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The Relationship between Perceived Social Status, Stress,
and Health in Mexican American Immigrants

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A dissertation submitted to the faculty of
Brigham Young University
in partial fulfillment of the requirements of the degree of

Doctor of Philosophy

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ABSTRACT

The Relationship between Perceived Social Status, Stress, and Health in Mexican American Immigrants

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Doctor of Philosophy

The current paper examines the relationship between social support, perceived social status and health in the context of the Hispanic Paradox. It was hypothesized that social support will predict perceived social status which, in turn, is an important factor in predicting physical health among Mexican immigrants. The current paper also hypothesized that stress mediates the relationship between perceived social status and health. Three hundred and twenty male and female Mexican immigrants (ages 18-79) completed questionnaires, wore ambulatory blood pressure monitors for 24 hours, and submitted blood samples. Results supported some, but not most hypotheses. Greater social support was related to higher perceived social status ($p = 0.01$) and stress mediated two indirect relationships between perceived social status and health outcomes. Specifically, as perceived social status increased calories consumed decreased ($p = 0.01$) and self-reported health improved ($p = 0.02$). Still, there were no direct relationships between perceived social status and health outcomes and only two stress mediated relationships. Implications of the results and future directions are addressed. The paper discusses the possibility that higher education and possible variations in degree of acculturation among study participants might have resulted in a unique relationship between perceived social status and health. The paper also addresses the role that a high LDS affiliation among participants might play in the relationship between perceived social status and health of Hispanic immigrants. Finally, the relationship between perceived social status and self-reported health as the study's most consistent finding is discussed.

Keywords: Hispanic Paradox, perceived social status, Hispanic immigrants

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Introduction

Perceived social status is related to physical and mental health (Adler, Espel, Castellazzo, & Ickovics, 2000). Perceived social status is typically measured using objective measures of socioeconomic status (SES) such as income and education. The relationship between perceived social status and health has been called the social gradient, because for each increase in SES there is a corresponding increase in health (Adler, Boyce, Chesney, Cohen, Folkman, Kahm & Syme, 1994). While this model appears to be valid among the population of the United States generally, it is not valid among Hispanic immigrants in the United States, for whom *lower* objective SES is related to *better* health when compared to those living in the US (Vega, Kolody, Aguilar-Gaxiola, Alderete, Catalano & Caraveo-Anduaga, 1998; Wei, Valdez, Mitchell, Haffner, Stern & Hazuda, 1996). This reversed social gradient has been called the Hispanic Paradox because it represents a reverse to the typical social gradient found in Western societies (Scribner, 1996). The Hispanic culture has been identified as a collectivistic culture (Rinderle & Montoya, 2008), and collectivistic cultures value group membership and social connections as part of their identity as opposed to individual achievements like education and income (Oyeserman, Coon, & Kemmelmeier, 2002). This has led to the development of a measure of perception of social status, with which people rate their perceived social status in regard to others in their community by marking an "X" on a ladder to indicate their perceived relative position in the community. Ostrove, Alder, Kuppermann and Washington (2000) found that for Hispanic Americans, this measure of perceived social status was strongly related to health outcomes, and that it was often more strongly related to health than were objective measures of SES. The purpose of this study is to examine whether a measure of perceived social status will be a better predictor of health for Hispanic immigrants than are objective measures of SES.

SES and Health

The nature of the relationship between SES and health appears to vary as a function of perception of social status in both Western and non-Western cultures. In Western cultures, people's perception of their social status is defined largely by objective measures of SES, or income and education (Adler et al., 1994). Where this is the case, research has established that higher scores on objective measures of SES predict better health, while lower scores on measures of objective SES are related to poorer health outcomes (Adler et al.). This relationship, referred to as the social gradient, predicts an increase in health for each step increase in SES (Adler et al.). Also, as Jackman and Jackman report that perceived social status is related to objective measures of SES in these cultures (as cited in Ostrove et al., 2000) high perceived social status is also positively related to better health outcomes.

Perception of social status in some non-Western cultures, however, is not based on income and education. In some cultures, a different relationship between SES and health outcomes is found where lower objective SES is more often related to better health (Cooper et al., 1997). For example, Bunker et al. (1996) found that rates of definitive hypertension were greater for those West Africans at the high end of the SES spectrum than for those at the low end (11.2% vs. 3.6%) and Cockerham, Hattori, and Yamori (2000) found that despite having a lower objective SES than others in Japan, residents of Okinawa have the highest average life expectancy in all of Japan. This represents a reverse to the positive social gradient found in Western cultures and has been referred to as the reversed social gradient (Steffen, 2006). Steffen (2006) reports, for example, that while Hispanic immigrants had significantly lower levels of education and income than those born in the US, they had had significantly lower systolic (parameter estimate = -5.47 , $p = .01$) and diastolic (parameter estimate = -2.88 , $p = .04$) 24-hour

blood pressure. In these cultures, social identity is defined by social relationships whereas in Western cultures perceived social status is defined by education and income (Triandis, 1995).

An explanation for both the social gradient and reversed social gradient is that people's *perception* of their SES, rather than actual SES, affects health status in both Western and non-Western cultures. In other words, it is not objective SES but perception of SES that predicts health. For example, Western cultures like the United States tend to be more individualistic than non-Western cultures (Triandis, 1995). They are achievement-oriented societies that honor individual achievement and the attainment of material prosperity. As a result, people in Western cultures with high levels of education and income perceive themselves as comparing favorably with others in the community. Conversely, a perception of one's employment status and financial prospects as being poor or highly uncertain increases stress and strain in Western cultures. One's perception of comparing unfavorably to others in terms of education and income may be a more powerful influence on health than actual status and prospects.

Perceived social status in some non-Western cultures, however, is defined through social support and relationships. Non-Western cultures tend to be more collectivistic and value relationships over individual achievement (Triandis, 1995). In these societies, group membership is central to a person's identity, and satisfaction in life is often derived from successfully maintaining harmonious relationships with others (Oyserman et al. 2002). In collectivistic cultures, people value social connections and relationships as opposed to individualistic cultures where individual achievements like education and income are valued (Oyserman et al.).

The Hispanic culture, in particular, had been identified as collectivistic (Rinderle & Montoya, 2008). As in other collectivistic cultures, among Hispanics, social support and relationships are a powerful influence on perceived social status. Family and relationships with

family members, for example, play a more central role in a person's identity in the Hispanic culture than they do in Western cultures (Sabogal, Marin, Otero-Sabogal, & Marin, 1987). Collectivistic cultures value relationships. As a result, those with good social networks and many positive relationships perceive themselves as having high social status, regardless of their education or income. Consequently, those who are socially well connected may feel that they compare favorably with others, and they therefore experience less stress. This is significant, as stress has been implicated in the relationship between perceived social status and health outcomes (Adler et al., 2000).

This explanation could account for reversed social gradient seen in some cultures. People in cultures with a reversed social gradient could have a much lower objective SES, but still perceive themselves as comparing well with others in terms of social networks. They would not experience the stress associated with trying to compete with others and would not suffer from its effects. The same would be true for people from reversed social gradient cultures with low objective SES who are healthier than those with high objective SES in Western cultures. People with low objective SES may still have a high perceived social status. As a result, they would experience less stress than do some with high SES, leading to better health among "reversed social gradient" people than those in the more Western cultures with high SES.

Research has supported the idea that perceived social status is a significant predictor of health outcomes. Although Jackman and Jackman report that perceived social status and objective SES are related in Western cultures (as cited in Ostrove et al., 2000), perceived social status is emerging as a more significant predictor of health than are objective measures. Adler and her colleagues (2000) found that perceived social status was related to better psychological and physiological functioning, better health trajectories, and better self-reported health. Among

other things, after controlling for objective SES, they reported that perceived social status predicted poorer sleep latency and higher heart rate. They also suggested that that low perceived social status may be related to higher levels of stress. Ostrove et al. (2000) found perceived social status to be significantly related to self-reported health among groups of minority women. Perceived social status remained a significant predictor of health among the sample even after accounting for the effects of objective measures. Other research (Operario, Adler, & Williams, 2004) reported similar results, and found that a measure of perceived social status was a better predictor of self-reported health than were objective measures in various samples ($r = .31$ for measures of perceived social status vs. $r = .25$ for measures of objective social status).

Perceived Social Status and Health Among Hispanic Immigrants

A reversed social gradient is observed in Hispanic immigrants to the United States. Studies confirm that Hispanic immigrants enjoy better health than US born Hispanics and Whites despite lower SES (Sundquist & Winkleby, 1999; Vega et al., 1998; Wei et al., 1996). Some researchers have attempted to explain this phenomenon by suggesting that those who immigrate to the United States are healthier than their non-immigrating counterparts (Vega, Scribney, Aguilar-Graxiola, Kolody, 2004; Wei et al., 1996). However, at least one study has indicated that the general population in a country from which people emigrate to the U.S. (Mexico, for example) are healthier than those in the United States to begin with (Lorenzo, Williams, Gonzales-Villapondo, Stern, Hazuda, & Haffner, 2005). This suggests that it is not simply healthy people who immigrate, but that immigrants are healthier to begin with. However, as Hispanics immigrate to the United States, their health begins to decline (Morales, Kington, Valdez, & Escarce, 2002; Vaeth & Willet, 2005).

A more likely explanation for health outcomes among Hispanic immigrants is that perceived social status accounts for both the reversed social gradient initially seen among the immigrants and the decline in health after immigration. In their country of origin, Hispanics experience high perceived social status despite low income and education and consequently enjoy good health. Immigrating to the United States, however, results in a loss of social support and social networks (Smart & Smart, 1995a). At this point, recognition of a smaller social network is reflected in declining perceived status and health begins to decline. It may be that in both the immigrants' country of origin and the United States, it is perception of social status that accounts for the difference in health outcomes.

