How Might Differences in Immigration Experiences for Men and Women Lead to
Gender Disparities in Functional Limitations for Older Mexican Immigrants in the U.S.?

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Abstract of Thesis

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A number of studies have shown that across all races and ethnicities women tend to have higher levels of functional limitations than men despite lower rates of mortality (Warner and Brown 2011; Solé-Auró et al. 2014). While several studies do incorporate Mexican-Americans and include nativity as a control, it is possible that Mexican-born immigrants' experiences differ from their U.S.-born counterparts in ways that may affect health later in life. Using longitudinal data from the Health and Retirement Study, this study investigates the factors that may account for differences in the strength and mobility limitations between older men and women who are Mexican immigrants living in the United States. These data indicate that socioeconomic status, chronic disease, and depressive symptoms serve as predictors for functional limitations later in life for Mexican-born men and women, and that each of these predictors serves as an explanation for differences in the functional status of these men and women. These findings extend research of gender disparities in morbidity by examining this subpopulation and highlight the importance of focusing on preventing comorbidities and depression, especially for women.

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Chapter 1: Introduction

A morbidity paradox exists between the health of women and men (Gorman and Read 2006). Though women generally live longer than men, women experience higher morbidity rates later in life (Bird and Rieker 2008). This morbidity paradox for men and women exists within each race and ethnicity in the U.S. (Warner and Brown 2011; Solé-Auró et al. 2014). In general, women tends to live more years with functional limitations (Warner and Brown 2011; Read and Gorman 2006), have higher rates of depression and anxiety disorders, and suffer non-fatal chronic health problems more often than men (Bird and Rieker 2008). By contrast, men tend to have higher rates of life-threatening diseases, substance abuse, and anti-social behavior disorders than women (Bird and Rieker 2008).

Using an intersectionality approach, Warner and Brown (2011) compared the functional status of white, black and Mexican-American men and women finding that women had significantly higher levels of functional limitations than men in the same racial or ethnic group and white men, who had the lowest levels of any gender and racial/ethnic group. Mexican-American women had the highest levels of functional limitations than any other group, while Mexican-American men had significantly higher levels of limitations than white men, but similar levels to black men. Their study defined functional limitations as the impairment of basic mobility, strength, and fine motor skills, such as walking two blocks, climbing a flight of stair, stooping, extending arms, lifting ten pounds, and so on.

The magnitude of the gender differences of functional limitations among older Mexican immigrants in the United States is less clear. Although studies examining the functional status of Mexican-American population often includes sex and nativity as

control variables, gender and nativity does not tend to be at the forefront of these studies. The experiences of Mexican-born immigrants in the United States may differ greatly from their U.S.-born counterparts in ways that may affect their functional health later in life. According to the fundamental causes perspectives, the social status associated with being an immigrant may expose this population to health disparities compared to their U.S.-born counterparts due to their differences in associated power, economic prestige, and social connections with advantaged groups (Link and Phelan 1995). In addition, the greater stressors Mexican-born immigrants experience as part of the immigration process and integration into American society may expose them to greater likelihood of disease that could increase the chance of developing functional limitations.

This study extends prior work on gender disparities in functional limitations by focusing on the subpopulation of Mexican immigrants, which is the largest immigrant group in the United States today (Pew Research Center 2015). As of 2013, there were 11.6 million Mexican immigrants in the U.S. While prior literature shows that Mexican immigrants overall tend to have lower mortality rates than other groups of similar socioeconomic status (i.e. the Hispanic Epidemiologic Paradox), these same advantages do not extend to the onset of functional limitations leading to prolonged periods of disabled life (Hayward et al. 2013). Due to the large size of the Mexican immigrant population in the United States, it is important to understand the functional limitations this group endures as they age due to its association with an individual's quality of life and its implications on the U.S. health system as a result of the higher medical expenditures required for treating functional impairments (Dunlop et al. 2007; Wakabayashi 2010).

One may expect that Mexican-born women experience greater levels of functional limitations than Mexican-born men, following patterns of other racial and ethnic groups. However, the context in which these differences exist may diverge from those of other subpopulations, particularly in the role the immigration process may affect the sexes differently. More specifically, the differing migration selection and motivates for Mexican men and women may contribute to greater levels of stress for women than men, exposing women to greater likelihood of disease and functional limitations later in life. In addition, women and men experience their transition in the U.S. differently, (Hill et al. 2012; Curran et al. 2006; Suárez-Orozco and Qin 2006) which could influence morbidity later in life.

For these reasons, this study asks two research questions focusing on what sort of attributes may explain differences in strength and mobility limitations in Mexican-born men and women based on the fundamental causes and stress process model perspectives. This study asks, "what role does socioeconomic status play in the differing levels of functional limitations for men and women who are Mexican immigrants?" Secondly, it asks "what role comorbidities, depression, and the attenuation of stress through social networks play in differences in functional limitations for Mexican-born men and women?"

Chapter 2: Literature Review

The Mexico-United States Migration Context

Changing migration patterns in the Mexico-United States migration context exemplifies the importance of bringing gender to the forefront of analysis on immigrant populations. Historically, male workers dominated the Mexico-U.S. migration pattern; however, as long-term settlement in the United States has become more likely, women have also made up a greater share of Mexican migrants (Cornelius 1992; Marcelli and Cornelius 2001). In 1985, 41 percent of documented Mexican immigrants to the U.S. were women; however, by 1995 women constituted 57 percent of documented Mexican immigrants to the U.S. (Cerrutti and Massey 2001).

Larger-scale migration between Mexico and the United States began with the creation of rail systems along the border around 1900 (Durand et al. 2001). With World War I, industrialist recruited Mexicans to replace southern and Eastern Europeans who then faced greater immigration restrictions (Durand et al. 2001). Studies on the 1920s immigration demographics indicate that migrant populations were diverse and comprised of single men, single women, children and entire families (Durand and Massey 1992). Migration from Mexico to the United States took a hiatus during the depression years of the 1930s (Durand and Massey 1992), but increased with the creation of a temporary worker program, the Bracero Program, as the result of agricultural labor shortages during World War II (Durand and Massey 1992; Donato 1993). Under the Bracero Accord of 1942, Mexicans were granted six-month renewable visas to work in the agriculture sector, mainly located in the southwestern portion of the U.S. (Durand et al. 2001). Approximately 4.6 million Mexicans entered the United States over the 22 years the program lasted; however, these estimates are expected to be low due to the flow of undocumented migration during this time period (Durand and Massey

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1992). The Bracero program created a migrant stream that was dominated by men (Durand and Massey 1992). Historically, Mexico to United States migration increased due to the demand for workers in the United States in jobs that were unstable, poorly paid, and had limited opportunities for advancement (Massey 1987).

Across time, men in their prime working years (between 18 and 34) dominate the Mexico-United States migration pattern (Durand et al. 2001). Men tend to follow their fathers, brothers, or uncles to the United States and maintained strong social ties with one another (Donato 1993; Massey 1987). Men also travel to the United States alone to find work relying on social contacts to reduce the costs of migration (Donato 1993). As men accumulated property and resources in the United States, women and children were integrated into the migration process (Donato 1993; Durand and Massey 1992). These established social networks of family members protect women who migrate and encouraged female migration (Donato 1993).

Cornelius (1992) notes a shift in the gender composition of migrants becoming more single women and whole families. Reason for this shift are believed to include: changing demand for migrant labor in year-round, nonagricultural positions; economic crisis in Mexico during the 1980s; changes in U.S. immigration laws which encourage women and dependent children to reunite with families; and maturing transnational migration networks, which strengthen incentive for permanent settlement (Marcelli and Cornelius 2001).

Long-term trends suggest that residents from Mexico's western states have dominated migration to the United States since the 1920s (Durand et al. 2001). The majority of immigrants overtime have come from rural or small communities, yet data suggests a bifurcation in migrant birthplaces between rural and city migrants (Durand et al. 2001). Durand et al. (2001) find that emigration from large metropolitan areas surged

between 1985 and 1989. With greater economic development, rural agricultural workers and urban factory workers have seen displacements and unemployment, which spur migration to the United States (Massey 1987). It is believed that the economic turmoil in Mexico, which caused many of its local manufacturing plants to close in the late 1980s due to opening its borders to foreign trade, has led to the increase of migration to the United States for urban men and women who are more likely to permanently settle in the United States (De La Rocha 2006). During this time, Mexican migrants came from more geographically diverse parts of Mexican including the Mexico City metropolitan area and the migrants tended to come with more skill (Marcelli and Cornelius 2001; Cornelius 1992). It should be noted, however, that during this time period, Mexico experienced greater urbanization, leading younger generations to be more likely to be born in an urbanized area (Durand et al 2001). Therefore, the apparent shift in the greater participation of urbanites in migration may also be attributed to the greater urbanization of Mexico (Durand et al. 2001).

Numerous studies focused on migrants' social class show that they tend to come from a diverse set of social classes in Mexico and does not fit a generalization (Durand and Massey 1992). Overtime Mexico has improved its educational attainment rates leading to increased education levels for migrants (Durand et al. 2001). However, Durand et al.'s (2001) analysis shows that migrants are less selected on education than they were in the past. In fact selection effects of migrants from the host population can play an important role in differing health disparities of Mexican immigrants later in life.

