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Disability crossover: Is there a Hispanic immigrant health advantage that reverses from working to old age?

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Contents

Disability crossover:
Is there a Hispanic immigrant health advantage that reverses from working to old age?

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Abstract

BACKGROUND
Hispanic immigrants have been found to be more likely to have a disability than US-born populations. Studies have primarily focused on populations aged 60 and older; little is known about immigrant disability at younger ages.

OBJECTIVE
Taking a broader perspective, we investigate whether Hispanic immigrants have lower disability rates in midlife; if so, at what ages this health advantage reverses; and the correlates of this pattern.

METHODS
Using American Community Survey 2010–2014 data, we estimate age-specific disability prevalence rates by gender, nativity, education, and migration age from age 40 to 80. We also present estimates by six types of disability.

RESULTS
Compared to non-Hispanic whites, disability prevalence among foreign-born Mexican women is lower until age 53 (men: 61) and greater after 59 (66). Similar patterns hold for other foreign-born Hispanics. Crossovers are observed in rates of ambulatory, cognitive, independent living, and self-care disability. Evidence of a steeper age–disability gradient among less-educated immigrants is found. Minimal differences are noted by migration age, challenging an acculturation explanation for the crossover.

CONTRIBUTION
The paper contributes to a better understanding of immigrant–native disability patterns in the United States. It is the first to systematically document a Hispanic immigrant

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health advantage in disability that reverses from working to old age. Hispanic immigrants (particularly foreign-born Mexican women), may face steeper risk trajectories, consistent with their greater concentration in low-skill manual occupations. We call for increased scholarly attention to this phenomenon.

1. Introduction

The Hispanic population in the United States continues to grow rapidly, and its share in the population over age 65 is expected to more than double between 2012 and 2050, from just over 7% to over 18% (15.4 million people). Hispanics tend to be disadvantaged socioeconomically relative to non-Hispanic whites (based on income, education, employment, and occupational status) and have lower rates of health insurance coverage. They are also overrepresented among the undocumented immigrant population (Hummer and Hayward 2015). Rapid growth and aging of this particularly vulnerable population will impact future health patterns in the United States. Hence, understanding how this population fares in terms of health outcomes is important to researchers and policy makers.

Studies consistently find that foreign-born Hispanics have lower mortality rates than American-born Hispanics and non-Hispanic whites (Abraido-Lanza et al. 1999; Arias 2010; Eschbach, Kuo, and Goodwin 2006; Franzini, Ribble, and Keddie 2001; Markides and Coreil 1986; Markides and Eschbach 2005, 2011; Palloni and Arias 2004; Shor, Roelfs, and Vang 2017; Singh and Siahpush 2002). While there is evidence that health-selective return migration (the so-called "salmon bias") and other data quality issues contribute to the phenomenon, studies generally conclude that these sources of bias are insufficient to explain away the Hispanic immigrant mortality advantage (Abraido-Lanza et al. 1999; Arias 2010; Akresh and Frank 2008; Crimmins et al. 2005; Elo et al. 2004; Hummer and Hayward 2015; Lariscy, Hummer, and Hayward 2015; Turra and Elo 2008). The mortality advantage is particularly pronounced among Mexican-born immigrants and at older ages (Angel et al. 2010; Elo et al. 2004; Hayward et al. 2014; Hummer et al. 2000; Lariscy 2011; Lariscy, Hummer, and Hayward 2015; Markides and Eschbach 2011). Evidence of lower mortality, especially when observed among low socioeconomic-status immigrants like Mexicans (Alba and Foner 2015), provides a strong challenge to widespread findings in the health literature that lower socioeconomic status is associated with poorer health (Hayward and Gorman 2004; Masters, Hummer, and Powers 2012; Zsembik and Fennell 2005). Because it runs contrary to typical patterns of health determination, the Hispanic mortality advantage is often referred to as an 'epidemiological paradox' (Markides and Coreil 1986) or the

'Hispanic paradox' (Abraido-Lanza et al. 1999; Franzini, Ribble, and Keddie 2001; Markides and Eschbach 2005; Palloni and Arias 2004).

Recent literature on immigrant health has broadened the scope to include disability. The emerging evidence suggests that the Hispanic immigrant health advantage in mortality may not extend to disability: Several studies – using various disability measures and data sources – report that Hispanic immigrants, and particularly Mexicans, have higher disability rates than non-Hispanic whites at age 60 and older (Angel, Angel, and Hill 2014; Eschbach et al. 2007; Garcia et al. 2015; Hummer, Benjamins, and Rogers 2004; Markides et al. 2007; Nam, Al-Snih, and Markides 2015).