However, while research supports perceived social status as a predictor of health in many samples, it has not been studied in Hispanic immigrants to the United States. A preliminary study (Green & Steffen, 2006) indicates that there is a relationship between perceived social status and health outcomes for Hispanic immigrants, but this was a pilot study and limited in sample size and outcome measures. Ostrove et al. (2000) found perceived social status to be related to health in Hispanic Americans, but immigrants were not studied. Moreover, the fact that the Hispanic immigrant population is still healthier than those born in the United States despite lower objective SES warrants an examination of subjective SES in this population.

Mediating Variables

Some research has indicated that health behaviors may partially explain the decline in health immigrants to the US after immigration. These health behaviors include poorer eating habits among immigrants (Gray, Cossman, Dodson, & Byrd, 2005). Research also suggests that the general Hispanic immigrant population develops poorer eating habits with increased acculturation to the US (Morales et al., 2002). Researchers have also found an increase in

obesity among Hispanic immigrants upon their arrival in the US (Dey & Lucas, 2006). Each of these factors has been implicated in declining health among Hispanic immigrants.

However, researchers have also suggested that the stress associated with immigration may partially mediate the relationship between perceived social status and health (Adler et al., 2000; Cohen, Kaplan, & Salonen, 1999; Gallo & Matthews, 2003; Operario et al., 2004). Immigration to the United States, for example, is associated with an increase in stress (Smart & Smart, 1995b; Williams & Berry, 1991). Williams and Berry identify “acculturation stress” as a potentially significant part of an immigrant’s experience and list potential contributors to acculturation stress as decreased social support, lower SES, poor coping mechanisms, little knowledge of the new culture, and low expectations for the future. Each of these factors, they claim, contributes to the stress experienced by immigrants to the United States. Investigators have suggested that it is this stress that mediates the relationship between perceived social status and poor health (Cohen et al., 1999; Gallo & Matthews, 2003; Operario et al., 2004; Ostrove et al., 2000).

More recently, research has supported stress as an important aspect of immigration (Smart & Smart, 1995b) and specifically implicated job strain and perceived discrimination as sources of stress for immigrants. Investigators have noted that there often exists stress associated with immigrants’ attempts to find jobs (Grzywacz, Quandt, Arcury, Marín, & 2005; Zunzunegui, Forster, Gauvin, Raynault, & Douglas, 2006) and distress associated with the jobs that immigrants hold (Santos, Bohon, & Sánchez-Sosa, 1998). More specifically, Santos et al. points out that conflict in work relationships among Mexican immigrants affected their levels of distress. Recent immigrants may also feel distress associated with perceived discrimination and

racism (Smart & Smart, 1995a). Perceived discrimination may prevent Hispanic immigrants from feeling that they have integrated themselves into their new country.

Research has established a link between the stress associated with immigration and health outcomes. Stress itself has long been established as a predictor of health outcomes (Dantzer, 2001; Johnson, 1985; Thoits, 1995), and has been strongly implicated in elevated blood pressure (Stansfield and Marmot, 2002), and higher inflammatory markers which are predictors of disease (Fuligni, Telzer, Bower, Cole, Kiang, & Irwin, 2009). Decreased social support has been linked to health outcomes (Uchino, 2006), better immune responses to disease (Pressman, Cohen, Miller, Barkin, Rabin, & Treanor, 2005), and social variables have been linked to stress hormones (Cohen, Doyle, & Baum, 2006). Research has linked perceived racism to higher levels of cardiovascular reactivity, (Lepore et al. 2006) and discrimination has been shown to predict a higher level of general stress (King, 2005). Job strain has been linked directly to stress itself (Carrere, Evans, Palsane, & Rivas, 1991) as well as to various measures and predictors of health, including hypertension (Markovitz, Matthews, Whooley, Lewis, & Greenlund, 2004), and blood pressure (Brisson, Laflamme, Moisan, Milot, Mâsse, & Vézina, 1999).

The stress associated with perceived social status may lead to increased depression, which, in turn, may contribute to poorer health. Prolonged stress can result in clinical manifestations of depression (Slavik & Croake, 2006). This appears to be the case with Hispanic immigrants. As Hispanics immigrate to the United States they experience higher levels of depression and declining overall mental health in conjunction with elevated stress and anxiety (Vega et al., 1998). These elevated levels of depression, and declining mental health, like other factors associated with immigration, have themselves been linked to poor health outcomes (Ford, 2004; Schiffer, Pelle, Smith, Widdershoven, & Hendricks, 2009).

Finally, the stress that immigrants experience upon arrival in the United States appears to be greatest immediately after immigration (Steffen, Smith, Larson, & Butler, 2006). They report a precipitous decline in health outcomes for Hispanic immigrants during the first three years after immigration. This decline appears to taper off after three years of living in a new country. They suggest that this immediate decline in health may be attributable to the stress associated with initial culture change. This may include the fact that upon arrival in the United States, social networks are significantly limited and immigrants may have trouble creating social networks because of language barriers. It may also include stress associated with trying to learn a different language, trying to understand a new culture, and even learning to eat different food.

From the research regarding immigration, stress, and health outcomes, it is clear that “acculturation stress” may, in fact, represent the mechanism through which SES leads to poor health. Immigrants may perceive themselves as having (and actually have) a limited social network, which results in a lower perceived social status. This, in turn, is associated with stress in connection with immigrants’ attempts to find jobs and having lower wage jobs with high job strain. Immigrants may also experience higher levels of perceived discrimination or racism, and may experience higher levels of overall stress associated with immigration such as language barriers, little knowledge of the future and low expectations for the future.

Current Study and Hypotheses

In summary, research indicates that among Mexican immigrants, lower education and income predict better health. This represents a reverse to the trend found in Western countries, where higher objective SES predicts better health. Research supports a decline in social support among Mexican immigrants as the culprit for a decline in perceived social status. The advantage of a measure of perceived social status over more traditional objective measures in predicting

health has led researchers to theorize that it is one's perception of social status that is related to health, and not actual income and education. With this in mind, the proposed research attempts to predict health outcomes for Mexican immigrants using a measure of perceived social status. Also, the current research attempts to explain the predicted relationship between perceived social status and health through mediating variables. Various stressors such as job strain, and perceived discrimination and the decline in mental health associated with stress have been supported by previous research as potential mediating variables. From this background information, five hypotheses were proposed:

1. It was first hypothesized that a decline in social support will be associated with a lower perceived social status among Mexican immigrants. Among collectivistic cultures, self-perception, identity, and feelings of self-worth appear to be related to social connections and a limited social support and social network results in a declining perceived social status.
2. It was also hypothesized that there will exist a significant direct effect between perceived social status and physical health in terms of higher ambulatory blood pressure (daytime diastolic and systolic), inflammatory markers (C reactive proteins), a measure of self-reported health (PHQ), and diet (calories and percent of calories from fat) in a sample of Mexican immigrants. It is also hypothesized that the relationship between subjective SES and health will remain significant after controlling for objective measures of SES (education and income), BMI, physical activity, and alcohol intake.
3. Further, it was anticipated that the relationship between perceived social status and health is mediated through the stress associated with low perceived social status and that there will, consequently, exist a significant indirect effect between perceived social status and indicators of physical health.

4. It was also anticipated that objective SES will not be related to health outcomes, or will not be as strongly related to health outcomes as subjective SES for Mexican immigrants.

Mexicans define their identity through relationships with others. As a result, education and income will have a smaller effect on Mexican immigrant stress. Consequently, objective measures will not predict health or will not predict health as well as measures that rely on perceptions of relationships.

5. Finally, as stress appears to be greatest during the first three years after immigration, it was hypothesized that stress will be more significantly related to health outcomes for those who have more recently immigrated (less than three years) when compared to those who have been in the US for three years or longer. This is likely attributable to the increased stress associated with initial culture change and having a limited social network, which results in a greater immediate negative impact on health. After three years in a new country, stressors appear to become less pronounced as immigrants become more accustomed to the culture and develop social networks.

Method

Participants

Participants for the study were recruited from the community through Spanish language television, radio, newspaper advertisements, and announcement placed in Hispanic markets, churches, ESL programs, and community centers. The participants had all been born in Mexico and currently reside in the United States. Exclusionary criteria included pregnancy and use of blood pressure medication. Informed consent was obtained prior to enrollment into the study.

In total, 320 participants were recruited, ages 18-79, with a mean age of 36 and a standard deviation of 11.6. One hundred and eighty of the participants were male and 140 were female.

The participants varied with respect to education. Seventy-seven percent of the participants reported completing high school, 64% had completed some vocational or technical training, 45.5% reported having completed some college, 21.4% reported graduating from college, and 2.7% reported completing post-graduate work.

Study participants also varied somewhat with respect to income. The mean income among participants was between \$15 and \$19 thousand yearly, with 48% of the study sample making between \$15 and \$39 thousand.

Study participants represented various religions. However, the sample was dominated by members of the Church of Jesus Christ of Latter-day Saints (LDS) and Catholics, with 63% of the sample identifying themselves as LDS and 27% identifying themselves as Catholic. The remaining 10% consisted of Protestant (1.3%), other religion (6.1%), or people having no religion (2.6%). In addition, on average, study participants attend church monthly and said that they were “moderately” spiritual, but 41% of the participants reported attending church weekly.

Procedures

Participants were asked to come to the BYU Comprehensive Clinic having abstained from food for the past 12 hours. Upon arrival, participants' blood was drawn by a trained phlebotomist, after which the blood was sent to the BYU student health clinic for analysis. After blood was drawn, the participants were weighed with a balance-beam, eye level scale and measured using a measuring scale mounted to the balance.

