CROSSING OVER: REVERSAL OF THE MEXICAN IMMIGRANT HEALTH ADVANTAGE AT OLD AGE*

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Abstract

This paper investigates whether the Mexican immigrant health advantage persists from working age into old age. Using nationally representative data from the 2010-2014 American Community Survey, we analyze age-specific disability prevalence among Mexicans in the US. We find that while working age foreign-born Mexicans (FBM) are less likely to have any disability than native-born non-Hispanic whites (NHW), the health advantage is reversed at old age: disability prevalence rates cross between ages 51 and 60 for females and between 61 and 66 for males. At older ages, disability prevalence among foreign-born Mexicans approaches that of native-born Mexicans and, among females, exceeds it at some ages. Foreign-born Hispanic females exhibit patterns similar to their foreign-born Mexican counterparts. The FBM-NHW crossover in the prevalence of overall disability is found to reflect reversals in the rates of ambulatory, cognitive, independent living, and self-care disability. These findings shed light on a growing population at risk for an immigrant health disadvantage and calls for increased scholarly attention to the factors and mechanisms leading to this phenomenon.

Keywords: Mexican Immigrant Health Advantage, Disability Crossover, American Community Survey

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INTRODUCTION

Studies of the health of the general adult population in the United States generally find that immigrants display a health advantage over those born in the US despite their lower socioeconomic status (Jasso et al. 2004; Singh, Rodriguez-Lainz, and Kogan 2013). This phenomenon is often referred to as the “Hispanic paradox,” because Hispanic immigrants—the majority of whom are born in Mexico—represent the largest low status immigrant group in the United States and are often the focus of research on immigrant health (Jasso et al. 2004; Markides and Coreil 1986; Markides and Gerst 2011).

While the immigrant and specifically the general Hispanic health advantage over US-born non-Hispanic whites has been corroborated with over three decades of evidence, recent literature focusing on health outcomes of older immigrants specifically has found that foreign-born Hispanics have equivalent or higher disability rates as compared to non-Hispanic whites (Crimmins, Hayward, and Seeman 2004; Eschbach et al. 2007; Hayward et al. 2014; Hummer and Hayward 2015; Markides et al. 2007; Mehta, Sudharsanan, and Elo 2013; Melvin et al. 2014; Sheftel 2017). This newly identified phenomenon illustrates the importance of studying immigrant-native health differentials by age and is particularly significant because of the quickly growing older Hispanic population.1

This paper seeks to further our understanding of the Hispanic immigrant health paradox in the context of disability. Is there evidence of an immigrant health advantage that reverses at older ages? If so, at what age does it occur and how pronounced is it? Using recent Census Bureau five year estimates from the 2010-2014 American Community Survey (ACS), we estimate age-specific disability rates for foreign-born Mexicans and other Hispanics, and compare them to American-born groups including non-Hispanic whites, US-born Mexicans and other Hispanics.

We find that while working age foreign-born Mexicans are less likely to have a disability than US born non-Hispanic whites, the health advantage is reversed at old age: disability rates cross between ages 52-60 for females and 61-66 for males. At old age, the disability prevalence of foreign-born Mexicans approaches that of US born Mexicans and, among females, exceeds it

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1 Those over 65 are the fastest growing segment of the Hispanic population in the US (e.g., Angel and Whitefield 2007). Treas and Carreon (2010) project that older Hispanics will increase from 7.1 percent of the older population in 2010 to 19.5 percent in 2050. Current American Community Survey (ACS) 1-year estimates (2015) show that of the over 43 million foreign-born persons in the US, 14.8 percent are 65 or older. That is, almost 6 million foreign-born persons in the United States are 65 or older.
at some ages. Foreign-born Hispanic females show patterns similar to their US born Mexican counterparts. These findings shed light on a growing population at risk for an immigrant health disadvantage and calls for increased scholarly attention to the factors and mechanisms leading to this phenomenon.