Healthy Migrant Effect & Migration Norms and Motivations

Differing selection mechanisms and migration norms and motivations may influence the long-term health outcomes for male and female Mexican immigrants. First, the healthy-migrant effect suggests that individuals in the origin population are selected

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to immigrate based on their relatively better physical and psychological health characteristics (Palloni and Arias 2004). The successful migrants tend to be healthier than those who do not migrate from the origin country's population and "may be healthier than the average individual in the receiving population" (Palloni and Arias 2004:388).

Studies suggest that women are less likely than men to be selected to migrate based on health (Read and Reynolds 2012; Gorman et al. 2010). These scholars base this on evidence showing that recent female immigrants to the United States generally have worse health than men (Gorman et al. 2010; Read and Gorman 2006).

Migration motivations and norms between men and women may contribute to this phenomenon (Read and Reynolds 2012; Gorman et al. 2010; Hill et al. 2012). Migration patterns from Mexico to the United States indicate that men tend to accompany their father and other male family members or immigrate independently to enter the labor force in the United States (Cerrutti and Massey 2001). By contrast, women are often considered associational migrants as they almost always follow their parents or spouse, which is more rare for men (Cerrutti and Massey 2001). Although labor market participation may occur for women after migration, the primary reason for migration tends to be for family reasons rather than work (Cerrutti and Massey 2001). However, Kanaiaupuni (2000) cautions that situations in which it appears women are making associational moves may actually have hidden economic motivations or women may be exposed to forces leading them to become participants in the labor force regardless of original motivations.

Due to the patriarchal relationships in Mexico, single women are less likely to migrate internationally on their own without a firm social network in place in the destination country. However, they do comprise a significant portion of internal

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migrants in Mexico (Curran and Rivero-Fuentes 2003). Normative, patriarchal relationships in Mexico tend to deny women the opportunity to migrate independently to the United States while supporting the migration of men by providing ample resources (Hondagenu-Sotelo 1992). Women are often perceived to face greater threats during the migration process and undergo greater control in their movements (Curran and Rivero-Fuentes 2003). Ethnographic research suggests that young, single women who migrate to the United States are encouraged by their older siblings to help care for their young children while both the mother and father are employed outside of the household (Marcelli and Cornelius 2001). However, some studies indicate that the economic crisis in the 1980s led to greater migration for women due to the lack of opportunity in Mexico (de la Rocha 2006 and Marcelli and Cornelius 2001).

Because of the demarcation of traditional male and female roles in the family unit, married women tend to delay migration until after the years of family formation (Kanaiaupuni 2000). Men tend to migrate due to the responsibility of fulfilling the economic needs of their marriage, children, and growing family (Kanaiaupuni 2000; Curran and Rivero-Fuentes 2003). By contrast, women are expected to raise children, care for them, and ensure they are educated (Kanaiaupuni 2000). As a result women tend to delay migration with their husbands due to the social stigma associated with migrating mothers and the difficulty of migrating with children (Kanaiaupuni 2000). Often times a split household migration strategy offers lower costs of living and raising children in Mexico, leading to the decision for women to stay in Mexico (Kanaiaupuni 2000). Findings indicate that the number of children in the household greatly reduces the odds of the mother migrating, but has no effect on the migration of men (Cerrutti and Massey 2001). However, marriage appears to reduce the odds of initial migration for men (Cerrutti and Massey 2001; Massey 1987).

The timing of migration for Mexican men and women also create a pathway for differences in health later in life. Men who immigrated in early-life are more likely to experience greater ADL limitations than men who immigrated in later-life (Wakabayashi 2010). One possible explanation is that lower education rates for early-life male immigrants may prevent men from accumulating the necessary economic and social resources to maintain a healthy life (Wakabayashi 2010).

Married women often migrate later in life for the first time to visit or help care for their grandchildren and relatives living elsewhere (Marcelli and Cornelius 2001; Kanaiaupuni 2000). Wakabayashi (2010) found that women who immigrated later in life (after the age of 34) saw greater disadvantages in ADL limitations. One reason for this may be due to the prolonged period in the origin country where the social status of women leaves them subordinate to men (Llacer et al. 2007). Women's health may be disadvantaged in the origin country due to lack of education, employment experience, limited access to health care services, and lower salaries (Llacer et al. 2007) despites gains in equality over time (Gorman et al. 2010). This prolonged period in the host country may lead them to be unable to accumulate the resources following their migration during later ages (Wakabayashi 2010).

Overall, the context of the Mexican-U.S. migration process differs greatly between men and women. These differences have major implications on the composition of the Mexican immigrant population in the United States. The evidence presented here and in the remainder of this chapter shows how differing experiences in the migration process and integration process in the U.S. could contribute to higher functional limitations for Mexican-born women than men later in life.

The Fundamental Causes Paradigm

The "fundamental causes" perspective explains that health disparities exist between races/ethnicities, gender, and socioeconomic groups due to their associated power, economic status, prestige, and beneficial social connections with advantaged groups (Link and Phelan 1995). These fundamental causes have a persistent effect on health despite changes in intervening mechanisms such as unhealthy behaviors (Link and Phelan 1995). According to this theoretical perspective, socioeconomic status (SES) may limit an individual's access to information regarding health risks and treatment (Link and Phelan 1995).

Socioeconomic status is commonly defined as income, education, and employment. Overall, lower measures of socioeconomic status, such as income and education, tend to be associated with higher levels of disability in older ages (see Rogers et al. 1992). Although each component of SES is linked, they each provide separate pathways to disability, which can differ by gender (see Keddie et al. 2004).

Income: Lower income levels may inhibit individuals from taking preventive action, seeking health care for chronic illnesses, and receiving treatment for illnesses, which over the lifespan may lead to greater risk of functional impairment. Overall higher incomes are associated with lower likelihood of the onset of functional limitations and impact the progression of disability with greater influence on improvement (Zimmer and House 2003).

Generally, Mexican immigrants are concentrated in low paying jobs that lack the opportunity for advancement, and both Mexican-born men and women's incomes tend to be low throughout the lifespan (Massey 1987). While migrants may accumulate greater resources with time spent in the United States, their low wages may continue to impact their opportunity to maintain healthy life styles, seek preventive health care, and

care for chronic illnesses once they begin. These lower incomes may put Mexican migrants at greater risk for functional limitations, and may further exacerbate their progression (see Zimmer and House 2003).

Overall women earn lower incomes than men over the life-course, despite a greater trend for their participation in the work force. Women who do participate in the labor force tend to have more absences from work or reduce work hours due to competing demands of work and family (Bird and Rieker 2008). This contributes to a reduced life-course SES for women due to historical differences in incomes between men and women and the women's pattern to take greater responsibility in caring for children and elderly parents (Bird and Rieker 2008). Due to the cultural emphasis on familism, Mexican-born women may be less opt to work outside of the home full-time. A familistic culture emphasizes the importance of the family and the needs of the collective over the individual (Bean et al. 1977; Raley et al. 2004). Moreover, while women reside in Mexico they may be less likely to obtain employment outside of the home due to the traditional gender norms where women are relegated to domestic duties (see Gorman et al. 2010). Despite these barriers to the labor force in Mexico, research indicates that most female Mexican immigrants tend to see higher rates of labor force participation in the United States compared to rates in Mexico (Cerrutti and Massey 2001).

Because women tend to marry older men and have greater life expectancies, their income in older ages may be more adversely affected (Bird and Rieker 2008). If the women are eligible for social security benefits they may see lower benefits than men due to their lifetime history of lower wages and hours worked and the necessity of relying on the benefit for longer periods of time due to their greater life expectancy (Bird and Rieker 2008). In addition, women often bare greater burdens of their spouse's health care cost leading to additional stress and impoverishment due to their longer life

expectancies and patterns of marrying older men (Bird and Rieker 2008). Overall, income throughout the life-course may impact the likelihood of the development of functional limitations later in life, leading those with lower incomes to be less able to prevent their onset.

Higher incomes and assets later in life may help reduce the progression of functional limitation by providing resources, such as access to treatment of chronic conditions. Mexican immigrants may see lower incomes during their retirement years due to the limited ability to accumulate retirement savings with the low paying jobs typically held by this population. Furthermore, to become eligible for social security benefits, immigrants must work in the United States for at least ten years. This may further reduce their incomes during years in which they are no longer physically able to work, inhibiting their opportunity to receive care to prevent the progression of functional limitations.

Education: The positive relationship between income and health varies significantly in strength and shape based on education levels (Bird and Rieker 2008; Schnittker 2004). Education tends to improve health; however, the effects of education on health are much greater at lower income groups (Schnittker 2004). Higher levels of education lower the risk of the onset of disability (Zimmer and House 2003) and are associated with greater likelihood for the individual to regain their abilities (Rogers et al. 1992).

Formal education may serve as direct pathway to reduce functional limitation through the greater ability to navigate the health care system and enables better health knowledge to prevent and control chronic conditions (Rogers et al. 1992; Link and Phelan 1995). Additionally education may increase opportunities for economic advancement granting an individual access to better health insurance and material

resources for taking care of one's body over time (Link and Phelan 1995; Rogers et al. 1992). Conversely, lower education levels overall may inhibit individuals from purchasing materials to maintain a healthy life style, seeking preventive health care, and caring for their chronic diseases, all of which overtime may lead to greater functional limitations.