A Spanish speaking research assistant then connected the participants to an ambulatory blood pressure monitor that they were instructed to wear for 24 hours (Accutraker-II). The Accutracker tracked ambulatory blood pressure by inflating a blood pressure cuff that had been placed on each participant's non-dominant arm. A microphone attached to the participant's arm

beneath the blood pressure cuff recorded blood pressure and heart rate. Three EKG leads attached to each participant's chest regulated the frequency of the Accutracker's measurements by monitoring R wave gating. Nuprep gel and alcohol cleaning swabs were used to prepare the skin to increase EKG pad cohesion. Readings from the blood pressure cuff and EKG leads were recorded by the Accutracker that was attached to each participant's waist with a belt. After a participant was fitted with the Accutracker, research assistants allowed the Accutracker to conduct unrecorded blood pressure readings for calibration. During the third calibration, research assistants manually recorded blood pressure and checked their reading against the Accutracker's blood pressure reading. Research assistants ensured that the manual readings and the Accutracker's readings are within 5 mmHg for both systolic and diastolic blood pressure to check calibration. This calibration process was completed a total of three times for each participant. Once calibration procedures were completed, participants were instructed to go about their normal daily activities and normal routine. The blood pressure monitor recorded blood pressure and heart rate three times an hour during awake time.

As participants left after being connected to the monitor, they were given questionnaires that they were to fill out during their free time during the subsequent 24 hours. They included scales measuring objective SES, perceived social status, job distress/strain, overall stress, perceived racism/discrimination, social support, length of stay in the United States, physical activity, smoking/drinking habits, and mental health, and were administered in Spanish. Participants were asked to return the next day at the same hour that they first arrived the previous day. Upon arrival the next day, participants returned the monitor and completed questionnaires. Participants were be asked to indicate what time they fell asleep the previous night and the time they woke up that morning.

Measures

Objective SES was assessed by asking participants to select their income and education levels from categories representing all levels of income and education.

Subjective Social Status Scale (SSSS). Perceived social status was measured through the SSSS, which presents a vertical “ladder” and asks participants to rank themselves relative to others in their current community (local community), country in which they currently reside (US community), and country of origin (Hispanic community), by placing an “X” on one of the rungs of the ladder. Placing themselves on one of the upper rungs of the ladder suggests higher perceived social status while lower rungs represent lower perceived social status. The SSSS scale has been found to be a psychometrically sound tool for assessing perceived social status a test-retest reliability of .62 (Operario et al. 2004).

Job Content Questionnaire (JCQ). The JCQ assesses job distress/strain. It is a 29-question survey that is designed to assess psychological distress and demands of a job, decision latitude, social support, physical demands, and job insecurity (Karasek, Brisson, Kawakami, Houtman, Bongers, & Amick, 1998). Sample questions include, “In my job, I have to work very hard,” and “My supervisor helps me do my job.” Participants respond on a four-point Likert scale that ranges from “completely agree” to “completely disagree.” The JCQ demonstrates good psychometrics in both English and Spanish, noting that it demonstrates substantial predictive validity with respect to stress with validity coefficients of .73 for women and .74 for men (Karasek et al. 1998).

Interpersonal Support Evaluation List (ISEL). The ISEL was used to assess social support. The ISEL is a 12-question questionnaire that measures supportive social resources that could potentially facilitate coping with stressful events (Cohen, Mermelstein, Kamarck, &

Hoberman, 1985). Sample ISEL questions include, “I feel like there is no one with whom I can share my problems and fears” and “When I need suggestions about how to deal with my problems, I know someone that I could talk to.” Participants are asked to respond on a four-point Likert scale that ranges from “completely true” to “completely false.” Authors of the ISEL report good psychometrics, with validity estimates ranging from .46 to .74 with other measures of various aspects of social support (Cohen et al. 1985). Reliability estimates for the ISEL range from alpha coefficients of .60 for the least reliable subscales to .92 for the most reliable subscale and a test-retest reliability of .80 (Cohen et al. 1985).

The Social Network Index (SNI). The SNI was also used to assess social support. It is a 12- question inventory that purports to assess participation in 12 types of social relationships, including family members, friends, neighbors, coworkers. Points are assigned to each type and number of relationships the participant indicates that he or she has. For example, each participant is asked to mark how many close friends he or she has. If a person has none, they are to mark a zero; if they have one friend, they are to mark the number 1, etc.

Perceived Stress Scale (PSS). The PSS was used to assess overall stress. It is a 10 question survey that is designed to measure experienced stress and the degree to which situations in one’s life are perceived as stressful (Cohen, Kamarck, & Mermelstein, 1983; Remor, 2006). Sample questions include, “Are you confident that you can handle your personal problems?” and “Do you feel that you have so many problems that you can’t control them all?” Participants are asked to respond on a five-point Likert scale that ranges from “never” to “almost always.” Remor (2006) examined the psychometrics of the Spanish version of the PSS and noted that it demonstrated adequate reliability (internal consistency, $\alpha = .81$, and test-retest, $r = .73$), validity (concurrent), and sensitivity.

Perceived Ethnic Discrimination Questionnaire – Community Version (PEDQ-CV). The PEDQ-CV was used to assess perceived racism/discrimination. It is a 29-question inventory used across ethnic groups to assess perceived racism or ethnic discrimination. The scales purport to measure several sub-dimensions of racism, permitting the examination of different forms of race-related stressors (Brondolo, Kelly, Coakley, Gordon, Thompson, Levy, Cassells, Tobin, Sweeney, & Contrada, 2005). Sample questions include, “because of your ethnicity, has your supervisor been unfair with you?” and “because of your ethnicity, have other people thought that you can’t do things or complete a particular job?” Participants are asked to respond on a five-point Likert scale that ranges from “never” to “many times.” Brondolo et al. (2005) report that the PEDQ-CV has good reliability and construct validity.

The International Physical Activity Questionnaire (IPAQ). The IPAQ was used to assess the physical activity of participants and is designed to obtain estimates of physical activity. The measure asks participants to list how much time they have spent in vigorous (running, biking) and moderate (lifting objects, playing tennis) exercise during the previous week. It also asks participants to rate how much time they spent walking and being inactive (e.g. sitting, reading, watching television) during the previous week. Hagströmer, Oja, and Sjöström, (2006) report that the IPAQ demonstrates sound validity with strong correlations (0.55) between IPAQ scores and physical activity. Physical activity is measured as a metabolic level (metlevel), which represents how many calories were “burned” during a typical week due to physical activity.

The Food Frequency Questionnaire (FFQ). The FFQ was used to assess the diet of the participants. It is a comprehensive evaluation of diet that assesses the eating habits of participants. It asks participants to indicate what kind of food they eat, including specific questions about fruits, vegetable, meats, drinks, and vitamin supplements. It also asks

participants to indicate portion size and how frequently they eat. The measures were sent to Berkeley, California, for computer scoring. The authors note that the measure was designed specifically to assess the Hispanic diet and purported that it demonstrates good reliability estimates for the different subscales (Wakimoto, Block, Mandel, & Medina, 2006).

The Physical Health Questionnaire (PHQ). The PHQ is a self-report measure that assessed physical health of participants in four domains: gastrointestinal problems, headaches, sleep disturbances, and respiratory illness (Schat, Bohon, & Sánchez-Sosa, 2005). Several studies report adequate psychometrics with reliability estimates ranging from .66 to .83 for the different domains. (Schat et al., 2005)

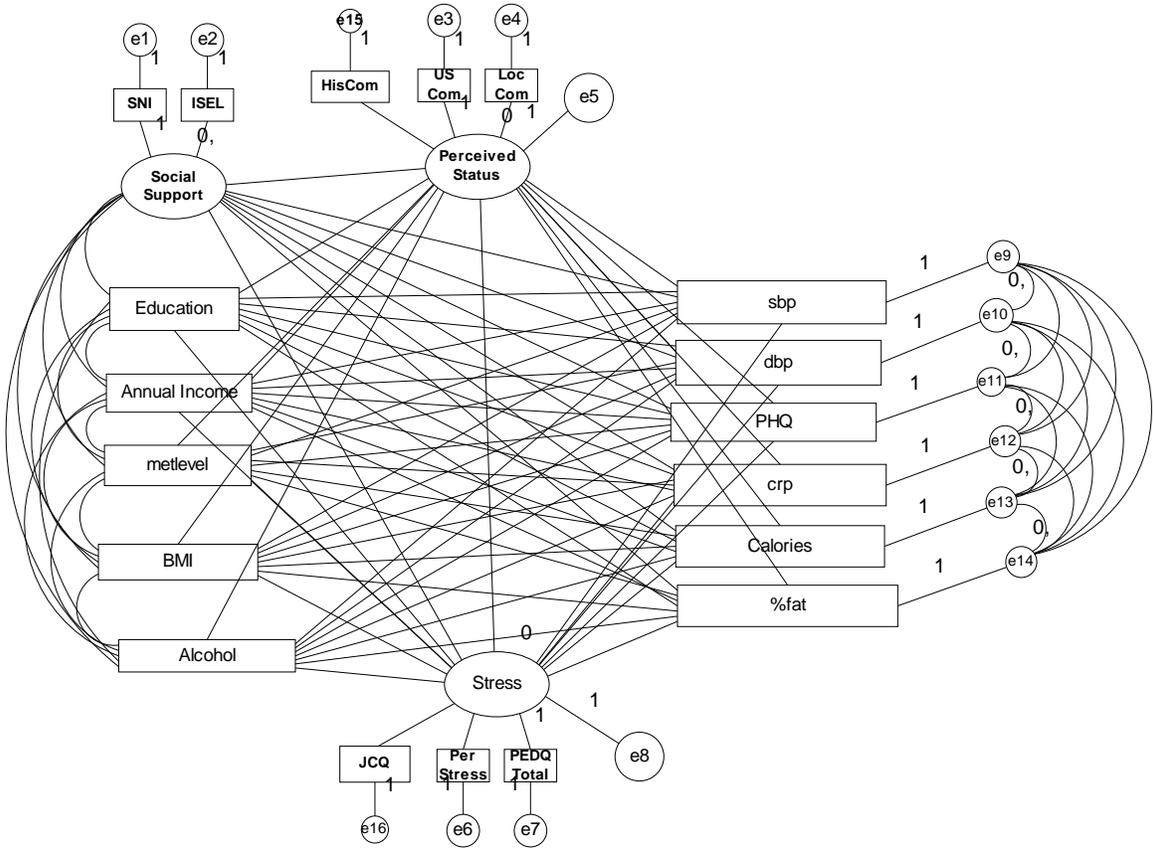
C-Reactive Proteins (CRP). CRP levels was used as measures of physical health. CRP is secreted by the liver in response to tissue injury, inflammation, or infection. It is believed that CRP plays a role in cardiovascular disease because many cardiovascular problems, such as atherosclerosis, have a significant inflammatory component. CRP has been found to be a significant predictor of cardiovascular disease, independent of other risk factors such as cholesterol (Ridker, Cushman, Stampfer, Tracy, & Hennekas, 1997)

Other characteristics were assessed through more straightforward measures. Obesity was assessed by calculating the Body Mass Index of each participant (kg/m²). Smoking/alcohol consumption was assessed with two questions that ask about the frequency of smoking/drinking behaviors. Length of stay was determined by asking participants how long they have lived in the United States.