**BACKGROUND**

Studies of the general adult population in the United States consistently find an immigrant health advantage over native-born populations when looking at rates of chronic illness and mortality (Abraido-Lanza et al. 1999; Arias 2010; California Center for Health Statistics 1984; Eschbach, Kuo, and Goodwin 2006; Franzini, Ribble, and Keddie 2001; Jasso et al. 2004; Markides and Coreil 1986; Markides and Eschbach 2005, 2011; Palloni and Morenoff 2001; Singh et al. 2013; Sullivan et al. 1984). The immigrant health advantage, especially when found among low status immigrants\(^2\) like Mexicans, challenges widespread findings in the health literature that lower socioeconomic status is correlated with poorer health outcomes (Dupre 2007; Hayward and Gorman 2004; House et al. 1996; Marmot and Wilkinson 1999; Masters, Hummer, and Powers 2012; Zsembik and Fennell 2005). Because this finding seems to run contrary to typical determinants of health outcomes, it is sometimes referred to as the “epidemiological paradox” (Markides and Coreil 1986) or the “Hispanic paradox” (Abraido-Lanza et al. 1999; Franzini et al. 2001; Palloni and Morenoff 2001) when it is found among the US-born Hispanic population.

How immigrants fare in terms of health outcomes at older ages is less well understood (Gubernskaya, Bean, and Hook 2013). An emerging literature suggests that an Hispanic immigrant health advantage extends into older ages in terms of chronic diseases (Cantu et al. 2013; Swallen 1997; Treas and Gubernskaya 2015) as well as rates of mortality (Angel et al. 2010; Elo et al. 2004; Hayward et al. 2014; Hummer et al. 2000; Lariscy, Hummer, and Hayward 2015; Markides and Eschbach 2011). On the other hand, studies focusing on disability as a

\(^2\) As defined by Alba and Foner (2015:4) “Individuals arriving with low levels of education, who typically end up in poorly paid, sometimes off-the-books jobs that are frequently dirty and sometimes dangerous and demeaning. These immigrants are also stigmatized because of their ethnicity or race; they stand out because they look different in the eyes of the native majority and because they have different cultural backgrounds and, in some cases, religions. Members of low-status groups face the greatest barriers to integration in both the immigrant and the second generations.”
measure of health report that older foreign-born Hispanics have higher disability rates as compared to older non-Hispanic whites and their US-born counterparts (Crimmins et al. 2004; Eschbach et al. 2007; Hayward et al. 2014; Hummer, Benjamins, and Rogers 2004; Markides et al. 2007; Mehta et al. 2013; Melvin et al. 2014; Sheftel 2017).

Markides et al. (2007), looking at 2000 Census data, find that both older foreign and US-born Mexicans have higher rates of disability than US-born non-Hispanic whites. Similarly, a recent analysis of ACS data finds that foreign-born Mexican males have higher disability rates than US-born white males and foreign-born Mexican females have higher disability rates than both US-born white females and US-born Mexican females (Sheftel 2017). An analysis of National Health Interview Study (NHIS) data also finds higher proportions of disability among older foreign-born Mexicans than US-born non-Hispanic whites and conjectures that mechanisms of selection on socioeconomic characteristics account for these results (Melvin et al. 2014). Multivariate analyses by Crimmins et al (2004), Hummer et al. (2004) and Mehta et al. (2013) substantiate this hypothesis and conclude that sociodemographic factors lead to higher disability rates among older foreign-born Mexicans as compared to US born non-Hispanic whites.

The present study adds to the emerging evidence on the age-specific patterns of Hispanic immigrant-native health differentials. We seek to understand whether the Hispanic immigrant health advantage—in the context of disability—reverses, namely whether disability rates are lower for Mexican immigrants (and other Hispanic immigrants) at working ages and higher at older ages compared to native-born populations. Using data from the 2010-2014 American Community Survey (ACS), which provides large, recent, and nationally representative samples of the relevant populations, we estimate disability prevalence rates among immigrant and US-born Mexicans, other Hispanics and non-Hispanic whites from age 40 to 80. All analyses are separated by gender because of well-established differences in morbidity and mortality between males and females (Case and Paxson 2005). Further, we conduct analyses by age at immigration to test acculturation hypotheses related to life stage at immigration (Gubernskaya et al. 2013).

Our analytic lens is focused on Hispanic immigrants and foreign-born Mexicans in particular, because, as the largest foreign-born population in the US, with 820,000 individuals at
age 65 or older (based on ACS 2010-2014, 5 Year estimates), the health outcomes for the Mexican-born population have important implications for American society as a whole. Foreign-born Mexicans tend to be socioeconomically disadvantaged with low levels of education and high rates of poverty, factors that make them particularly vulnerable to negative health outcomes, especially at older ages (Angel et al. 1999; Angel and Angel 1997; Angel and Whitfield 2007). Further, because of their concentration in occupations involving manual labor and hazardous work conditions, disability is a particularly important measure of health for this population. Greater exposure to these conditions over the working lifespan may lead to elevated functional limitations and disability at older ages (Hayward et al. 2014; Kochhar 2005; Toussaint-Comeau 2006; Weigel 2014). The reverse may also be true, of course, selection effects supporting the immigrant health advantage at younger ages may persist (or at least their protective impact) into older ages leading to better health outcomes (Akresh and Frank 2008; Crimmins et al. 2005; Feliciano 2005; Goldman et al. 2006; Riosmena, Wong, and Palloni 2013).