Female immigrants from Mexico tend to be positively selected on education (see Donato and Kanaiaupuni 2000), while male immigrates are negatively selected on education since those with greater education have better job opportunities in Mexico than those less educated (Gorman et al. 2010; Kanaiaupuni 2000; Parrado and Flippen 2005). Because strict, traditional gender roles lead to gender discrimination in the labor markets in Mexico, more educated women may see incentives to migrate to the United States for participate in the labor force (Kanaiaupuni 2000). The higher education levels for these Mexican-born women may protect against health decline and disability later in life.

Opportunities that hinder education in early years may have profound effects on health later in life (Bird and Rieker 2008). The individuals' family background plays an important role in whether the individual was able to postpone employment to earn education (Bird and Rieker 2008). Socioeconomic status throughout the life-course may play an important role in functional limitations later in life (Bowen and Gonzalez 2010). In Bowen and Gonzalez's (2010) study, they found that childhood SES was associated with more severe ADL and IADL limitations later in life, which were mediated by adult SES and health behaviors. The lower education of the individuals' parents had greater effect on the risk of disability net of the adult health risk factors. Individuals who were unable to finish their education may over time see lower incomes both of which are associated with the greater risk of disability later in life. Individuals coming from poorer

families are exposed to a "chain of risks" (Ben-Shlomo and Kuh 2002) that lead to fewer opportunities of socioeconomic achievement in adulthood (Bowen and Gonzalez 2010).

Prior studies show that higher educational attainment is an important predictor of lower levels of functional limitations later in life. Because of the different selection mechanisms of Mexican immigrants to the United States, one may expect that differences in educational levels between men and women may impact their functional status as they age.

Employment: Mexican immigrants in the United States have relatively high employment rates (Larsen 2004). Most Mexican women are likely to work when they arrive to the United States regardless of their primary reason for migration (Cerrutti and Massey 2001; Hongdagneu-Sotelo 1994).

Mexican migrants tend to be actively recruited through migration streams for work that is shunned by United States natives (Massey 1987). These jobs positions are unstable with lower wages and limited opportunities for advancement (Massey 1987). The economic segmentation for these types of jobs leads employers to actively recruit for the positions through migration streams (Massey 1987). Historically male Mexican immigrants have been concentrated in physically demanding occupations such as construction and agriculture (Kochhar 2005), which may cause long-term musculoskeletal damage leading to greater disability rates (Hayward et al. 2013). In addition, these occupation types may expose individuals to environmental toxins, infectious disease, and greater risk of injury (Goldman et al. 2014). Women tend to work in the domestic or service industry. Similar to men, Mexican female immigrants employed in these industries experience greater risk of musculoskeletal damage (Hayward et al 2013), as well as greater risk of violence and sexual harassment due to the independent nature of their work (Llacer et al. 2007). It is possible that these types of

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occupations may lead to the earlier onset of functional limitations due to wear and tear on the musculoskeletal system (Hayward et al. 2013). Overall the type of employment for Mexican immigrants may lead to greater susceptibility to develop functional limitations as they age.

Reverse Causality in the SES-Health Relationship: It is possible that the relationship between socioeconomic status and functional limitations has reverse causation. More specifically, low income may lead to higher levels of functional limitations and higher levels of functional limitations may, in turn, lead to lower income due to the need to end employment. However, the likelihood of reverse causation varies between the measurements of SES. For instance, it is unlikely that the aging process impacts the completion of formal education during young adulthood (Keddie et al. 2004). In fact, it is more likely that the economic circumstances of the individual's family during his or her childhood influence the individuals' years of formal education.

Income is highly susceptible to reverse causation. For instance, the onset of functional limitations and poor health may reduce income due to early retirement (Gurland et al. 1998). Keddie et al. (2004) explain that for Mexican-American men lower income was associated with greater functional limitations. However, the onset of functional limitations for these men may have caused them to begin working part-time or turn to side jobs to supplement their income, leading to lower incomes (Keddie et al. 2004). Conversely, it could be that lower wages and the lack of benefits prevented these men from obtaining the appropriate health care to prevent functional limitations. Therefore, one should remain astute of the sensitivity of the relationship between income and health.

The Stress Process Model

Studies oriented in the stress paradigm have led to considerable evidence that stress mediates the association between the fundamental causes and disease (Link and Phelan 1995). The stress process model posits that social status exposes individuals to differing types and intensities of stressors (Matheson et al. 2006). According to the stress process model both life events and "life strains" (or chronic strains) may converge to produce psychological stress (Pearlin et al. 1981). Stressful life events and daily difficult conditions are believed to expose individuals to greater risk of mental disease (Pearlin et al. 1981; Turner et al. 1995). In turn, this ongoing stress leads to greater likelihood of developing chronic diseases (See Figure 1 for a path diagram depicting the stress process model.)

Figure 1: Path Diagram of the Stress Process Model
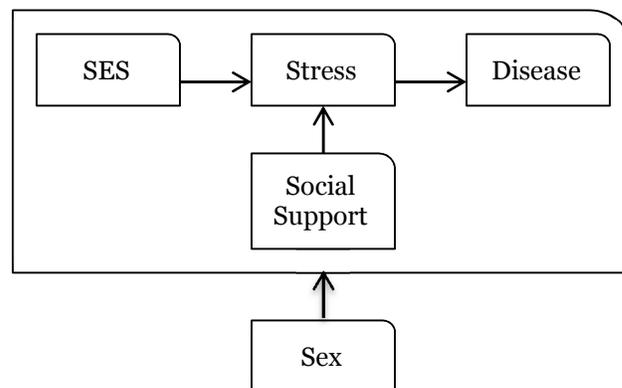
Chronic strains may relate to ongoing challenges due to one's socioeconomic status. These stressors occur due to one's lack of access to opportunity, material needs, and choices or alternatives (Matheson et al. 2006). In contrast to major life events, which are depicted as transitory, chronic strains have a re-occurring nature and develop slowly (Matheson et al. 2006). However, life events may intensify the existence of chronic stressors (Pearlin et al. 1981). Greater episodes of depression following life

events may occur due to the effect of the life event illuminating the continued chronic strain in the individual's life (Pearlin et al. 1981). In addition, life events may create a new interpretation to the individual's chronic strains (Pearlin et al. 1981). Thus both chronic strains and life events interact to produce greater psychological stress (Pearlin et al. 1981).

Because change is inevitable throughout the life cycle, it should be understood that the psychological effects of these changes is dependent upon the context in which they occur (Perlin et al. 1981). Prior work differentiates between the desirability, the degree of control of these life events, and whether these changes are an expected event in the life cycle (Pearlin et al. 1981). This becomes particularly important when applied to the migration context for Mexican men and women, particularly the lesser choice for women to migrate due to patriarchal norms in Mexican society and the expectation of migration for some Mexican men.

One should note that the causal link between stress and mental health may be reversed as mental health status may lead some individuals to interpret later events as more stressful (Turner et al. 1995). However, studies indicate that a substantial portion of this relationship is explained by the causal link from social stress to mental health status (Turner et al. 1995).

According to the stress process model, social support serves as a mechanism that mediates stress and its outcomes (Pearlin et al. 1981). The quality of the social support is particularly important in ameliorating stress (Pearlin et al. 1981). The added benefit of social support arrives when individuals have a social network in which they can rely upon and trust (Pearlin et al. 1981). Social support may come from family members, spouses, colleagues at one's place of employment, or friends (Pearlin et al. 1981).

The stress process model may be applied to the different immigrant experience for men and women to help explain the higher levels of morbidity experienced by Mexican women. A further discussion of the application of the stress process model and the pathway through which stress impacts functional limitations for Mexican immigrants follows.

This association between stress and mental health differs based on socioeconomic status, gender, and marital status (Turner et al. 1995). Prior studies indicate that lower social classes and women tend to experience higher levels of stress (Turner et al. 1995). Mexican-born women in the U.S. face a double disadvantage to the lower social status associated with being a woman and an immigrant (see Llacer et al. 2007). Turner et al. (1995) find that women tend to experience greater levels of current and ongoing stress than men. In addition, gender differences in mental health may arise from women's tendency to experience greater social stress resulting from others' life event due to their concerns of others (Turner et al. 1995). In turn this may, in part, drive women's tendency to experience greater depressive symptoms (Turner et al. 1995).

Throughout the migration process, individuals are exposed to a variety of short- and long-term stressors, which may differ by gender. Immigration can be considered a stressful life event for the individual migrating and adjusting to a new culture, as well as the family members who remain in the origin country. Ethnographic data shows that women who migrate following their spouses are typically excluded from the decision-making process, leading to greater stress attributed to feeling vulnerable and fearing infidelity, abandonment, or widowhood (Curretti and Massey 2001; Hondagneu-Sotelo 1994). Because women tend to migrate at later ages, their longer stay in a country where they have a lower social status than men may lead to prolonged stress in the country of origin (Llacer et al. 2007). Prior to migrating women may face chronic stress attributed

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to limited employment opportunities, lower salaries, and limited access to health care (see Llacer et al. 2007) all of which may lead to greater risk of disability later in life and greater psychological vulnerabilities (Bhugra 2004). Pre-migration stress for men may include a series of events related to the financial well-being of his family, which he is solely responsible for providing for due to the traditional gender norms in Mexico.