Analysis

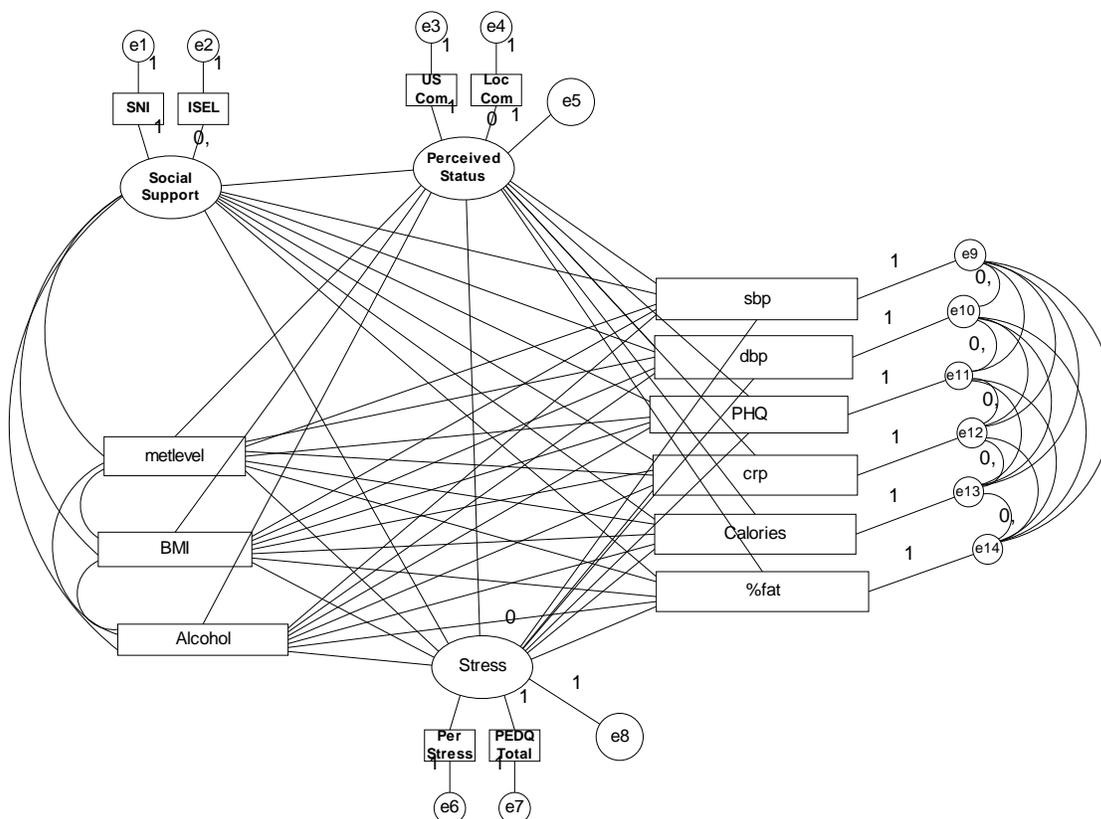
Structural equations modeling (SEM) in Analysis of Moment Structures (AMOS) software was used to examine relationships between variables. In order to be able to conduct a

full analysis, AMOS requires that there be no missing data in the data set. As a result, a mean imputation process was used to insert values in place of missing data in the data set. This consisted of inserting the mean value of all participants on a particular variable in place of missing data. Then, an SEM model was created incorporating each pertinent variable (See Figure 1). Direct, indirect, and total effect pathways were analyzed according to Figure 1 below. In addition to path analysis, model fit statistics were analyzed and include a Chi-Square statistic, a Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI), and the Root Mean Square Error of Approximation (RMSEA).



- SNI = Social Network Index
- ISEL = Interpersonal support Evaluation List
- His Com = Subjective rating of social status in the Hispanic Community
- US Com = Subjective rating of social status in the US Community
- Loc Com = Subjective rating of social status in the local Community
- JCQ = Job Content Questionnaire
- Per Stress = Perceived Stress Scale
- PEDQ = Perceived Ethnic Discrimination Questionnaire
- SBP = Systolic Blood Pressure
- DBP = Diastolic Blood Pressure
- PHQ = Physical Health Questionnaire
- CRP = C-reactive Proteins
- Calories = Calories consumed
- % Fat = Percentage of calories consumed from fat
- Metlevel = Calories burned from physical activity per week

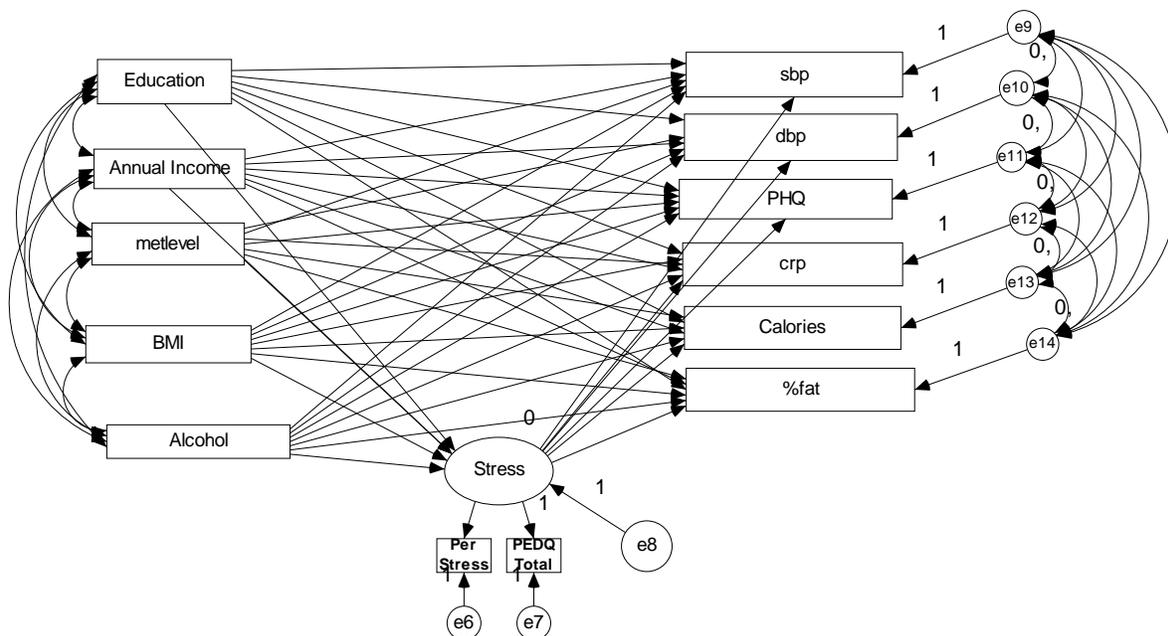
Figure 1: Hypothesized Model



SNI = Social Network Index
 ISEL = Interpersonal support Evaluation List
 US Com = Subjective rating of social status in the US Community
 Loc Com = Subjective rating of social status in the local Community
 Per Stress = Perceived Stress Scale
 PEDQ = Perceived Ethnic Discrimination Questionnaire
 SBP = Systolic Blood Pressure
 DBP = Diastolic Blood Pressure
 PHQ = Physical Health Questionnaire
 CRP = C-reactive Proteins
 Calories = Calories consumed
 % Fat = Percentage of calories consumed from fat
 Metlevel = Calories burned from physical activity per week

Figure 2: Perceived Social Status Model

The second model contained the reverse and included variables of objective SES but excluded variables of perceived social status (see figure 3).



Per Stress = Perceived Stress Scale
 PEDQ = Perceived Ethnic Discrimination Questionnaire
 SBP = Systolic Blood Pressure
 DBP = Diastolic Blood Pressure
 PHQ = Physical Health Questionnaire
 CRP = C-reactive Proteins
 Calories = Calories consumed
 % Fat = Percentage of calories consumed from fat
 Metlevel = Calories burned from physical activity per week

Figure 3: Objective Social Status Model

Each of these models was then compared to the original model via a chi-square test to determine if each new model was statistically different from the original. After the chi-square comparison, goodness of fit measures were compared to determine which model, if any, fit the data better than the other.

To examine hypothesis #5, a separate path model was constructed which consisted of six direct pathways, with one path existing between Stress and each of the six outcome variables.

This model is depicted in Figure 4 below.