A wide range of ages is crucial in the analysis given our objective of providing evidence of crossovers in age-specific disability rates. By looking at age 40 and older, we provide a suitable window into disability starting from prime working ages, a period of the life course marked by high rates of immigrant employment—particularly among lower status immigrants—in these high risk occupational sectors (Population Reference Bureau 2013). The analysis provides new evidence on the ages at which disability rates “cross over” and how pronounced the differentials are. The estimates provide a current picture of this growing population that has specific needs and significant economic, social and political implications.

**Data and Methods**

This study uses data from the 2014 American Community Survey (ACS) 5-year public-use microdata sample (PUMS), which randomly sampled 5 percent of the American population between 2010 and 2014 (Ruggles et al. 2015). The large sample size of the ACS (and the Census

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3 The notion of age-specific rates “crossing over” for two subpopulations is a familiar one to demographic audiences. For example, the phenomenon of black-white mortality crossovers at very old ages has occupied a prominent place in the mortality literature (see Lariscy (2017) and Fenelon (2013) for recent contributions).
long form before it) permits investigation of small subgroups in US society, which motivates its use here and in previous studies on immigrant health (Elo et al. 2011; Gubernskaya et al. 2013; Markides et al. 2007). The unweighted 2010-2014 5-year data includes a random sample of 15,552,144 people ranging in age from 0 to 96 years old. This analysis limited the age range from 40 to 80. At the lower bound it enables us to focus on prime working ages and condition on age at immigration. At the upper bound the analytic sample was restricted to the age of 80 because some subgroups had limited sample sizes above this age, which can be especially problematic when estimating single year age specific disability prevalence. It was finally restricted to a number of specific groups (as will be explicated) based on race, ethnicity and nativity.

The final analytic sample was comprised of 6,612,011 (unweighted) people between 40 and 80 years old. Focusing on age-specific disability prevalence rates allows us to study the patterns of disability in detail and without concern for age structure differences which have been shown to play an important role in aggregate disability patterns (Sheftel 2017). Our final sample sizes are large, even for key immigrant subpopulations, but since we are reporting rates for single-age groups statistical power may be a concern. To investigate this issue we also report 95% Confidence Intervals.

While not a health and disability study specifically, the ACS and similar variables from the Census long form are often used to investigate disability in the US (Elo, Mehta, and Huang 2011; Gubernskaya et al. 2013; Markides et al. 2007; Siordia 2014a, 2014b, 2015a, 2015c, 2015d, 2016; Siordia and Leyser-Whalen 2014; Siordia and Ramos 2015; Stern 2004). Siordia (2014a:262) considers the ACS the “gold standard” for estimating disability prevalence in the US (Siordia 2014a, 2015b, 2015c). The ACS survey includes six disability questions regarding hearing\(^4\), vision\(^5\), cognitive\(^6\), ambulatory\(^7\), self-care\(^8\), and independent living\(^9\) difficulties, the term the ACS uses for disability. While this is a relatively short set of disability related questions

\(^4\) Deafness or a serious difficulty hearing.
\(^5\) Blindness or a serious difficulty seeing even when wearing glasses.
\(^6\) Serious difficulties concentrating, remembering or making decisions due to a physical, mental or emotional condition.
\(^7\) Serious difficulties walking or climbing stairs.
\(^8\) Difficulties dressing or bathing.
\(^9\) Difficulties doing errands alone such as visiting a doctor or shopping, due to a physical, mental or emotional condition.
it covers a wide variety of activities and health related difficulties and thus because of its efficiency in measurement is similar to the set of questions used in census and surveys worldwide (Verbrugge 2016).