As men and women migrate, they may lose connections with their social network and feel a sense of loss of support (Bhugra 2004). Post-migration the individuals must deal with the stress of acculturation, discrimination in the destination country, and economic difficulties (Bhugra 2004). The acculturative stress hypothesis states that immigrants face discrimination and chronic stress due to their lower status in U.S. society (Goldman et al. 2014; Finch and Vega 2003). Immigrants face a series of stressors when migrating to the United States to include: limited English proficiency, weak ties to social institution, barred participation in welfare programs unless they are naturalized citizens, and limited or no work experience in the United States (Population Reference Bureau 2013). All of these stressors may inhibit immigrants from seeking health care (Population Reference Bureau 2013) and may lead to adverse health consequences.

Migration to the United States often redefines gender relations and social norms leading to greater independence and decision-making ability for women, while men often lose power and social status (Gorman et al. 2010; Parrado and Flippen 2005). Due to normative, patriarchal relationships between genders in the Mexican culture, these changes in gender role in the destination country may lead to greater stress for women, especially as they move from traditional homemaker roles to participating in the labor market (Llacer et al. 2007). Stark differences in gender relations between the two countries allow women to see improvements in gender inequality, while sometimes

leading to cases in which male-dominated authority is reinforced (Parrado and Flippen 2005). The stress associated with the transition of gender relations and roles is a determinant of poor mental health for immigrants (Llacer et al. 2007; Bhugra 2004).

Mexican-American women may experience greater stress associated with the cultural adherence of familism (Aranda et al. 2001). This places a disproportionate burden upon Mexican women, especially as they grow older (Aranda et al. 2001). The women are responsible for organizing the family members, caregiving for the youth and elderly, maintaining religious and cultural rituals, providing health care, and so forth (Aranda et al. 2001). Furthermore, stress may be even greater for those women who are employed outside of the home and continue their traditional sex-role of maintaining the home (Aranda et al. 2001). This dual-role, which often is associated with greater stress and health costs for women of all races and ethnicities, is further accentuated by Mexican-born women due to the emphasis of familism in their culture.

Stress has been linked to chronic diseases and illnesses to include heart disease, cancer, stroke, diabetes, and depression (Link and Phelan 1995). Chronic disease tends to be connected to the loss of mobility and greater functional limitations (Fried et al. 1999). Verbrugge and Jette's (1994) disablement process framework explains that disease is the main pathway for the development of functional limitations. According to this model, there are several types of risk factors that predispose individuals to functional limitations with the onset and progression of disease (Verbrugge and Jette 1994). These risk factors include social, life style, demographics, and behavioral characteristics that prompt chronic disease and its progression. Interventions can reduce the likelihood or progression of functional limitations through the introduction of medical assistance, life style and behavioral changes, and coping (Verbrugge and Jette 1994). Lastly, environmental conditions may exacerbate the progression of disease

leading to greater functional limitations. Examples of exacerbators may be side effects of drugs to treat disease, adoption of unhealthy behaviors and coping mechanisms, and things that inhibit participation in society (i.e. social prejudice against disabled).

Fried et al.'s (1999) study on women ages 65 and older found that chronic disease provided greater explanation for disability than age, education, and race. While chronic diseases tend to lead to certain forms of functional limitations, Markides et al. (1996) found that for Mexican-Americans ages 65 and older arthritis, cancer, stroke, heart attack, and hip fractures were each associated with at least two or more of the nine functional limitations measured when controlling for gender and age. Despite their mortality advantage, Mexican-Americans tend to have higher rates of diabetes, some cancers, and mental illness (Markides and Coreil 1986). Therefore, it may be expected that the development and progression of chronic disease mediate the association between stress and disability.

Social Support

Social support can protect against morbidity and mortality through a series of mechanisms, and may provide a pathway for mediating the relationship between stress and disease. Social support can ameliorate stress leading to better health outcomes (Finch and Vega 2003). Prior research indicates that inadequate social support is often associated with poorer health than individuals with adequate social support (Angel and Angel 1992). The absence of social ties to family and friends, and lack of involvement in a community may increase chance of mortality (see Bloom 1990). In fact, engagement in social activities is connected with slower decline in functional status over time (Unger et al. 1997).

Social support may be defined as emotional or instrumental. Prior studies show that emotional support is associated with lower levels of functional limitations and lower risk of mortality for older adults. (Everard et al. 1995). On the other hand, instrumental support, such as helping with day-to-day activities or errands, may be associated with increased functional limitations and mortality for older adults (Everard et al. 2000; Weinberger et al. 1990; Penninx et al. 1997).

As individuals immigrate they are confronted with the stress of an unfamiliar and potentially hostile environment, with limited supportive ties in the country of destination (Angel and Angel 1992). Therefore, immigrants are often at a higher risk of declining health to the extent that migration removes these important social ties (Angel and Angel 1992). Yet some factors may enable for the replacements of new supportive social ties decreasing the risk of poorer health outcomes (Angel and Angel 1992).

Social support (or strong social networks) may be a greater indicator of social capital or the ability to enhance knowledge of the health care system and preventive care (Finch and Vega 2003). Being married and having a support network of friends, family, or co-workers may all provide these types of social capital required for improving health outcomes. In addition, the social capital afforded to an individual through their social network may allow immigrants to transition more smoothly by obtaining information on housing and job opportunities (Hagan 1998).

Finally, strong social networks may protect against health decline by discouraging risky behaviors and violence (Gorman et al. 2010; Waite 2006). Social contacts may also encourage medical treatments and promote healthy behaviors, such as exercising or lowering alcohol intake (Bloom 1990). However, the composition of one's social network could impact health differently for men and women (Llacer et al. 2007). Because women tend to be more integrated in families during migration and

resettlement family ties may be protective against health decline attributed to acculturation (Gorman et al. 2010). On the other hand, it is believed that social networks made up of largely family members could be harmful to one's health due to social isolation from others outside of the extended family and the social control exerted to perform more traditional, domestic roles (Llacer et al. 2007; Grewal et al. 2005).

Marital Status: Marriage may serve as a resource and mechanism linking the "fundamental causes" and health outcomes. Marriage is believed to protect against functional limitations through two pathways: providing greater social support and improving one's socioeconomic status (Read and Gorman 2006). Research shows that those who are married have better physical and mental health, especially among those reporting satisfaction with their marriage (Rogers et al. 1992). Married individuals tend to exhibit fewer disabilities; however, it has become apparent that the association between marital status and disability varies by gender (Rogers et al. 1992). According to social support theory, married women experience worse health than married men due to traditional gender roles in the family where the woman provides support and care for ill family members, but receive less support in return (Rogers et al. 1992). This, however, was not supported by Rogers et al.'s (1992) study, which showed that generally married men are more likely than married women to have functional limitations and less likely to regain their ability. Marriage among Hispanic elderly also appears to reduce the risk of IADL limitations (Jones 2012).

Marriage may also increase socioeconomic status leading to the positive relationship between marriage and women's health (Lillard and Waite 1995). While married men may benefit more greatly from the social support, married women who generally have greater economic advantages compared to their unmarried counterparts may see a health advantage due to their greater access to health care and lower levels of

financial stress (Read and Gorman 2006; Meyer and Pavalko 1996). In contrast, those who are divorced, separated, widowed, or have never been married tend to have lower incomes, assets, and wealth which may hinder their ability to seek needed health care, nutritional food, and a safe home environment (Waite 1995).

Marital disruption either through divorce or the death of a spouse increases stress and leads to negative health behaviors (Waite 1995). The increase in negative health behaviors may be associated with the stress of the end of the marriage; however, it appears that it could be the "permanent consequences of being unmarried" (Waite 1995:488). Marriage may provide a sense of obligation to the spouse and social support in dealing with stress that inhibits risky behaviors and encourages healthy behaviors not found in unmarried or divorced individuals (Waite 1995).

One key question regarding the benefits of marriage is how much marriage selection contributes to these heath differences between married and unmarried individuals. A great number of researchers argue that the healthiest individuals are more likely to be selected into marriage, which may account for the apparent health advantages of married individuals (Waite 1995; Lillard and Panis 1996; Mastekaasa 1992). Health selection into marriage may occur due to the direct exclusion of mentally and physically ill individuals from the marriage pool or through a range of criteria individuals use to find a potential mate to include income, risk-taking behaviors, negative health behaviors such as smoking and excessive alcohol usage, and emotional stability (Goldman 1993). Despite this, studies have shown a consistent positive effect of marriage on well-being and the selection of psychologically health into marriage cannot fully explain the effect (Ross 1995). While selection into marriage may explain some of the apparent health advantages of marriages, it is possible that marriage does cause better health outcomes for the married than for single, widowed, or divorced individuals.

Employment: While employment is beneficial to health by providing a living income, employment is also important for fostering social ties to the community, serving as a form of social support (Gorman et al. 2010).