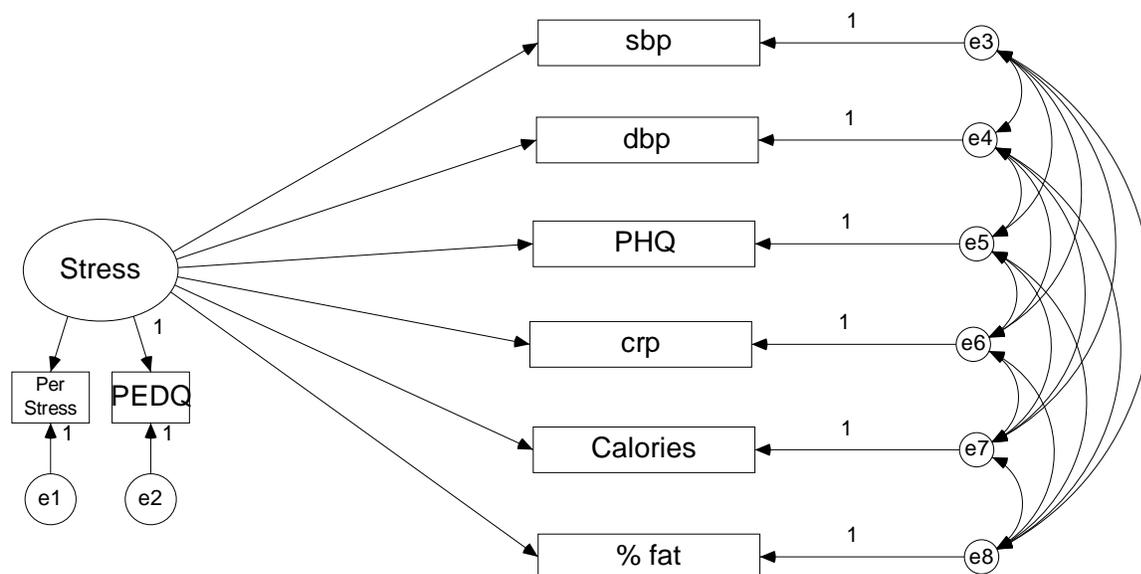


Figure 4: Hypothesized Multiple Group Model

The complete data set was then divided into two groups according to how long the participant had resided in the country. The first group consisted of people residing in the country less than three years and will be referred to as the Recently Arrived Group. The second group consisted of those who had lived in the country for more than three years and will be referred to as the Earlier Arriving Group. After having constrained each of the six direct pathways from Stress to the outcomes variables to be equal across groups, a multiple group analysis was conducted by fitting each group to the model in Figure 4 separately. The nested model comparison was then analyzed to determine whether or not the two groups were statistically different from each other and then unconstrained standardized regression coefficients from the six pathways in each group were compared to specify which effects, if any, were different across groups.

Results

Sample characteristics are presented in Table 1, comparing immigrants who have been in the US for less than 3 years (the Recently Arrived Group) with more established immigrants, or the Earlier Arriving Group (3 or more years living in the United States). The Recently Arrived Group had only 56 participants while the Earlier Arriving Group had 256 participants. As a result, the full model (model incorporating all participants) is weighted in favor of the Earlier Arriving Group. Participants in the Earlier Arriving Group had higher levels of CRP ($t(318) = -2.72, p < .01$, two-tailed), higher incomes ($t(318) = 23.47, p < .01$, two-tailed), BMI ($t(318) = -2.89, p < .01$, two-tailed), and were older ($t(318) = -3.22, p < .01$, two-tailed), while participants in the Recently Arrived Group were more educated ($\chi^2(6, N = 320) = 17.23, p < .01$) (See Table 1).

The two groups did not differ significantly on other variables (See Table 1). With respect to health outcome variables, with the exception of CRP, all other health variables (Calories, % Fat, PHQ, and Blood Pressure) were not significantly different. Specifically, the both groups consumed the same number of calories ($t(318) = -.023, p = .99$, two-tailed) and the same percentage of calories from fat ($t(318) = -.18, p = .86$, two-tailed). They also did not differ with respect to the PHQ ($t(318) = -.74, p = .46$, two-tailed), systolic blood pressure ($t(318) = -.15, p = .88$, two-tailed), diastolic blood pressure ($t(318) = -.01, p = .99$, two-tailed), or the number of calories burned during the week through physical activity (Metlevel) ($t(318) = .066, p = .95$, two-tailed).

Religiously, the two groups did not differ with respect to religious affiliation ($\chi^2(1, N = 320) = .41, p = .52$) or church attendance ($\chi^2(5, N = 320) = 8.67, p = .12$). The Recently Arrived

Group consisted of 20% Catholic and 80% LDS while the Earlier Arriving Group was 17% Catholic and 83% LDS.

Finally, the two groups did not differ significantly with respect to gender ($\chi^2(1, N = 320) = .20, p = .66$) or alcohol use ($\chi^2(2, N = 320) = 1.55, p = .46$). The Recently Arrived Group consisted of 54% men and 46% women while the Earlier Arriving Group consisted of 56% men and 44% women. In the Recently Arrived Group, 88% reported not drinking alcohol, while 12% said they did. In the Earlier Arriving Group, 86% reported not drinking alcohol with 14% saying they did.

As the study sample consisted almost entirely of those who identified themselves as either LDS or Catholic, a comparison of the two groups across key variables was conducted to determine if the two subgroups differed significantly. Sample characteristics are presented in Table 2, comparing those who identified themselves as LDS and those who identified themselves as Catholic. Overall, the two groups did not differ with respect to their calories consumed ($t(276) = .45, p = .66$, two-tailed), percentage of calories consumed from fat ($t(276) = -.50, p = .65$, two-tailed), CRP ($t(276) = 1.14, p = .25$, two-tailed), systolic blood pressure ($t(276) = .44, p = .66$, two-tailed), diastolic blood pressure ($t(276) = .04, p = .97$, two-tailed), age ($t(276) = -1.06, p = .28$, two-tailed), Metlevel ($t(276) = 1.02, p = .24$, two-tailed), the PHQ ($t(276) = 20.53, p = .49$, two-tailed), or BMI ($t(276) = 1.43, p = .15$, two-tailed). However, the LDS group was more educated ($\chi^2(6, N = 278) = 36.66, p < .01$), had a higher income ($\chi^2(9, N = 278) = 20.22, p < .05$), and attended church more frequently ($\chi^2(5, N = 278) = 212.28, p < .01$).

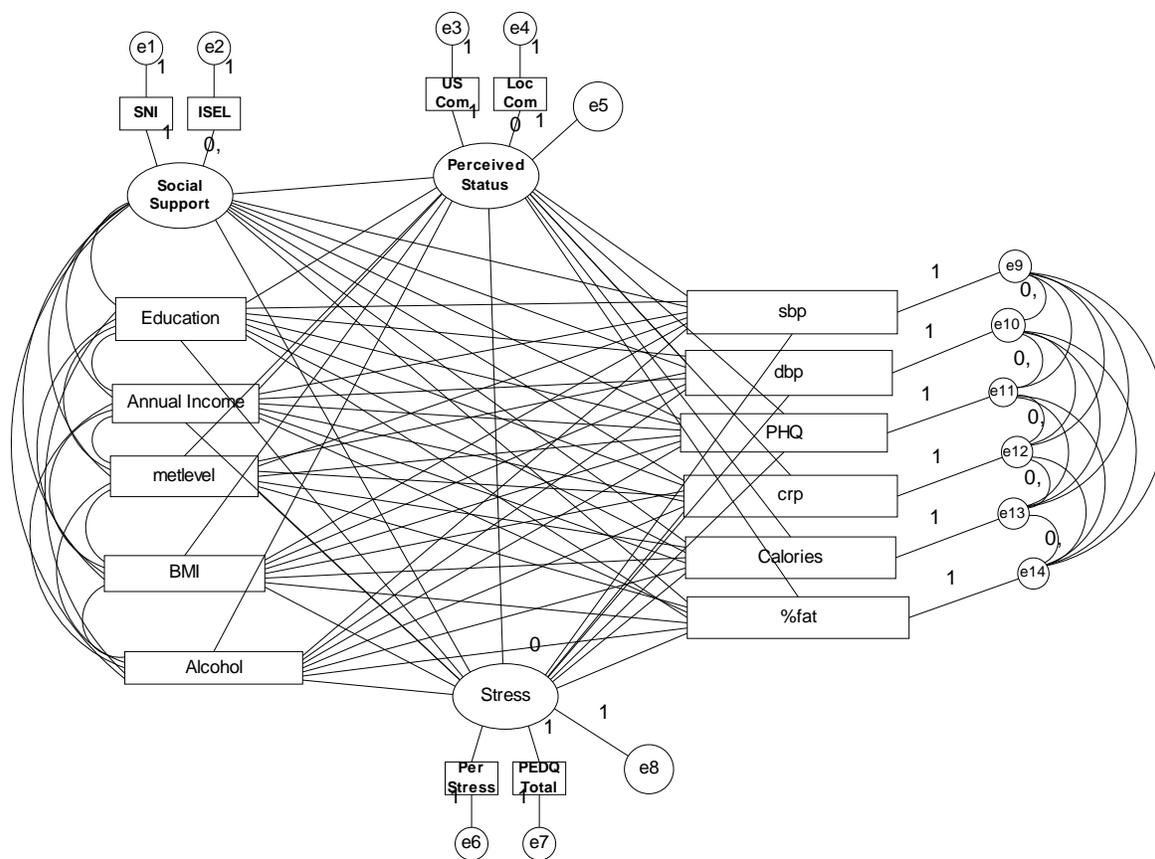
Table 1**Comparison of Participant Variables by Groups**

	Mean of the Recently Arrived Group (0 to 3)	Mean of the Earlier Arriving Group (3 and Above)	p-value
Calories	2497	2501	0.99
% Fat	32.01	32.14	0.86
Systolic Blood Pressure (mmHg)	121.28	121.54	0.88
Diastolic Blood Pressure (mmHg)	71.51	71.52	0.99
PHQ (0 to 45)	21.47	21.95	0.46
CRP (mg/dL)	1.59	2.29	<0.01
Education levels 1=less than high school 6=post graduate	3.65	3.01	<0.01
Income 1=< than \$5,000 9=> than 60,000	3.38	4.19	<0.01
Met level Calories/week	6,876	6,786	0.95
BMI	26.46	28.73	<0.01
Age	31.95	37.21	<0.01
Church attendance 1=Never 6=many times a week	4.44	4.23	0.12

In analyzing output data associated with the initial model (Figure 1), it was discovered that factor loadings associated with the observed variables “job distress/strain” (JCQ) and “subjective social status among the Hispanic community” (His Com) were small (0.149 and 0.449, respectively) when compared to the other factor loadings associated with their respective latent variable (Stress and Perceived Social Status, respectively). They were consequently removed from the overall analysis, rendering a final model (Figure 5), which was subsequently used for the remainder of the analysis and was used in answering hypothesis questions #1-3.

