third National Health and Nutrition Examination Survey, 1988-1994. *JAMA*, *280*(4), 356-362.
- Writing Group for the Women's Health Initiative Investigators. (2002). Risks and benefits of estrogen plus progestin in healthy postmenopausal women: Principal results from the Women's Health Initiative randomized controlled trial. *JAMA* *288*(3), 321-333.
- Wu, T. Y., Hsieh, H. F., Wang, J., Yao, L., & Oakley, D. (2011). Ethnicity and cardiovascular

risk factors among Asian Americans residing in Michigan. *Journal of Community Health, 36(5)*, 811-818.

Table 1
Descriptive Statistics

Ethnicity	Variable	M	SD	Range
Anglo-American	Income*	5.14	2.56	1-9
	Age	50.09	5.50	40-60
Mexican American	Income*	3.67	1.69	1-8
	Age	49.94	7.39	40-60

*income denoted in tens of thousands of US dollars per year

Table 2
Descriptive Statistics

Variable	M	SD	Range
C-Reactive Protein	3.13	3.95	.13 – 20
HDL	52.41	13.66	24 – 98
DBlood Pressure	72.52	11.73	38.5 – 110
BMI	28.74	5.78	18.56 – 44.28
Fasting Glucose	92.69	22.09	72 - 272

Table 3

Results For ANOVA Tests Comparing Health Outcomes Variables Between Mexican American Immigrant Women and Anglo Women

Health Outcome Variable	df	F	p Value
C-Reactive Protein	117, 31	9.05	.003
HDL	50, 96	43.51	.000
Blood Pressure	103, 58	43.32	.000
Glucose	44, 104	3.63	.050
BMI	101, 41	12.25	.001