Most disability research measures two types of activity limitations to measure disability: limitations in personal care activities termed *activities of daily living* (ADLs) and limitations in household management activities termed *instrumental activities of daily living* (IADLs) (Verbrugge 2016). Elo et al. (2011) and Markides et al. (2007) note that the ACS and Census long form self-care and independent living measures used here mirror ADL and IADL items respectively. The hearing, vision, cognitive, ambulatory and self-care disability instruments used have been shown to provide reliable measures, whereas the independent living instrument has been found to be less reliable (Stern 2004). The ACS uses proxy reporting whereby a single household member completes the survey on behalf the rest of the household members. Limitations related to proxy-reporting will be addressed in the discussion section of the paper, but overall the ACS has been found to be an effective way to estimate disability for the American population (Elo et al. 2011; Erikson 2012; Gubernskaya et al. 2013; Markides et al. 2007; Siordia 2014b, 2015a, 2015b, 2015d, 2016; Siordia and Ramos 2015).

We constructed a binary measure of *any disability* based on individuals’ responses to the six disability questions on the ACS survey (coded 1 if the individual answered affirmative to at least one of these six measures). Our main focus is on this measure of *overall (any) disability*, but below we also report on the age-specific patterns in the prevalence of hearing, vision, cognitive, ambulatory, self-care and independent living disabilities individually. Looking at the different dimensions of disability outcomes allows us to assess their contribution to the overall pattern and may speak to different explanations behind disability crossovers. In addition, we also calculated a *total disability* rate using the total number of disabilities reported in relation to person-years at risk.

In order to facilitate a comparative analysis, individual level microdata was aggregated by age, in one-year age intervals using normalized person weights provided by the ACS, for native-born and foreign-born groups.\(^{10}\) For each group aggregation was performed separately for

\(^{10}\) ACS provided PERWT sample weights were normalized to preserve the original N so that standard errors in bivariate analysis reflect actual sample sizes
males and females. Table 1 displays the groups included in this analysis: 1) native-born non-Hispanic whites, 2) native-born non-Hispanic Blacks, 3) native-born Mexicans, 4) native-born Hispanics (non-Mexican) 5) foreign-born Mexicans and 6) foreign-born Hispanics (non-Mexican). While foreign-born Mexicans are the focus of this paper, other groups were included as points of reference. Inclusion in these groups was based on answers to a number of survey questions about birth place, race and ethnic origin.

The ACS asks separately about Hispanic origin and race. Thus those who are considered Hispanic in this study could be of any race. If a respondent indicated that they were Hispanic they were asked about their specific country of origin. Those who indicated Mexican were considered Mexican for this analysis. Among the Hispanic (non-Mexican) and Mexican groups there are those who are native born and foreign-born and their respective disability rates were aggregated separately by age. The ACS asks where each member of the household was born. Those who were born outside the fifty states were considered foreign-born. Island born Puerto Ricans were included among foreign-born Hispanics because immigrant health patterns have proven to hold for those who migrate from Puerto Rico to mainland United States (Landale et al. 2000). Non-Hispanic whites are those who answered white to the race question and non-Hispanic to the Hispanic question. Similarly, non-Hispanic Blacks are those who answered Black or African American to the race question and non-Hispanic to the Hispanic question.

**MAIN RESULTS**

*Sample Descriptive Statistics*

The final analytic sample is comprised of 6,612,011 (weighted) US born non-Hispanic whites, Blacks, Mexicans and Hispanics (non-Mexican) as well as foreign-born Mexicans and Hispanics (non-Mexicans). The mean age of the analytic sample is 56.5 and 24.4 percent of the sample is the age of 65. The sample is 48.4 percent male and 91.4 percent is native born. There are 299,970 foreign-born Mexicans, the focus of this study, in the sample. This subgroup is considerably younger with a mean age of 51.97 and 12.9 percent the age of 65. The mean age at immigration is 25.5 and 36.8 percent of these foreign-born Mexicans have become naturalized American citizens. These figures for the entire analytic sample, as well as each subgroup, are included in Table 1.
Mexican born vs. Native born

Table 2 shows age-specific prevalence rates of having any disability for selected subpopulations. We illustrate these results in a series of graphs. Figure 1 shows the overall disability rate for Mexican-born males and females respectively, using all native-born males and females as comparison (including American-born Mexicans). Included in the graphs are the corresponding 95% Confidence Interval ranges.

As is evident from this first illustration of disability rates, among both males and females foreign-born Mexicans start off with an overall disability advantage. At the prime working ages they have the lowest rates of overall disability among the subpopulations investigated here. However, that advantage starts to decline as they age and it is reversed at old age. For example, at age 45, the overall disability rates are for foreign-born Mexican males and females are 5.9% and 6.7%, respectively. This compared to 11.1% for the native-born population. In contrast, 45.4% of Mexican-born males report having a disability at age 75 compared to 36.3% for native-born males. For Mexican-born females this rate is even greater at 49.6%, which compares to 35% for native-born females. These differences by gender are statistically significant as indicated by the 95% Confidence Interval ranges.