Table 2**Comparison of Participant Variables by Religious Identification**

	Mean of the LDS Group	Mean of the Catholic Group	p-value
Calories	2488	2555	0.66
% Fat	32.31	32.02	0.65
Systolic Blood Pressure (mmHg)	121.28	121.54	0.66
Diastolic Blood Pressure (mmHg)	71.44	71.48	0.97
PHQ (0 to 45)	21.55	22.58	0.49
CRP (mg/dL)	2.09	2.36	0.25
Education levels 1=less than high school 6=post graduate	3.38	2.58	<0.01
Income 1=< than \$5,000 9=> than 60,000	4.15	3.81	0.02
Met level Calories/week	6,576	8,027	0.24
BMI	27.86	28.85	0.15
Age	36.40	34.76	0.28
Church attendance 1=Never 6=many times a week	4.73	2.99	<.0.01



SNI = Social Network Index
 ISEL = Interpersonal support Evaluation List
 US Com = Subjective rating of social status in the US Community
 Loc Com = Subjective rating of social status in the local Community
 Per Stress = Perceived Stress Scale
 PEDQ = Perceived Ethnic Discrimination Questionnaire
 SBP = Systolic Blood Pressure
 DBP = Diastolic Blood Pressure
 PHQ = Physical Health Questionnaire
 CRP = C-reactive Proteins
 Calories = Calories consumed
 % Fat = Percentage of calories consumed from fat
 Metlevel = Calories burned from physical activity per week

Figure 5: Modified Hypothesized Model

The analysis of the model in Figure 5 resulted in a chi-square of 69.41 ($p < 0.01$), a CFI of .996, a TLI of 0.882, and an RMSEA of 0.049. The significant p-value associated with the chi-square suggests the model represents an unlikely event. However, the chi-square value and

accompanying significant p-value themselves are influenced by sample size and not as helpful as other fit statistics. While some fit statistics (CFI and RMSEA) fall within the recommended cutoff points and seem to suggest an adequate fit, the TLI is lower than the recommended cutoff threshold. This would suggest that there is some warranted degree of uncertainty as to whether the proposed model accurately reflects the relationships among the data and that theoretical alterations to the model that result in a better fit may be warranted.

It was first hypothesized that in Hispanic cultures where self-perception and feelings of self-worth are related to social connections, a decline in social support would be associated with a lower perceived social status. This hypothesis was supported in the current study where higher levels of Social Support predicted higher Perceived Social Status (0.25; $p = 0.01$). A summary of all direct effects can be found in Table 3.

It was also hypothesized that there would be a significant, direct effect between Perceived Social Status and health outcome variables. More specifically, a direct relationship was hypothesized to exist between Perceived Social Status and ambulatory daytime blood pressure, inflammatory markers, a physical health questionnaire, and diet. It was also hypothesized that this relationship would remain significant after controlling for objective measures of SES (education and income), BMI, physical activity, and alcohol intake. Unfortunately, results of the analysis indicate that no such significant direct relationship exists between Perceived Social Status and outcome variables (see Table 3). Further, there were not any significant total effects between Perceived Social Status and indicators of physical health (see Table 4).

Table 3**Standardized Direct Effects**

	Social Support	Education	Income	Met Level	BMI	Alcohol	Perceived Status	Stress
Perceived Status	.25*	-.02	.06	-.03	.03	.05		
Stress	-.41**	.09	-.12	.09	.10	-.04	-.22*	
% of Calories From Fat	.06	-.11	.01	-.04*	.01	.11	.03	.06
Calories	.13	-.05	-.10	.10*	.01	.07	.05	.17*
C-reactive Proteins	-.11	.02	-.03	-.14	.36*	-.08	.08	.03
PHQ	.07	-.06	.01	.01	-.03	-.07	-.01	.52*
Diastolic Blood Pressure	.06	-.01	-.01	.03	.21**	.13*	.05	-.04
Systolic Blood Pressure	-.02	-.01	.03	.01	.24**	.15*	-.06	-.15
Perceived Stress								.78*
Perceived Discrimination								.35**
Local Community							.88**	
US Community							.91*	
ISEL	.61**							
SNI	.57*							

* significant at the 0.05 level ** significant at the 0.01 level

Table 4**Standardized Total Effects**

	Social Support	Education	Income	Met. Level	BMI	Alcohol	Perceived Status	Stress
Perceived Status	.25*	-.02	.06	-.03	.03	.05	.00	.00
Stress	-.47**	.09	-.13	.09	.09	-.05	-.22*	.00
% Calories From Fat	.04	-.10	.01	-.04	.01	.11	.02	.06*
Calories	.06	-.03	-.12	.11*	.02	.06	.01	.17
C-Reactive Proteins	-.11	.02	-.03	-.14*	.36*	-.08	.07	.03
PHQ	-.18*	-.02	-.06	.05	.01	-.10	-.12	.52*
Diastolic Blood Pressure	.09	-.02	.00	.03	.21**	.14*	.06	-.04
Systolic Blood Pressure	.04	-.06	.05	.00	.23**	.16*	-.02	-.15
Perceived Stress	-.37**	.07	-.10	.07	.07	-.04	-.17*	.78*
PEDQ	-.16**	.03	-.05	.03	.03	-.02	-.08*	.35**
Local Community	.22	-.02	.05	-.02	.02	.04	.88**	.00
US Community	.23*	-.02	.05	-.02	.02	.04	.91*	.00
ISEL	.61**	.00	.00	.00	.00	.00	.00	.00
SNI	.57*	.00	.00	.00	.00	.00	.00	.00

* significant at the 0.05 level ** significant at the 0.01 level

It was further anticipated that any relationship that did exist between Perceived Social Status and health would be mediated through stress that is associated with a low perceived social status. The analysis resulted in three such significant indirect relationships between Perceived Social Status and outcome variables (see Table 5). The Stress mediated an association between Perceived Social Status and both Calories and the PHQ such that Immigrants with a higher Perceived Social Status consumed fewer Calories (-0.04 ; $p = 0.01$) and had better self-report health (-0.12 ; $p = 0.02$). Stress also mediated an indirect effect between Perceived Social Status and Systolic Blood Pressure such that those immigrants with a higher Perceived Social Status actually had slightly higher Systolic Blood Pressure (0.03 ; $p = 0.04$). However, the stress mediated relationship between Perceived Social Status and Systolic Blood Pressure is in the

opposite direction than what would normally have been expected. Also, the inverse relationship between Perceived Social Status and Calories, although significant, is relatively small. It seems that the only significant and relatively substantial stress mediated indirect relationship between perceived status and health outcomes is the relationship between Perceived Social Status and the PHQ.

Table 5

Standardized Indirect Effects

	Social Support	Education	Income	Met. Level	BMI	Alcohol	Perceived Status	Stress
Perceived Status								
Stress	-.06*	.00	-.01	.01	-.01	-.01		
% Calories From Fat	-.02	.00	-.01	.00	.01	.00	-.01	
Calories	-.07*	.01	-.02	.01	.02	-.01	-.04*	
C-Reactive Proteins	.00	.00	.00	.00	.01	.00	-.01	
PHQ	-.25*	.05	-.07	.05	.05	-.03	-.12*	
Diastolic Blood Pressure	.03	.00	.01	-.01	.00	.00	.01	
Systolic Blood Pressure	.05	-.01	.02	-.01	-.02	.01	.03*	
Perceived Stress	-.37**	.07	-.10	.07	.07	-.04	-.17*	
PEDQ	-.16**	.03	-.05	.03	.03	-.02	-.08*	
Local Community	.22	-.02	.05	-.02	.02	.04		
US Community	.23*	-.02	.05	-.02	.02	.04		
ISEL								
SNI								

* significant at the 0.05 level ** significant at the 0.01 level

It was also anticipated that objective measures of SES would not be as strongly related to health outcomes as subjective SES, or perceived social status, among Hispanic immigrants. This hypothesis was not supported by the data. The model containing only subjective measures of social status (Figure 2) had a chi-square of 56.40 ($p = 0.01$), a CFI of 0.973, a TLI of 0.914, and an RMSEA of 0.047. A chi-square test (with degrees of freedom equal to the difference in the number of parameters between the original model and the 'subjective only' model) resulted in a p-value of 0.99 when compared to the original model (Figure 1). The model containing only objective measures of social status (Figure 3) resulted a chi-square of 26.91 ($p < 0.01$), a CFI of 0.963, a TLI of 0.712, and an RMSEA of 0.073. A chi-square test (again, with degrees of freedom equal to the difference in number of parameters) resulted in a p-value of 0.03 when compared to the original model. While the SEM model containing only subjective measures of SES did have better fit statistics than the SEM model incorporating only objective measures (higher CFI and TLI and lower RMSEA), it was not statistically distinguishable from the original model (chi-square of 0.99), rendering moot a comparison with the 'objective only' model.

Finally, it was hypothesized that stress would be more significantly related to health outcome variables for those who had immigrated to the United States more recently (less than three years) than for those who had been in the US for longer than three years. The analysis revealed that there was, indeed, a significant difference in the relationships among stress and health between those two groups. The nested model comparison which was conducted as part of a multiple group analysis resulted in a nested p-value of less than 0.01, and differences in direct effects pathways from Stress to health outcomes variables between the two groups ('the Recently Arrived Group' and 'Earlier Arriving Group') are represented in Figures 6 and 7 below. However, in contrast to the proposed hypothesis, stress was not associated with poorer health

outcomes in the more recently immigrated sample. While there does not appear to be a meaningful difference between blood pressure (systolic or diastolic) between the two groups, there appear to be meaningful differences in each of the other health outcomes variables, with the relationship in each case being stronger and more positive for the group of immigrants who have been in the US longer. This would suggest that stress seems to have a more negative effect on some indicators of health for those who have been in the US longer than those who have been in the US for less than three years. Conversely, with the exception of the relationship between Stress and PHQ, stress does not appear to have a deleterious effect on health outcomes for those living in the US for less than three years.