The separation of sexes in occupations (i.e. segmented labor market theory) may hinder Mexican-born women's ability to form social networks in comparison to men (Parrado and Flippen 2005). Because men often are working in construction or manual labor they are often in contact with other men both within and outside of their ethnicity (Parrado and Flippen 2005; Llacer et al. 2007; Bhugra and Becker 2005). By contrast, women tend to work independently in the domestic or service industries where there are fewer opportunities to forge social ties outside of the family (Parrado and Flippen 2005; Hagan 1998; Gilbertson 1995; Portes and Jensen 1989). Thus men often see greater benefits in the social networks than women. Men's connections to other ethnicities may help them to navigate their new environment better than women who have limited connections to individuals outside of their own ethnicity. In addition, men tend to see greater social networks due to greater involvement in church and recreational activities (Hagan 1998).

Female immigrants who are following a spouse or homemakers tend to be at greater risk for social isolation (Llacer et al. 2007). Generally, employed, Mexican-American women see a decreased risk of depression compared to their unemployed counterparts (Roberts and Roberts 1982; Rivera et a. 1997). According to the stress process model and disablement process frameworks, this increased risk of depression for unemployed women may lead to greater risks of chronic disease and eventually functional limitations.

However, the relationship between employment and mental health for Mexican-American women appears to be dependent upon marital status and having children in

the household. Working outside of the home benefited mental health for married, Mexican-American women who held the belief that employment status was compatible with women's proper role and had help with housework (Krause and Markides 1985). Working outside of the home was also beneficial psychologically for divorced and separated women; however, those who had small children at home had greater risk of negative mental health (Krause and Markides 1985). This may be attributed to stress due to role conflict women tend to experience between being employed outside of the home and being a mother and spouse in the home, which in the long-run may adversely impact physical and mental health (Bird and Rieker 2008:72).

Focusing upon the relationship between occupation type and functional limitations, Keddie et al. (2004) found that foreign-born, Mexican-American women who were homemakers for the majority of their lives were four times more likely to have ADL limitations than Mexican-born women who were employed in white-collar work. This finding may be connected to the higher prevalence rate of depression symptoms found among homemakers, which may accelerate disabilities (Keddie et al. 2004).

Chapter 3: Hypotheses, Data and Methods

Research Questions & Hypotheses

Prior research indicates that men tend to have less functional limitations as they age than women regardless of race or ethnicity (Warner and Brown 2011). The main focus of this research is to determine what factors may account for these differences between Mexican-born men and women in the U.S. The first research question is what role socioeconomic status plays in the different levels of mobility and strength limitations found between men and women who are Mexican immigrants. Socioeconomic status is a "fundamental cause" of health disparities. Prior research indicates that education and household income can function in separate pathways affecting one's functional limitations as they age, and that these relationships can differ by gender (Keddie et al. 2004).

Hypothesis 1: Overall, the first hypothesis is that lower levels of socioeconomic status will lead to greater levels of functional limitations over time.

> *Hypothesis 1a:* Over time one would expect those with lower levels of education to see higher levels of functional limitations. Mexican immigrant men tend to have lower levels of education due to migration norms that lead them to migrate earlier in life (Gorman et al. 2010; Kanaiaupuni 2000). Their lower levels of education may lead to the earlier onset and progression of functional limitations as they age. By contrast, one might expect that Mexican-born women, who tend to have higher levels of education (see Donato and Kanaiaupuni 2000), may see later onset of functional limitations and potentially slower progressions as they as they age.

Hypothesis 1b: Generally, one may expect that lower household income may increase the likelihood of functional limitations due to one's inability to access health care resources that could prevent their onset or limit their progression throughout the aging process. Because of women's lower mortality and their likelihood to marry older men, their household income may be reduced later in life (Bird and Rieker 2008), leading to the greater likelihood of a higher number of functional limitations as they age.

The second research question is what role stress and the potential attenuation of stress through social networks plays in the differences of functional limitation between Mexican-born men and women. According to the stress process model, prolonged periods of stress is linked to chronic disease and illnesses. These higher levels of chronic disease may, in turn, lead to a higher number of functional limitations as Mexican-born women age. However, social support may serve as a way to ameliorate stress leading to better health outcomes, whereas inadequate social support has been connected to poorer health (Angel and Angel 1992). Figure 2 is a path diagram of the variables discussed in the hypotheses and their expected pathway for influencing functional limitations.

Hypothesis 2a: According to the stress process model, functional limitations may be higher among those with a higher number of comorbidities and depressive symptoms. Women, more than men, are found to have a higher number of comorbidities and elevated levels of depressive symptoms. This means that different levels of functional limitations between Mexican-born men and women may be attributed to differing levels of comorbidities and depression.

Hypothesis 2b: Greater levels of social support may help to better protect against functional limitations. Therefore, it is expected that functional limitations may be lower among men and women who have social networks within their

neighborhoods or are married. However, prior research indicates that female immigrants are less likely to maintain social networks that would ameliorate stress (Llacer et al. 2007). Women are also more likely to be widows in their older age than men due to mortality differences. Therefore, it may be expected that differing levels of social support between Mexican-born men and women may contribute to the greater levels of functional limitations for Mexican immigrant women over men.

Figure 2: Path Diagram of Hypotheses
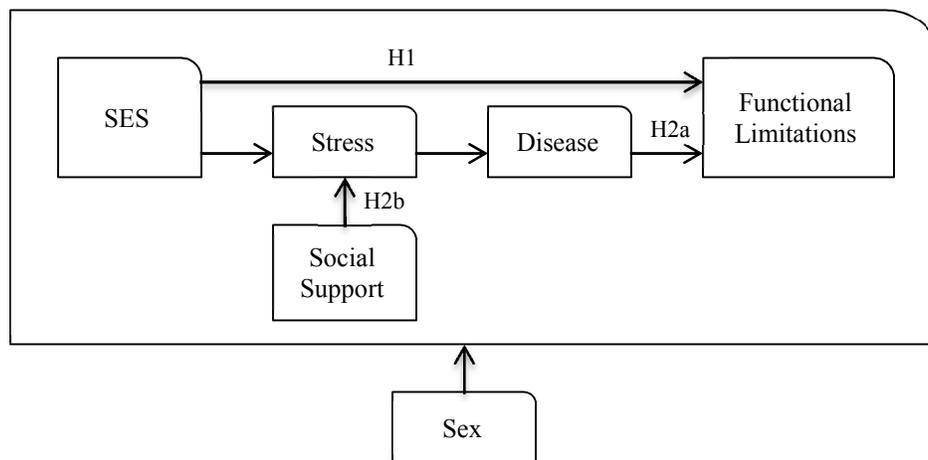
Data

This study uses the 2002, 2004, 2006, 2008, 2010, and 2012 waves of the Health and Retirement Study (HRS). HRS is sponsored by the National Institute on Aging and is conducted by the University of Michigan. For this study, the RAND HRS public-use data file was used.[1] HRS is a nationally representative panel study for non-institutionalized adults over the age of 50. The survey contains oversamples for blacks and Hispanics at a 2-to-1 rate relative to whites (Health and Retirement Study 2008). Bilingual interviewers

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[1] The RAND HRS Data file is an easy to use longitudinal data set based on the HRS data. It was developed at RAND with funding from the National Institute on Aging and the Social Security Administration.

administered the survey questionnaires to ensure Spanish-speaking respondents were able to participate.

HRS was originally designed to track individuals between the ages of 51 and 61 and their spouses as they transitioned from working age to retirement age to collect information about retirement decisions (HRS 2008). In 1998, the Assets and Health Dynamics of the Oldest Old (AHEAD) sample was fully integrated with HRS to maintain a dataset that is nationally representative of the entire U.S. population over the age of 50 (HRS 2008). AHEAD originally tracked the 'interactions between health, family, and economic variables' for individuals who were ages 70 and older in 1993 (born prior to 1924) (HRS 2008). Prior to the merge, HRS collected three waves of data: 1992, 1994, and 1996, while AHEAD contained two waves: 1993 and 1995 (HRS 2008).

To ensure the dataset was representative of the entire population over the age of 50, this study does not use waves until after the AHEAD sample was merged with the HRS sample. Also, because the question wording for some of the independent variables remained more consistent after 2000, the decision was made to use 2002 thru 2012.

HRS conducts interviews with each respondent biannually adding a new cohort every six years. Because new cohorts were not added until 2004, the 2002 survey data is representative of those 55 and older, and as of 2006 the entire dataset is representative of those over the age of 50 (HRS 2011). In 1992, 12,652 individuals (including spouses) were interviewed with an overall response rate of 81.6% (HRS 2011). The first wave for the AHEAD study in 1993 had a total of 8,222 respondents and a response rate of 80.4%. In subsequent years, the response rate varies from 87.6% (for HRS 2004) to 88.9% (for HRS 2006).

Attrition remains a concern for all panel data, and with a panel focused on older individuals and health disparities attrition rates may become more concerning. Throughout the survey periods used, 60% of the sample missed at least one interview for reasons other than death and 6% died during observation.