Careful inspection of Figure 1 shows that there are fairly distinct ages (by gender) at which the disability curves cross. For males that age is approximately 65 years; for females the crossover age is approximately 59 years. These points of crossover are near ages traditionally associated with retirement from the workforce. The conclusions are similar when using only native-born non-Hispanic whites as comparison group. As shown in Figure 2a, the advantage in terms of lower disability prevalence that foreign-born Mexican females enjoy over native-born non-Hispanic white females at prime working ages reverses between ages 52 and 60 (“disability crossover”). Among foreign-born Mexican and native-born non-Hispanic white men, a disability crossover occurs between ages 61 and 66, as shown in Figure 2b.

Figures 2a and 2b also show the contrast with American-born Mexicans. Compared to native-born whites, we note that this population has greater disability prevalence across the entire age span (age 40 to 80), and this health disadvantage tends to widen significantly up to approximately age 65, after which it remains fairly stable. This is in stark contrast to foreign-
born Mexicans, whose disability rates are much below those of either American-born group at younger ages, but then converge to the levels of US-born Mexicans at older ages and, among females, even exceed those at some ages. Like American-born Mexicans, foreign-born Mexicans display a more rapid increase in disability prevalence during working ages compared to native-born whites. However, while the gap between US-born Mexicans and whites is fairly stable at older ages, the rate rises faster for foreign-born Mexicans between ages 60 and 80, resulting in rate convergence.

**Mexican-born vs. Other Foreign-born Hispanics**

The next set of figures adds the estimated disability rates of foreign-born (non-Mexican) Hispanics. As shown in Figure 3a, the age-specific disability rates are quite similar for foreign-born Mexican females and other foreign-born Hispanic females and they cross over native-born non-Hispanic white females at about the same age range (53-56). Other foreign-born Hispanic females tend to have slightly higher disability prevalence until age 53. From 53 to 66, the rates are very similar for the two populations and after that the disability rates are greater among foreign-born Mexican females. For men, as shown in Figure 3b, we also observe that the rates are similar during the working age life span. However, after age 63, disability rises faster among male immigrants from Mexico compared to other male Hispanic immigrants. In fact, while the disability rate of the former crosses over that of native-born white males at ages 62-65, the latter remains at or below that of whites.

**Mexican born by Age at Immigration**

Figure 4 shows the overall disability rates for Mexican-born Hispanics by age of immigration to the US: immigrated by age 18 vs. immigrated between age 19 and 30. By excluding those Mexicans who immigrated after the age of 30 from this part of the analysis, we are eliminating the possibility of negative selection on health for those who immigrate at older ages (Gubernskaya et al. 2013). To increase statistical power, and given that we found similar trends by gender, we pool males and females for this analysis. We see that the disability prevalence rates are fairly similar across the two groups. At some ages those who immigrated as
children or adolescents have greater overall disability rates but the differences are typically small and there are ages where the pattern is reversed. Disability rises faster than for native-born whites (pooled) in both subpopulations and the age range at which they cross over whites is the same (near age 60).

Specific Disabilities

The previous results are based on an overall measure of disability that captures whether or not a person had reported any of six types of disabilities. This section presents prevalence rates for each of the six dimensions separately: (a) ambulatory, (b) cognitive, (c) independent living difficulty, (d) self-care difficulty, (e) vision, and (f) hearing disability. Figures 5a-5f show the corresponding prevalence rates for foreign-born and American-born Mexican, white, and (other) foreign-born Hispanic females. The graphs for males are shown in Figures 6a-6f.

Across disability types, with the exception of hearing and vision disabilities, there are three distinct features. First, the disability rates are greater for women than men. Second, foreign-born Mexicans consistently have the lowest rates at younger age and the highest at old age. Third, the cross in prevalence rates between whites and foreign-born Mexicans occurs around age 60. These patterns are consistent with the findings for overall disability prevalence shown above. There is some interesting variation in crossover ages for the different measures that we will now discuss in turn.

Ambulatory Disability. The rates for foreign-born Mexican females are consistently higher than those for whites by age 59 and can be as much as 12 percentage points higher at old age. For males the rates cross over at age 61 and are 10 percentage points higher by age 80 (35% vs. 25%). (See Figures 5a and 6a.)