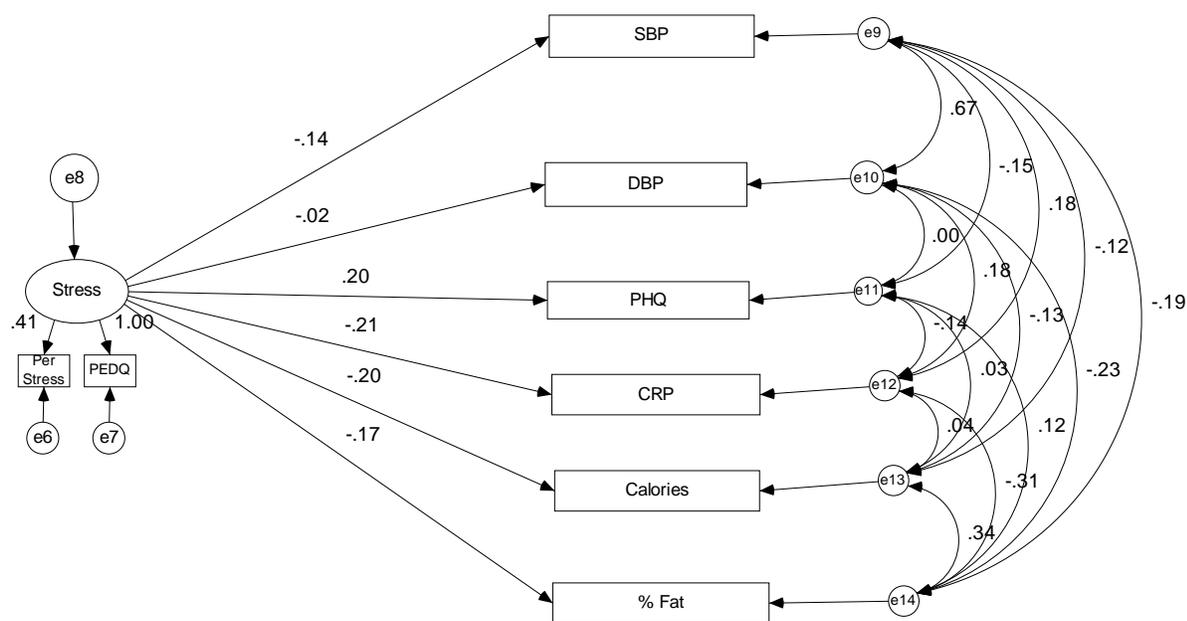


Figure 6: The Recently Arrived Group

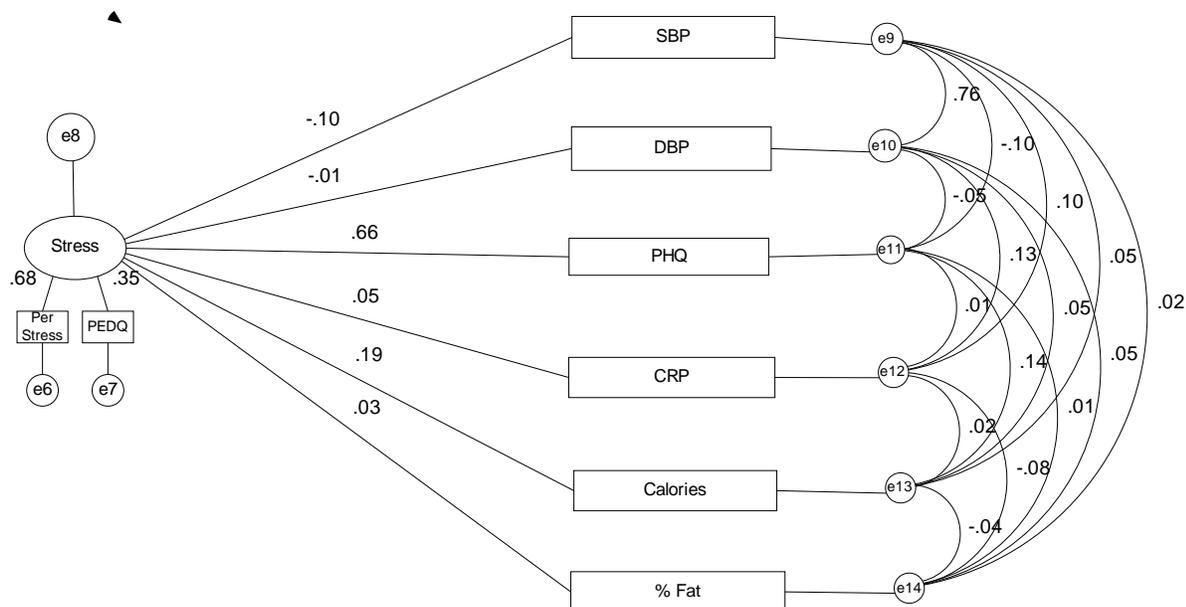


Figure 7: The Earlier Arriving Group

Discussion

Overall, the results present a mixed picture. Some hypotheses were supported. For example, the relationship between Social Support and Perceived Social Status was significant and relatively robust and a stress-mediated relationship exists between Perceived Social Status and both Calories and the PHQ. Other hypotheses were not supported by the results. There was no significant direct (or total) relationship between Perceived Social Status and health outcomes. Perceived Social Status was indirectly related to Systolic Blood Pressure, but the relationship was in the opposite direction than was hypothesized. Also, a comparison of subjective measures of social status to objective measures of social status could not be made because the model representing subjective measures of social status was not statistically distinguishable from the

full model. Also, immigrants who had been in the country less than three years actually had better health outcomes than those who had been in the country for more than three years.

Differences between the Recently Arrived Group and the Earlier Arriving Group included the fact that the Recently Arrived Group was more educated, while the Earlier Arriving Group was older, and had a higher income, BMI, and CRP. Differences in the LDS population and the Catholic population included the fact that the LDS population was more educated, had a higher income, and attended religious services more frequently.

Implications

Some of the results of the current study support and are consistent with previous research (Rinderle & Montoya, 2008; Triandis, 1995). For example, in the current study, Social Support enjoyed a substantial relationship with Perceived Social Status among immigrants. This lends support to the growing body of evidence which indicates that Hispanics with a good social network perceive themselves as having high social status. Further, it supports the literature by suggesting that this relationship may hold true for those Hispanics who have immigrated to the US (Rinderle & Montoya, 2008; Triandis, 1995).

The hypothesis that stress would mediate a relationship between Perceived Social Status and health outcomes was also supported, although to a limited degree. As Perceived Social Status increased, both the number of calories consumed and results of the PHQ decreased, where lower scores on the PHQ represent better self-reported health. Although the indirect relationship between Perceived Social Status and Calories was small, it was significant and suggests that those with higher perceived social status may not experience high calorie consumption to the same degree as those with a lower perceived social status. The stress-mediated relationship between Perceived Social Status and the PHQ, on the other hand, is more substantial and

represented the greatest stress-mediated relationship between Perceived Social Status and a particular health outcome in the study.

It is worth noting that while no direct pathways were significant, two indirect (stress mediated) pathways were significant. This lends some support to the hypothesized idea that stress is, in fact, the mechanism through which poorer health is associated with perceived social status among Hispanic immigrants. It is also consistent with research that suggests that immigrants experience a degree of acculturation stress upon entering the country (Smart & Smart, 1995b; Williams & Berry, 1991). Acculturation stress may lead to greater calorie consumption among immigrants and, as noted above, poorer perceived health (PHQ).

However, other results of the current study are not consistent with and even contradicted previous research and study hypotheses (Adler et al., 1994; Ostrove et al. 2000). Three of the six indirect relationships between Perceived Social Status and health outcomes were insignificant, and measures of perceived social status could not be proven to better predict health outcomes than measures of objective social status. The current study indicated that higher perceived social status actually predicted higher systolic blood pressure when mediated through stress, although the size of the effect was very small (.03). This is particularly perplexing when considering that in the current study, Perceived Social Status has a significant inverse relationship with stress, and the fact that a positive relationship between stress and blood pressure is well established (Stansfield and Marmot, 2002).

Additionally, the multiple group comparison did not result in the hypothesized outcome. In contrast to the hypothesis, stress often predicted worse health outcomes for those immigrants who have been in the US longer than for those who have been in the US for less than three years. This trend holds true for each health outcome except blood pressure. Each of the four pathways

from stress to Calories, PHQ, CRP, and % Fat are positive and more substantial for the Earlier Arriving Group than they are for the Recently Arrived Group. Moreover, higher stress actually seems to predict lower blood pressure for each group, and better health in terms Calories, % fat, and CRP for the Recently Arrived Group. This was contrary to what would be expected given the research which maintains that stress is greatest during the first three years after immigration (Steffen et al., 2006). The only area in which higher stress predicted a worse overall health outcome for the Recently Arrived Group is represented in the Stress/PHQ relationship.

Of note is the fact the full model is more closely aligned with the profile for immigrants who have been in the US longer than three years, particularly with respect to the PHQ and Calories. The differences in regression weights between the two groups (the Recently Arrived Group and the Earlier Arriving Group) in the Stress/PHQ pathway and the Stress/Calories pathway represented the most substantial differences in regression weights between the two groups (.41 and .39, respectively). This is worth noting because the stress-mediated relationship between Perceived Social Status and both PHQ and Calories was significant in the full model. This would suggest that the significance of the relationships in the full model between Perceived Social Status and both PHQ and Calories may be accounted for largely by the group of immigrants who have lived in the US for longer than three years. Conversely, immigrants who have been in the US for less than three years do not appear to follow the pattern in the full model with respect to Stress/Calories and follow the full model with respect to Stress/PHQ to a much lesser degree than does the Earlier Arriving Group. Much of this correlation between the results in the full model and results of the Earlier Arriving Group, however, can be explained by the fact that the full model is made up of mostly immigrants who have been in the US for longer than

three years (256 participants in the Earlier Arriving Group) when compared to those who have been in the US for less than three years (56 participants in the Recently Arrived Group).