Measures

Functional Limitations: This study incorporates a series of measures aimed at assessing mobility, strength, and fine motor skill functional limitations that are caused by a health problem. Studies on functional limitations often include measures of basic activities of daily living (ADLs) and instrumental activities of daily living (IADLs). In contrast, this study focuses on mobility because ADLs and IADLs tend to measure more severe forms of impairment, which are rarer among the mixture of young and old in the Health and Retirement Study (see Haas 2008). Through rigorous analysis HRS staff determined that people typically loose their mobility, strength, and fine motor skills prior to loosing the ability to do ADLs or IADLs (Fonda and Herzog 2004). Therefore, this study will look at the onset and progression of functional limitations in mobility and strength. Measures for mobility and strength functional limitations include: walking several blocks, sitting for two hours, getting up from chair, climbing several flights of stairs, stooping/kneeling/crouching, reaching or extending arms, pulling or pushing large objects, lifting weights or things over 10lbs, or picking up a dime. For analysis, a count variable was created ranging from 0 to 9.

Socioeconomic Status

Educational Attainment: Education is measured in the years of schooling ranging from 0 to 17. For analysis and interpretation, the respondent's educational

attainment has been centered so that 0 indicates 12 years of schooling (or the completion of high school).

Household Income: Household income is based on the calendar year prior to the interview date. RAND calculated the total household income based on components of income asked about in the HRS survey and basing their calculations on the Census definition of household income. These components of income include earnings, pensions, social security, and Supplemental Security Income (SSI). The variable used here includes the income of institutionalized members of the household. Even though the individual is not residing in the household, it remains possible that the members of their family may be benefiting from this income or using it to support themselves. RAND has imputed incomes for missing values for each of the components of income (See RAND HRS Data Documentation, Version O). Household income was adjusted in each of the panel waves to 2012 dollars. Household income is a continuous variable.

Employment: A dummy variable captures if the respondent is in the labor force (=1) or not (=0). If the respondent is working full-time or part-time or say they are unemployed, they are considered to be in the labor force.

Chronic Disease/Stress Process

Comorbidities: A count variable is used to indicate the number of comorbidities the individual has. The questions ask whether a doctor has ever told the respondent that he or she has had the following eight diseases: high blood pressure, diabetes, cancer, lung disease, heart problem (heart attack, coronary heart disease, angina, congestive failure, or other heart problems), stroke, psychiatric problems, or arthritis.

Lagged Depression: The Center for Epidemiologic Studies Depression Scale (CES-D) is used to account for the impact of depression on functional limitations. The

scale is a combination of six negative indicators minus two positive indicators. The negative indicators are a combination of whether the individual experiences the following sentiments all the time or most of the time in the week prior to the survey: depression, everything is an effort, sleep is restless, felt alone, felt sadness, and could not get going. The positive indicators are whether the individual felt happy and enjoyed life all or most of the time. The higher the number of the scale, the more negative responses the respondent gave about the past week. This variable is lagged to determine the effect of the prior period's depression measure on functional limitations.

Social Support

Because different forms of social networks have been linked to different patterns of health outcomes (see Grewal et al. 2005), this study includes three variables to serve as measures of social support: marital status, presence of friends in the neighborhood, and presence of relatives in the neighborhood. While marital status has often been used to examine health disparities, the other two measures are somewhat new. Recent studies, including Luo et al. (2012) and Wakabayashi (2010), have incorporated these measures to examine disparities in morbidity and mortality in older populations.

Marital status: Marital status is composed by a series of dummy variables for separated, divorced, widowed, or never married. Never married serves as the reference category. Marital status is self-reported. At the start of an interview for each new wave, the respondent is asked whether their marital status remains the same as the previous wave's through a series of questions.

Friends living in the neighborhood: Respondents are asked if they have any good friends living in their neighborhood. A dummy variable captures whether respondents do have good friends in their neighborhood (=1) or not (=0).

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Relatives in the neighborhood: Respondents were also asked if they have any relatives living in their neighborhood (besides the people who live in their household). A dummy variable captures whether respondents do have any relatives in their neighborhood (=1) or not (=0).

Covariates

The models include several control variables for immigrant demographics and experience, health behaviors, health insurance status, and panel attrition, which may contribute to the differential functional limitations risks for Mexican-born men and women.

Demographics & Immigrant Experience: This study includes several demographic and immigrant experience variables known to influence health and well-being in the United States. Measures of acculturation, such as age at migration and English proficiency, may dictate whether an immigrant is able to achieve a certain social status and what type of resources are available to support a member of society throughout life. For this reason, the following two variables are included as covariates in the models.

Age at migration: Age at migration is a continuous variable in the model. The survey asked respondents what year they came to the U.S., what age they were when they came to the U.S., or how many years ago they first came to the U.S. if the respondent said they were born in a country outside of the U.S. or did not respond to the question about their country of birth. These answer were merged in a HRS file to report the estimated year of immigration. The year of immigration was subtracted from the year of birth of the respondent to estimate the age the respondent arrived to the U.S.

English Proficiency: The interview language serves as a proxy measure for English proficiency. Because the interview was administered in English and Spanish, it

may be assumed that taking the survey in English indicates a certain level of assimilation to the English language. Likewise, taking it in Spanish shows greater comfort with this language and less comfort with the English language. If the respondent took the survey in English at any point in the panel, the respondent was considered proficient (=1).

Health-related behaviors*:* Three dummy variables are included as indicators for health-related behaviors expected to be risks for poor health and limitations: alcohol usage, smoking, and obesity.

Alcohol usage: This dummy variable captures if the respondent consumes more than 3 alcoholic beverages per day when they do drink (=1). If the respondent does not drink or drinks 3 or less alcoholic beverages on day when they drink this is coded as 0.

Ever smoked: A dummy variable capture if the respondent has ever smoked (=1) or has never smoked (=0).

Obesity: If the respondent's Body Mass Index (BMI) is above 30, this dummy variable is coded 1.

Health Insurance*:* The analysis contains a dummy variable of ever uninsured (=1) indicating that the respondent did not have any kind of insurance for the duration of the panel waves used.

Panel Attrition*:* Attrition remains a concern for any longitudinal panel. However, when studying health disparities, nonrandom attrition due to mortality becomes a particular concern (Warner and Brown; Liang et al. 2008). Following methods used in prior studies, these models include indicators for attrition that is "mortal" (respondent died) and "non-mortal" (missing occasions) (see Warner and Brown 2011). By controlling for attrition in this way, the conditions required to treat the missingness of data as random are fulfilled (Warner and Brown 2011).

Died during observation: Because panel attrition due to death may also be related to gender differences in mortality rates, a dummy variable captures whether the respondent died during the course of observations (=1).

Measurement Occasions: A count variable indicates the number of occasions for the respondents. This variable can range from 1 to 6 for the sample.

Methods

I estimate age-based trajectories using a random coefficient growth curve model using the maximum likelihood technique. Multilevel models allow one to examine how (1) an outcome changes within an individual over time and (2) the interindividual differences of these changes over time and what predicts these differences. This method has been used in a variety of other studies examining disparities in health trajectories (see Warner and Brown; Herd 2006; and Liang et al. 2008 for examples).

While the outcome variable is a count and violates the normality assumption, sensitive analysis showed similar results when specifying a poisson-regression, suggesting the relationship is not sensitive to the normality assumption. Therefore, the count variable is used here uses the maximum likelihood technique.

The level 1 equation, or the individual growth model, examines the relationship between the change in functional limitations and time, capturing how functional limitations for individuals change over time. In this analysis, I use age at the survey date as a proxy for time. Auxiliary analysis (not shown here) indicates that this relationship is best fitted as a linear function. The level 1 equation is as follows:

$$Y_{ij} = \pi_{0i} + \pi_{1i}Age_{ij} + \Sigma \pi_{ki}X_{kij} + \varepsilon_{ij}$$

where Y_{ij} is the number of functional limitations for individual i at time j; π_{0i} is the intercept of the functional limitations for individual i; Age_{ij} is the age of the individual centered on 51, the lowest age the respondent could be in the panel; π_{1i} is the rate of change (slope) for functional limitations for individual i over time; and X_{kij} are the time-varying predictors such as household income, comorbidities, lagged CES-D score, employment status, and marital status and their corresponding change terms associated with individual i at time j; π_{ki} represents the effect of X_k on individual i's functional status; and ε_{ij} is the random error in functional limitations for individual i at time j.

The level 2 equation captures how these changes in functional limitations differ by gender and time-invariant predictors such as education level, uninsured status, age of migration and English proficiency.

$$\pi_{0i} = \gamma_{00} + \gamma_{01}GENDER_i + \Sigma\, \gamma_{02}X_i + \zeta_{0i}$$

$$\pi_{1i} = \gamma_{10} + \gamma_{11}GENDER_i + \zeta_{1i}$$

where π_{0i}, the initial level of functional limitations for individual i is the product of γ_{00} (the population-average level of function limitations); γ_{01} the differences in the average level of functional limitation for men and women; γ_{02} is the differences of a vector of time-invariant, person-level predictors, such as education, uninsured, age of migration and English proficiency (X_i); and a random error term for the values of each person's growth parameters around the population's average, ζ_{0i}. π_{1i} is the rate of change which is the product of γ_{10} is the average rate of change for functional limitations; γ_{11} is the difference in the average rate of change in functional limitations for men and women; and ζ_{1i} is a the deviation of individual i from average rates of change.