Cognitive Disability. For foreign-born Mexican females the cognitive disability rates cross over whites at about age 60 and although they fluctuate they can be as much as 10 percentage points higher. Among foreign-born Mexican men, cognitive disability is consistently more prevalent than among whites by age 65 and although they fluctuate are basically double that of white males (14% vs 7%, 16% vs 8%). (See Figures 5b and 6b.)
**Difficulty with Independent Living.** Rates of difficulty living independently are greater among foreign-born Mexican females compared to whites by age 61 and then are the highest of all the subgroups by age 70 with as much as 17 percentage point differences. For men, rates cross over at age 63 and although they fluctuate are about 5 percentage points higher at old age. (See Figures 5c and 6c.)

**Difficulty with Self-Care.** Difficulties in self-care are consistently more prevalent among female foreign-born Mexicans than whites by age 61 and are among the highest by age 73. For males, foreign-born Mexican self-care difficulty rates cross over whites at age 60 and then fluctuate but are up to 7% higher than whites at old age. (See Figures 5d and 6d.)

**Visual Disability.** Foreign-born Mexican females have greater visual disability rates than white females from the outset and among the highest of all the groups by age 64. Although they fluctuate they often are double that of whites. For foreign-born Mexican females, vision disabilities are consistently higher than whites by age 46 and fluctuate but can be as many as 10 percentage points higher than whites. (See Figures 5e and 6e.)

**Auditory Disability.** Rates for auditory disabilities fluctuate but are consistently higher for foreign-born Mexican females than whites by age 64. However the differences aren’t as high as for the other disabilities. For foreign-born Mexican males, hearing difficulties fluctuate but are mostly below whites so these are not driving overall disadvantage. (See Figures 5f and 6f.)

**DISCUSSION AND CONCLUSION**

Whether due to selection mechanisms or socio-cultural factors this paper confirms the robust body of literature showing that Mexicans arrive in the US with a health advantage. We show that this population consistently has the lowest disability prevalence rates across gender and specific disability measures at the younger end of the age range. However, the opposite is true at the other end of the age spectrum where foreign-born Mexicans consistently have the highest prevalence across gender and disability measures. Thus, these results build on previous evidence pointing to an immigrant disability disadvantage at older ages (Crimmins et al. 2004; Eschbach et al. 2007; Hayward et al. 2014; Hummer et al. 2004; Markides et al. 2007; Mehta et
al. 2013; Melvin et al. 2014; Sheftel 2017). Here we detail the specific age ranges where there is a reversal of the Mexican health advantage finding that it occurs at relatively young ages, between 51 and 60 for females and between 61 and 66 for males. Within these ages, the disability rates for foreign-born Mexicans cross over those for non-Hispanic whites (of their respective gender) and from the point of crossover forward they no longer have a disability advantage. These crossover patterns are confirmed by our analysis of the types of disability and supplementary analysis using the total number of disabilities reported (see Appendix Figure 1).

One explanation for the immigrant health advantage is that immigrants arrive in the US with healthier lifestyles including but not limited to lower prevalence of smoking and drinking alcohol and healthier diets. Overtime in the US however, through the process of acculturation, immigrants have been found to converge to American lifestyle practices which leads to an overall decline in health (Abraido-Lanza, Chao, and Florez 2005; Akresh 2007; Antecol and Bedard 2006; Cho et al. 2004; Finch et al. 2009; Jasso et al. 2000). Our findings are consistent with this hypothesis showing an overall eroding of the immigrant health advantage overtime, which is more pronounced among those Mexicans who immigrated to the US before the age of 18 and thus had more time to acculturate.

In addition, we can look at our results from the perspective of Verbrugge and Jette’s (1994) sociomedical model of the disablement process, which describes the pathway from pathology to disability. Central to their model are personal and environmental factors that may exacerbate the disablement process. The concentration of Mexicans in physically arduous and high risk occupations (Kochhar 2005; Toussaint-Comeau 2006) and high rates of workplace injury (Dong and Platner 2004; Smith et al. 2005) is one such risk factor that is a plausible explanation for heightened disability rates at older ages (Hayward et al. 2014; Melvin et al. 2014). Consistent with our age-specific patterns, Weigel et al. (2014) specifically find elevated functional disability rates among middle and older aged Mexican immigrant farmworkers as a result of workplace injury. Construction workers, another occupational sector with a high concentration of Mexicans, also have elevated incidence of disability as a result of occupational injury (Schwatka et al. 2012).