Overall, it seems that the most robust and consistent relationships in the current study are those having to do with *perceptions* of social status, stress, and health. All three measures associated with the stress-mediated relationship between Perceived Social Status and the PHQ are all subjective interpretations of status, which may help to explain some of the relationship. On the other hand, stress did not seem to mediate a relationship between Perceived Social Status and objective measures of health. It could be that while Perceived Social Status does not substantially predict worse objective health in this sample, Perceived Social Status may be related to subjective perceptions of stress and health.

Limitations and Alternative Explanations

There appear to be statistical limitations to the study. First, the fact that the mean was substituted for missing data among variables could have introduced error and changed results. Imputed means result in more leptokurtic distributions and possibly restricted variances and, consequently, have the potential to reduce the correlations between variables.

Exclusionary criteria for participants may have also led to the unexpected findings. Those on blood pressure medication were excluded from the study. This may have resulted in the fact that those who do have high blood pressure as a result of stress and low perceived social status were removed from the study, reducing potential effects and relationships between variables.

Other statistical limitations relate to operationalization of constructs. The construct of Stress did not appear to be a well-defined construct, as the observed variable Perceived Ethnic Discrimination (PEDQ) had factor loading of only .35 (see Table 2). Also, as noted above, the

factor loading for the observed variable Job Strain (.15) was smaller than that for the PEDQ and was removed from the study. These results were obtained despite the fact that both ethnic discrimination and job strain were established contributing factors to stress among Hispanic immigrants. Further, the endogenous variable Stress did not include other variables that had been linked to acculturation stress like language barriers and trying to understand and adapt to a new culture. As a result, “Stress” as defined in the current study may not accurately capture the acculturation stress and overall stress experienced by Hispanic immigrants. A similar argument that was made with respect to Stress and its respective factors can be made regarding the construct Social Support. Factor loadings for the exogenous variables ISEL (.61) and the SNI (.57), while not quite as poor as Job Strain and the PEDQ were for Stress, are less than ideal and suggest that the construct of Social Support may not be ideally defined.

Perhaps the greatest limitations in the study, however, relate to population demographics. First, the study population was limited to Mexican immigrants living in Utah. Mexican immigrants in Utah likely are not perfectly representative of the greater Hispanic immigrant population in the US. Additionally, the study population was likely overrepresented by members of the LDS church, who accounted for more than half of the study population. Members of the LDS church are asked to live by a prescribed health code and, by nature of the organization of the LDS church, often have a built-in social support system. For example, their general frequency of church attendance, and consequent exposure to a greater social network, may be different from other religions. Overall, a disproportionately high number of LDS participants in the sample would limit the generalizability of the results.

Some of the effects of having a larger LDS population are evident when the LDS population is compared to the Catholic population. The LDS participants were more educated,

had a higher income, and attended church more frequently. Inasmuch as these differences are also representative of differences between the current sample and the greater Hispanic immigrant population, the study will fail to be representative and generalizable.

Perhaps the greatest threat to generalizability in the sample, however, is the fact that the overall study population appears to be more educated than the overall Hispanic immigrant community, which might, consequently, result in greater acculturation. According to Betts and Lofstrum (1998), Hispanic immigrants have achieved an average of nine years of formal education. In the current sample, on the other hand, 77% of the population had finished high school and almost half had attended at least some college. The study population appears to be substantially more educated than a representative population of Hispanic immigrants. As Hispanic immigrants become more educated, they may become more acculturated and consequently may come to identify themselves more with a western culture, rendering them poor representatives of Hispanic immigrants. Ostrove et al. (2000) has pointed out that education is not associated with perceived social status for Hispanics, while it is associated with perceived social status for more western cultures. As a result, the more educated and, perhaps western, the study sample becomes, the more education will be associated with perceived social status and the less the study sample may be representative of Hispanics.

The same demographic factors that might have resulted in poor relationships among individual pathways could also help to explain why the proposed model resulted in a poorer overall fit than what was expected. The current study population may be sufficiently different from a representative Hispanic immigrant population in terms of age, religious observance, residence, and education. The overall model, however, was proposed to be valid for a representative Hispanic immigrant population. As a result, data taken from the study population

may not fit as well into a model that was theorized to represent relationships among a more representative Hispanic immigrant population.

There are differences between the Recently Arrived Group and the Earlier Arriving Group that may help to explain why the multiple group analysis did not render the hypothesized result. The Recently Arrived Group was generally younger than the Earlier Arriving Group, and may have been healthier to begin with as a result. This may be manifest in the BMI and CRP differences between the two groups, with BMI and CRP being higher for the older group (the Earlier Arriving Group). While the differences between the two groups in terms of BMI and CRP may not appear to be that large (difference in means of BMI was 2.27 and difference in means of CRP was 0.70), such effects when applied to a large population can signify meaningful health differences between the two groups. This suggests that the fact that Stress predicts poorer health outcomes in The Earlier Arriving Group, as opposed to what was predicted, may be the result of the fact that the two groups were not comparable in terms of health to begin with. Further, the Recently Arrived Group was more educated than the Earlier Arriving Group. This might have resulted in their being more acculturated and, consequently, not good representatives of typical Hispanic immigrants who have arrived in the US within the past three years.

On the other hand, it could be that less acculturation associated with the Recently Arrived Group results in better health outcomes. It could be that immigrants who have migrated more recently, have not yet acculturated to the US culture. As a result, those who have immigrated more recently may more closely resemble those living in a non-western culture where lower SES is associated with better health. Those who have been in the US longer, however, may consequently have a greater degree of acculturation. If they also have a lower SES when compared to others in the US, they may experience the more western relationship between SES

and health, and have poorer health outcomes. As a result, lower acculturation in the more recently arrived group results in better health than their more acculturated counterparts, despite experiencing greater stress.

Finally, it could be that among Hispanic immigrants, perceived social status does not predict objective health outcomes as much as it predicts perceptions of health. Among all the outcome variables, the PHQ is the most subjective among them. As noted above, the only relationship that was both significant and relatively substantial between Perceived Social Status and health outcomes was an indirect pathway between Perceived Social Status and the PHQ. This relationship was also stress-mediated, suggesting that stress plays a role in perceptions of health and status.

Future Directions and Conclusions

Future examinations of perceived social status, stress, and health among Hispanic immigrants should be careful to include, to the degree possible, a representative sample of immigrants. With reference to the current study, future studies should ensure that each group is religiously and educationally representative of the general Hispanic immigrant population. In addition, when comparing stress to outcome variables among recently arrived immigrants versus those who have been in the US for a longer time, again, recruiting the appropriate population may be the key. Samples that are more comparable in terms of age and, more importantly, general mean health may render results more in line with previous research.

In addition, future research should be sure that measures are operationalized appropriately for Hispanic immigrants. This would include appropriate measures of social support, and, perhaps more importantly, adequate measures acculturation stress. Measures of acculturation stress should include measures of general stress, as well as measure of stress

associated with their jobs, stress associated with finding a job, and stress associated with negotiating a new language and culture. Such measures would more fully and accurately account for the stress experienced by an immigrant to the US.

Future research may also pursue an examination of the relationship between education, acculturation, and perceived social status among Hispanic immigrants. Given the fact that, traditionally, education does not appear to be related to perceived social status for Hispanics, research that examines the degree to which education results in 'westernization' among Hispanic immigrants may be warranted. Research may then examine the degree to which education plays a role in perceived social status for this group of Hispanics, and if this, consequently, affects health outcomes. Research in this area may help to explain the unexpected findings in the current study that perceived social status was not directly related to health outcomes for a more educated Hispanic immigrant sample. It may also help to explore the fact that in the current study, stress predicted better health outcomes among more recently arrived, yet more educated immigrants.

Research could also investigate the relationships between a Hispanic immigrant's length of residence in US, degree of acculturation, and health. While it could be that more education leads to greater acculturation, it could also be that recently arrived immigrants are generally less acculturated than those who have been in the US longer by virtue of the fact that they have not been in US as long. This may be reflected in a non-western relationship between social status and health among more recently arrived immigrants, where lower SES is associated with greater health. Research could then investigate the degree to which acculturation, and consequent association with health outcomes, varies as a function of how long an immigrant has lived in the US.

The relationship between Perceived Social Status and the PHQ could be investigated further. As Perceived Social Status only seemed to be strongly associated with the PHQ, further research could investigate to which, if any, of the specific four domains contained in the PHQ (gastrointestinal problems, headaches, sleep disturbances, and respiratory illness) Perceived Social Status may be most strongly related. It could be that the stress associated with a low perceived social status results in poor sleep, for example. Further, as the PHQ is a subjective report of health, investigation into the relationship between perceived social status and *perceived* health may be warranted. Although the relationship between perceived social status and health has been established in some populations, the specifics of the interaction seem to be unique to each population. For Hispanic immigrants, it may be that *perceptions* of both social status and health are the most significant, and that this relationship was manifest in the current study in the Perceived Social Status/Stress/PHQ relationship.

In conclusion, results of the current study were mixed, but provide some avenues for future investigation. While, for the most part, hypotheses were not supported by the data, social support did predict perceived social status, supporting the idea that, for Hispanic immigrants, perceived social status is directly related to their social network. Also, stress mediated a modest relationship between perceived social status and a self-report measure of health, partially supporting the theory that stress mediates a relationship between perceived social status and health. A more representative population and better operationalization of stress may largely account for the fact that the results were different than what was hypothesized. Still, it could be that a different relationship exists between perceived social status and health among Hispanic immigrants or that education plays a more significant role in this relationship than previously thought. In either case, the current study provides ample opportunity for future investigation.

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