Model 1 examines whether a difference in functional limitations between Mexican immigrant men and women does exist and the trajectory of functional

limitations with age. Model 2 tests hypothesis 1 (a and b), examining the role socioeconomic status plays in the differences of functional health trajectories of Mexican-born men and women. Model 3 tests hypotheses 2a and 2b by incorporating measures of comorbidities, lagged depression, and social support. Finally, Model 4 incorporates the measures of socioeconomic status, comorbidities, lagged depression and social support to test the combined effects on the trajectories of functional status for Mexican-born men and women. All of the models contain the control variables.

Chapter 4: Results

Bivariate Gender Differences

Table 1 shows the means of each of the variables used in this study for Mexican immigrant men and women. Across each of the panel waves there are statistical differences in the average number of functional limitations that Mexican immigrant men and women had. For example, in 2002 Mexican-born women ages 51 and older have an average of 3.72 functional limitations, while Mexican-born men have 2.62.

Mexican-born men and women also significantly differ across a series of socioeconomic, health-related, and social support variables. Mexican-born women are less likely to be in the labor force than men across all of the survey years. As expected, Mexican-born women have a higher number of comorbidities on average and higher lagged CES-D scores than Mexican-born men. Mexican-born women are also more likely to be widowed and less likely to be married than Mexican-born men. Finally, lower shares of Mexican-born women had ever smoked or are considered to be heavy drinkers.

Gender Differences in Functional Health Trajectories

Table 2 presents the estimates from the growth curve model of functional limitations. Model 1 estimates the differences in initial functional limitation between Mexican-born men and women and the differences in the rate of change between these two groups while controlling for immigration experience, health-related behaviors, insurance status, and panel attrition. Overall the model shows that the initial average number of functional limitations is 0.4 for men at age 51 and the average for Mexican-born women is 1.7. In addition, functional limitations increase over time, with a linear slope of 0.07. This model accounts for differences in the rate of change for Mexican immigrant men and women as they grow older. However, this model indicates that there

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Table 1: Means (Standard Deviations) for Variables By Gender

	2002		2004		2006		2008		2010		2012	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Mobility	2.62	3.72 *	1.89	3.72 *	2.06	3.94 *	1.93	3.70 *	2.10	4.02 *	1.88	3.22*
	(.30)	(.15)	(.20)	(.17)	(.20)	(.17)	(.18)	(.12)	(.26)	(.24)	(.19)	(.20)
Socioeconomic Status												
Years of education	5.68	4.95	6.42	5.73	6.62	5.73	6.50	5.80	6.32	5.52	7.08	6.33
	(.78)	(.28)	(.49)	(.33)	(.62)	(.38)	(.68)	(.43)	(.73)	(.49)	(.60)	(.38)
Income (ln)	10.25	10.13	10.41	10.34	10.35	10.25	10.45	10.14*	10.27	10.10 *	10.07	9.93
	(.17)	(.08)	(.14)	(.11)	(.10)	(.09)	(.11)	(.09)	(.11)	(.09)	(.16)	(.19)
In the labor force	0.51	0.19*	0.58	0.31*	0.54	0.24*	0.58	0.27*	0.5	0.28*	0.61	0.41*
Stress Process												
Comorbidities	1.53	2.05 *	1.14	1.87*	1.23	2.00*	1.34	2.05*	1.60	2.31*	1.35	1.91*
	(.13)	(.14)	(.14)	(.12)	(.13)	(.16)	(.07)	(.15)	(.11)	(.15)	(.07)	(.09)
CES-D score	1.78	2.78*	1.64	2.78*	1.88	2.76*	1.64	2.36*	1.46	2.70*	1.66	2.30*
	(.20)	(.35)	(.14)	(.27)	(.16)	(.22)	(.16)	(.19)	(.13)	(.21)	(.20)	(.17)
Social Support												
Marital Status												
Married	0.80	0.63*	0.81	0.65*	0.81	0.64*	0.83	0.62*	0.85	0.62*	0.84	0.64*
Separated	0.07	0.04	0.08	0.05	0.07	0.04	0.06	0.05	0.05	0.05	0.05	0.04
Divorced	0.06	0.08	0.04	0.09	0.03	0.06	0.04	0.06	0.04	0.05	0.06	0.08
Widowed	0.06	0.24*	0.05	0.17*	0.06	0.2*	0.04	0.21*	0.03	0.24*	0.01	0.17*
Never married	0.02	0.01	0.02	0.04	0.03	0.05	0.03	0.06	0.04	0.04	0.03	0.07
Friends in neighborhood	0.71	0.77	0.64	0.63	0.52	0.61	0.6	0.61	0.64	0.66	0.47	0.56
Relatives in neighborhood	0.37	0.27	0.28	0.19	0.19	0.24	0.24	0.20	0.3	0.18*	0.20	0.17
Controls												
Immigrant Experience												
Age at migration	26.38	28.35	25.56	27.05	24.60	27.34	24.95	27.03	25.54	26.45	24.92	27.32
	(1.85)	(2.29)	(1.08)	(1.33)	(0.96)	(1.38)	(1.01)	(1.38)	(1.29)	(2.02)	(1.17)	(1.30)
English Proficiency	0.20	0.22	0.25	0.21	0.27	0.21	0.27	0.20	0.30	0.23	0.21	0.19
Health-related Behaviors												
Obese	0.34	0.59	0.38	0.40	0.30	0.40	0.33	0.43*	0.36	0.41	0.44	0.50
Ever smoked	0.72	0.34*	0.7	0.29*	0.73	0.28*	0.68	0.31*	0.65	0.33*	0.64	0.32*
Heavy drinker	0.17	0.01*	0.14	0.01*	0.14	0.01*	0.15	0.03*	0.19	0.01*	0.28	0.03*
Ever Uninsured	0.95	0.92	0.88	0.88	0.88	0.87	0.87	0.88	0.84	0.87	0.83	0.84
Panel Attrition												
Died during observation	0.16	0.1	0.14	0.07	0.11	0.06	0.08	0.05	0.04	0.01	-	-
Measurement occasions	5.50	5.65	4.79	5.22*	5.15	5.34	5.20	5.36	5.56	5.64	3.33	3.72
	(.08)	(.08)	(.13)	(.16)	(.12)	(.11)	(.13)	(.13)	(.08)	(.07)	(.22)	(.34)
N	88	126	161	205	149	191	148	189	127	187	329	386

* indicates a statistical difference (p<0.05) between the average for men and women in each year using a t-test.
Source: Health and Retirement Study, 2002-2012

is no statistically difference between the age trajectories of men and women – a finding that remains robust throughout all of the models.

Socioeconomic Differences in Functional Health Trajectories for Men and Women

Model 2 estimates differences in functional status for Mexican-born men and women while accounting for socioeconomic status and the control variables. Consistent with the fundamental causes paradigm, the measures of socioeconomic status are strong predictors of functional limitations.

Comparing Models 1 and 2, the magnitude of the differences between the functional statuses of Mexican-born men and women decreases, but remains statistically significant. This indicates that other factors beyond socioeconomic status and the control variables may account for the differences seen in men and women's functional statuses. At age 51, on average, Mexican-born men have 3.03 functional limitations, while Mexican-born women have 3.89 when controlling for SES and the control variables.

One additional year of schooling after high school, decreases the initial functional status by 0.07. Likewise, a unit increase in log income decreases the initial functional status by 0.12. Labor force participation is the strongest predictor of functional limitations; however, it is possible that reverse causation may be responsible for this strong association. Individuals who have less functional impairments may be more likely to be working than those that have several limitations or any at all. However, labor force participation does lower the initial functional limitations by 1.1.

Table 2: Trajectories of Functional Limitations Among Older Mexican Immigrants: Random Coefficient Growth Curve Models

	Model 1	Model 2	Model 3	Model 4
Fixed Effects				
Intercept	0.43	3.03***	0.64	2.93***
Women[a]	1.26***	0.86***	0.70**	0.48*
Age	0.07***	0.03**	0.03**	0.01
Women x age	0.00	0.01	0.00	0.01
Socioeconomic Status				
Years of education		-0.07***		-0.06**
Income (ln)		-0.12**		-0.12*
In the labor force		-1.10***		-0.99***
Stress Process				
Comorbidities			0.56***	0.50***
CESD score (lagged)			0.19***	0.18***
Social support				
Marital status (never married)				
Married			-0.60	-0.54
Divorced			-0.46	-0.41
Separated			-0.35	-0.30
Widowed			-0.61	-0.56
Friends in neighborhood			-0.15	-0.14
Relatives in neighborhood			0.01	0.02
Controls				
Immigrant Experience				
Age at migration	-0.01	-0.01	0.00	0.00
English Proficient	-0.36	-0.03	-0.12	0.13
Health-related behaviors				
Obese	0.22*	0.24*	0.24*	0.22*
Ever smoked	0.19	0.01	-0.01	-0.04
Heavy drinker	-0.26	-0.13	-0.26	-0.15
Ever uninsured	0.70**	0.26	0.53*	0.15
Panel attrition				
Died during observation	1.18***	0.88**	0.86**	0.63*
Measurement occasions	0.08	0.02	0.05	0.00
Variance Components				
Level 1 Residual (ε_{ij})	4.07*	3.23*	2.55*	1.97*
Level 2 Intercept (ζ_{0i})	2.51*	2.61*	2.55*	2.49*
Level 2 Age (ζ_{1i})	0.01*	0.00*	0.00	0.00*
Covariance	-0.05	-0.03	-0.00	0.01
Log Likelihood	-6852.26	-5604.72	-4310.89	-4136.71

*p<0.05, **p<0.01, ***p<0.001.
a..Men serve as the reference group
Source: Health and Retirement Study, 2002-2012

The Role of Chronic Disease, Depression and Social Support on Functional Health Trajectories

Findings from Model 3 show that comorbidities and lagged depression symptoms serve as strong predictors for functional status over time. However, the difference in functional limitations for Mexican-born men and women remain statistically significant, meaning that over time there are other important factors in predicting impairment.