We find that ambulatory disability, self-care difficulty and independent living difficulty are among the specific drivers of the higher overall disability prevalence of Mexican immigrants.
at older ages. These specific measures mirror ADLs and IADLs, which are used to measure functional disability (Millán-Calenti et al. 2010; Spector and Fleishman 1998) and have been shown to be elevated among agricultural and construction workers. Further factors such as socioeconomic and residential disadvantage and disparities in access to health care and health insurance (Derose, Escarce, and Lurie 2007) are other risk factors leading to a cumulative health disadvantage for low status immigrants like Mexicans (Warner and Brown 2011). While these causal mechanisms remain in the realm of hypothesis here, they point to important directions for future research which would use longitudinal data to address change over time.

These results are also consistent with research on aging of the general population, regardless of ethnicity and nativity, which finds worse health outcomes for females as compared to males (Arber and Cooper 1999; Case and Paxson 2004; Warner and Brown 2011). Here the disability disadvantage for older foreign-born Mexican females is considerably more pronounced, across all measures of disability, as compared to older foreign-born Mexican males. Coupled with findings of lower mortality rates and longer life expectancies, this points to an especially protracted period of disability for female Mexican immigrants and potentially doubly disadvantaged population.

Mortality differentials between the native born and foreign-born populations may introduce a bias in our results. Rates of mortality among the foreign-born Hispanics in the US remain lower than US-born populations at older ages (Angel et al. 2010; Elo et al. 2004; Hayward et al. 2014; Hummer et al. 2000:200; Markides and Eschbach 2011). It is thus possible that the most severely disabled among the American born die at younger ages leaving a positively selected population. However we conclude that this bias is marginal at best for two reasons. First, of all, the crossover occurs at a relatively young age when the force of mortality is relatively weak. In addition, the disablement processes related to the specific disabilities driving the overall crossover are not necessarily connected to cause-specific drivers of mortality rates (cardiovascular disease and cancer) in middle age.

While our evidence of a reversal in the immigrant health advantage in terms of disability is strong, a number of limitations apply. First, this study is mainly descriptive in nature and thus offers no direct analysis of factors impacting disability trends but only offers conjectures. Further, it uses cross-sectional data studying current disability rates across age groups but cannot
analyze cohort specific trends or investigate longitudinal change. Further research would use longitudinal data to explore these aspects of immigrant disability at older ages.

In addition, because the measures of disability here are self- and proxy-reported and thus are subjective and not diagnostic measures, there may be variability in their ability to accurately reflect an individual’s actual physical ability (Siordia 2014c; Siordia and Lewis 2015). Compounding this, is evidence that Hispanics specifically are health pessimistic and thus self-reported measures for this population are particularly unreliable (Angel and Guarnaccia 1989; Hummer et al. 2004; Markides et al. 2007; Shetterly et al. 1996; Viruell-Fuentes et al. 2011). Nevertheless, self-reported measures are still used in the study of this population because observational studies are accessible and replicable (Siordia 2015b) and considered valid (Chandola and Jenkinson 2000). Specifically, the ACS data used in this study is considered among the best sources for producing reliable measures of disability in the general US population (Siordia 2014a).

Additionally a number of data limitations specific to the study of Hispanic subpopulations using ACS data must be taken into consideration. Despite overall high response rates\textsuperscript{11} to the ACS survey there is evidence of underreporting of the Hispanic population in US Census data, and estimates due to survey nonresponse cannot be accounted for (Lowenthal 2006; Martin 2002; Siordia and Ramos 2015). Compounding issues of underreporting, rates of allocation (procedures used by the Census Bureau to fix illogical and missing responses) of ACS data vary by race/ethnicity and disability leading to more uncertainty of estimates for some subgroups, including Mexican-Latino/as and Spanish only speaking households as well as self-care and vision disabilities (Siordia 2014b, 2015c; Siordia and Le 2013; Siordia and Young 2013). Further, while ACS microdata has the advantage of including undocumented immigrants, a population that is otherwise difficult to survey and that faces unique barriers to accessing health care, leading to distinct outcomes (Portes, Fernández-Kelly, and Light 2012). Although there is evidence of undercounting of undocumented immigrants in the ACS because of population specific sampling challenges, at older ages undercount rates are low (Judson and Swanson 2011; Passel and Cohn 2016; Van Hook et al. 2015; Woodrow-Lafield 2012). This is

\textsuperscript{11} Response rates of between 89.9% and 97.6% for the ACS 2010-2014 housing unit based surveys (US Census Bureau 2015)
limitation is further minimized by the amnesty programs offering pathways to documentation in the 1980s.

The immigrant population, even when limiting analyses to foreign-born Mexicans and other Hispanics, is in no way uniform in terms of health trajectories into older age. This paper explored the role of age at immigration and gender. While a comprehensive analysis of the factors underlying the observed immigrant-native disability patterns is beyond the scope of the present paper previous studies have found health differentials based on a number of factors including age at immigration and time in the United States (Gubernskaya et al. 2013; Treas 2015; Treas and Gubernskaya 2015), socioeconomic profile and sector of employment (Chavez 2012; Passel and Cohn 2009), legal status (Gubernskaya et al. 2013; National Academies of Sciences, Engineering and Medicine 2015; Oropesa, Landale, and Hillemeyer 2015), access to health insurance (Derose et al. 2009, 2007; National Academies of Sciences, Engineering and Medicine 2015; Singh et al. 2013; Wafula and and Snipes 2014), and geographic residence in the United States (Bècares et al. 2012; Korinek and Smith 2011; Lee and Liechty 2014). Future research should focus on these factors and their contribution to the crossover in immigrant disability at older ages.

This research is an important step in understanding the health of immigrants at older ages. Supporting the emerging body of literature pointing to a disability disadvantage among older immigrants, our research highlights the point of reversal. This crossover occurs at or before retirement age and thus is consistent with a life course perspective of the disablement process (Dannefer 2003; Verbrugge and Jette 1994) measures to reduce health disparities should be focused at even younger ages. Hummer and Hayward (2015) note that the Hispanic population over the age of 65 in the US is expected to quintuple between 2012 and 2050. Especially coupled with their disadvantaged socioeconomic position, disability trends are alarming for this rapidly growing population. This study enables policy makers and service providers to concentrate resources at specific ages in order to make measureable change. We also highlight possible avenues for reducing disparity noting the potential contribution of occupational concentration and limited health service and insurance access to the higher disability prevalence among Mexican immigrants. In all, the results of this research make a critical contribution to the
developing body of literature on a growing population likely to experience a protracted period of health challenges in old age.
References


Derose, Kathryn Pitkin, Benjamin W. Bahney, Nicole Lurie, and José J. Escarce. 2009. “Immigrants and Health Care Access, Quality, and Cost.” Medical Care Research and Review.


Fenelon, Andrew. 2013. “An Examination of Black/white Differences in the Rate of Age-Related Mortality Increase.” *Demographic Research* 29:441.


Millán-Calenti, José C. et al. 2010. “Prevalence of Functional Disability in Activities of Daily Living (ADL), Instrumental Activities of Daily Living (IADL) and Associated Factors, as


Table 1. Subgroups included in analysis, sample size and selected demographic characteristics (normalized person weights)

<table>
<thead>
<tr>
<th>Subgroup</th>
<th>N</th>
<th>Male (%)</th>
<th>Mean Age</th>
<th>Over 65 (%)</th>
</tr>
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<tbody>
<tr>
<td>Full Sample</td>
<td>N = 6,612,011</td>
<td>48.4%</td>
<td>56.5</td>
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<td>N = 6,046,931</td>
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<td>Age</td>
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<td>NB M (NHW+NHB+Hisp)</td>
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</table>
Figure 1. Age-Specific Overall Disability Rates
Mexican-born vs. Native-born by Gender (w/ 95% CI)
Data Source: ACS 2014 5-Year Data
Figure 2a. Age-Specific Overall Disability Rates
Female - Selected US Populations
Data Source: ACS 2014 5-Year Data
Figure 2b. Age-Specific Overall Disability Rates

Male - Selected US Populations

Data Source: ACS 2014 5-Year Data
Figure 3a. Age-Specific Overall Disability Rates
Female - Selected US Populations
Data Source: ACS 2014 5-Year Data
Figure 3b. Age-Specific Overall Disability Rates
Male - Selected US Populations
Data Source: ACS 2014 5-Year Data
Figure 4. Age-Specific Overall Disability Rates
Mexican-born by Age at Immigration (w/ 95% CI)
Data Source: ACS 2014 5-Year Data
Figure Se. Age Specific Vision Disability Rates
Female - Selected US Populations
Data Source: ACS 2010-2015 5-Year Data

Figure Sf. Age Specific Hearing Disability Rates
Female - Selected US Populations
Data Source: ACS 2010-2015 5-Year Data
Appendix Figure 1. Age-Specific Overall Disability Rates (Total Count)
Mexican-born vs. Native-born by Gender

Data Source: ACS 2014 5-Year Data