Conversely, social support factors including marital status and friend or relatives in the neighborhood are not significant predictors of functional limitations. In supplementary analysis, the reference group for marital status was rotated and regardless of the reference group, the relationship between marital status and functional limitations over time remained statistically insignificant.

Combined Effects of SES, Comorbidities, Depression and Social Support

In the final model, even after adjusting for SES, comorbidities, depression symptoms and social support, the gender differences in functional status over time remain statistically significant, although it is attenuated (see decrease in the size of the coefficient for women from Model 1 to Model 4 in Table 2). At age 51, Mexican-born women on average had 3.42 functional limitations compared with Mexican-born men who had 2.94.

Overall, comorbidities and lagged depression symptoms remain to be the strongest predictor for higher levels of functional limitations over time. A rise in the number of comorbidities is associated with 0.50 more functional limitations over time. Likewise, one unit rise in the CES-D score leads to 0.18 more functional limitations on average.

By contrast, higher levels of education, income and labor force participation were associated with lower level of functional limitations over time. Another year of education beyond high school is associated with a lower initial status of functional limitations by 0.06, on average. Likewise, one unit more of log income is associated with a decline of functional limitations by 0.12 over time. Finally, participation in the labor force is associated with 1.00 lower level of functional limitations on average.

Chapter 5: Discussion

Using longitudinal data, this study examines the role that socioeconomic status, stress, and social support play in explaining differences in functional limitations between older men and women who are Mexican immigrants. Overall these findings provide support that fundamental causes, chronic disease and mental health all serve as predictors for functional limitations later in life and serve as an explanation for differences in the functional status for men and women. This study adds to a long line of research on the effects of socioeconomic status and health-related predictors of functional limitations. However it contributes by its focus on how these factors play a role in explaining the functional status of Mexican-born men and women in the U.S.

Overall, these findings support the first set of hypotheses (1a and 1b), which were that higher levels of education and income would protect against the onset and progression of functional limitations. The differences for Mexican-born men and women are attenuated after controlling for education, household income, and labor force participation, indicating that socioeconomic status remains a viable explanation to the differences in functional status for Mexican-born men and women. As the fundamental causes paradigm explains higher SES enables one greater access to resources over time that could prevent the onset and progression of functional limitations. This finding adds to other research showing that higher levels of income and education protect against the onset and progression of functional limitations (see Zimmer and House 2003;Rogers et al. 1992). Finally, participation in the labor force was also associated with lower numbers of functional limitations. While it is possible that employment does extend health benefits to individuals, there may be a strong factor of reverse causation. For example, only individuals who are healthy remain in the workforce, while the onset of limitations may lead individuals to leave the workforce. In fact, the relationship between income and functional status is also susceptible to reverse causation. While these result support my

hypotheses, the statistical differences between men and women's functional status that remained after adjusting for socioeconomic status indicating that it is not a full explanation for their differences.

I tested the stress process model by incorporating comorbidities and lagged depressive symptoms, both of which the data indicated Mexican-born women experience more than men. The findings support the second hypothesis (2a), which stated that differences in functional limitations between Mexican-born men and women may be attributed to differences in their number of comorbidities and depressive symptoms. When testing the effects of comorbidities and lagged depressive symptoms with the control variables (not shown), the difference in functional status for men and women were reduced more than in Model 2 when only accounting for socioeconomic status. This suggests that this biological explanation may be a stronger predictor of differences in functional status among the genders than socioeconomic status. Under the assumptions of the stress process model, it appears that the combined effect of being a woman and an immigrant may lead to higher levels of depression and comorbidities, which this model shows are tied directly to higher levels of functional limitations over time. The measures of social support did not have a significant relationship with functional status over time. However, the inclusion of marital status and social support in the neighborhood does attenuate the differences in functional limitations between men and women (not shown). This signifies that while social support did not have significant relationship with functional status in these models, these variables still serve as an important role in differences of functional limitations between men and women.

Finally, after testing a combined model for the fundamental causes and stress process model paradigms (Model 4), the differences in functional status for Mexican-born men and women remain. Although, SES, stress, social support, immigration

experience and attrition do greatly attenuate the differences in functional status for Mexican-born men and women, the continued significant differences between genders indicate that there are other omitted variables that contribute to this difference. Furthermore, within-person variability, though attenuated, remains significant throughout all models further indicating that other individual level variables may provide further explanation for these differences in functional status between Mexican-born men and women.

There are several limitations to this study. First, the measurement of functional limitations every two years inhibits the recording of the dynamic aspect of this health issue. Functional limitations may occur for only short periods of time that would prevent their documentation if they occurred between waves. More frequent observation would enable a higher quality analysis on changes in this functional health (Liang et al. 2008).

Secondly, monitoring for the Health and Retirement Study begins in middle or late-life, meaning that mortality differentials among subpopulations affect the representativeness of the sample. The sample may be biased since less healthy individuals may not have survived to an age to be eligible for the study. This is referred to as left truncation. Because functional limitations are correlated with death, one may expect that the increase in functional status over time is underestimated. This could also overstate gender differences in functional limitations, if survival is more selective among men than women leading to more women with poor health than men (Liang et al. 2012).

Thirdly, there are several omitted variables that could be linked to functional status later in life. For example, childhood SES has been linked to functional status later in life. Although, this relationship is mediated by adult SES (see Bowen and Gonzalez 2010). While HRS does have data on mother's and father's education and income, there is a high level of missingness in this data and was omitted for this reason. While the

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analysis did incorporate age at migration, a measure of how long an immigrant has been in the country, and a proxy for English proficiency aimed at measuring incorporation into U.S. society, the study did not include citizenship status. This variable was excluded to optimize the number of waves used since citizenship was not measured by the survey until 2006. Finally, the inclusion on use of the health care system may be helpful in analyzing the role seeking health care and using preventative care may play in the development of functional limitations over time. This relationship would also have some important policy considerations.

The results do have several implications for research and policy. First, social support has been linked as a protective factor against limitations in several other studies (Jones 2012; Everard et al. 2000; Unger et al. 1997). The lack of relationship between these variables and functional limitations may be attributed to the way this measure was operationalized in these models. Prior studies have shown the quality of marriage is an important predictor of health outcomes (Hibbard and Pope 1993; Holt-Lunstad et al. 2008). Hibbard and Pope (1993) found that marriage is most likely to confer benefits in morbidity and mortality for women with higher levels of companionship and equality, but not for men. It is possible that the patriarchal relationships in Mexican-born household in the U.S. may prevent marriage from benefiting the health of immigrant women. Further research on marital equality on older Mexican-born immigrants in the United States would be needed to determine whether this is one reason that this form of social support does not seem to impact functional limitations as one may expect.

Similarly, social support as measured by friends and family in the neighborhood was not a significant predictor of functional status over time. It is possible that the measures did not capture for quality of the relationships or the frequency of contact, which may be important for ameliorating stress. In addition, being involved in

community organizations or volunteering may serve as a better indicator of social networks that reduce likelihood of morbidity. In fact, prior studies that have found connections between social support and functional limitations include more detailed measures of the types of social activities in which one participates (see Everard et al. 2000; Unger et al. 1997). Future research should examine other measures of social support to determine their effect on functional limitations for Mexican-born immigrants in the U.S. Some such measures may include having individuals to call upon for instrumental support, community involvement in a church or other volunteer organizations, or measure of the quality of one's social network.

Overall, this study extended research on gendered disparities in morbidity by focusing on the subpopulation of Mexican immigrants to the United States. Like other subpopulations, women are more likely to have functional limitations as they age. According to these results, comorbidities and depression are the biggest predictors of functional limitations over time. This finding lends support to the disablement process framework, which states that disease is the main pathway for functional limitations.

These results underline the need for future research on why women are faced with greater levels of depression and comorbidities in their older age in order to further reduce morbidity. While there was not a significant relationship between ever being uninsured and functional limitations, looking at the descriptive analysis shows that the majority of sample was uninsured at some point during the panel years used. This indicates a great barrier to receiving health care. Because comorbidities and depression served as the largest predictors of functional limitations, health policy should focus on reducing complications associated with chronic disease and preventing the onset of chronic disease, especially among women.

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