Relatively little is known about disability among Hispanic immigrants younger than 60. Warner and Brown (2011) estimate longitudinal models of functional limitations using Health and Retirement Study (HRS) data and show that Mexican Americans experience limitations at higher rates from age 53 to 75 than non-Hispanic whites. They adjust for nativity but do not look specifically at foreign-born Mexicans. Hayward et al. (2014) show that foreign-born Hispanic men in the HRS have comparable disability rates to non-Hispanic whites at ages 50–54, but rates increase more rapidly among foreign-born Hispanic men at older ages. Foreign-born Hispanic women already have higher disability rates than white women at ages 50–54, and this differential widens with age. Also using HRS data, Crimmins, Hayward, and Seeman (2004) find that foreign-born Hispanics between ages 51 and 61 are more likely to have a disability than non-Hispanic whites. Using National Health Interview Study (NHIS) data, Melvin et al. (2014) find that at midlife (ages 50–64) both male and female foreign-born Hispanics (with the exception of Puerto Ricans) have equal or lower proportions of functional limitations as compared to non-Hispanic whites, but the proportions reverse by age 65 for both men and women on all measures of disability. Using American Community Survey (ACS) data, Sheftel (2017) estimates that 18–64-year-old foreign-born Mexican males and females experience lower disability rates than non-Hispanic whites and those of Mexican origin born in the United States. However, above age 64, foreign-born Mexican males have higher disability rates than white males, and foreign-born Mexican females have higher rates than US-born white females and females of Mexican origin born in the United States.

Surveying the literature on immigrant disability, the findings – collectively – suggest a health advantage at younger ages that later reverses. This type of phenomenon, known as a "crossover" in demography and public health, is based on two graphs representing age-specific rates of two populations that narrow, intersect, and then diverge over some age range. (See, e.g., Lariscy 2017 for a recent contribution on black–white mortality crossovers at old age.) However, no study has systematically analyzed this phenomenon, including at what age the advantage reverses, how pronounced this pattern is, and how it varies by gender, age at migration, education, and

type of disability. Further, while a few of the studies reviewed above base their findings on age 50 and older (Crimmins, Hayward, and Seeman 2004; Hayward et al. 2014; Melvin et al. 2014; Sheftel 2017; Warner and Brown 2011), the primary focus of research to date has been populations older than 60. Disablement is a process that can begin at young ages; thus, taking a broader (life course) perspective is important to understanding disability onset and progression (Verbrugge and Jette 1994).

This paper attempts to fill this void by presenting results from a comprehensive analysis of disability patterns comparing foreign-born Mexicans and non-Mexican Hispanic immigrants to US-born demographics from age 40. We use large nationally representative samples of these populations available in the 2010–2014 ACS, enabling us to determine more accurately the age-specific patterns of disability, including at what ages disability rates cross. Unlike previous studies, we estimate disability rates from middle working age onward (age 40 and above) and for single-year age groups. In addition to (unadjusted) rates of overall disability, we also present evidence stratified by gender and type of disability. Additionally, we look at patterns by educational attainment and age at migration to evaluate explanations related to socioeconomic status and acculturation.

2. Data, measures, and methods

This study uses data from the 2010–2014 American Community Survey (ACS) public-use microdata sample (PUMS), which randomly sampled 5% of the American population between 2010 and 2014 (Ruggles et al. 2015). The ACS is offered in Spanish and English and is completed by one household member on behalf of all others.

We restricted the analysis to specific groups based on race, ethnicity, and nativity, and use categories and terminology consistent with the ACS survey. The ACS asks about Hispanic origin, race, and place of birth. Respondents of Hispanic, Latino, or Spanish origin were prompted to provide further detail. Those who indicated "Mexican, Mexican American, or Chicano" were considered to be of Mexican origin here and were further divided by birthplace into those born in Mexico (foreign-born Mexicans) and those born in the fifty United States (US-born of Mexican origin). Non-Mexican Hispanics were also divided by birthplace into those born in Central and South America (foreign-born Hispanics) and those born in the fifty United States (US-born Hispanics). Island-born Puerto Ricans were included among foreign-born Hispanics because typical immigrant health patterns have been shown to hold for those who migrate from Puerto Rico to mainland United States (Landale, Oropesa, and Gorman 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.

Table 1 displays basic descriptive statistics for the groups analyzed. Combined, our sample consists of 6,597,533 people between ages 40 and 80. The lower age bound of 40 was implemented to conduct analyses by age at migration (while still observing prime working ages). We did not go beyond age 80 because of sample size and selective mortality concerns. Results for those outside this age range are available upon request.

Table 1: **Subgroups included in the analysis, sample size, and selected demographic characteristics (weighted)**

Full sample
N = 6,597,533
Male: 48.4%
Mean Age: 56.5
Over 65: 24.4%

US-born
N = 6,173,601
Male: 48.3%
Mean Age: 56.8
Over 65: 25.1%

Foreign-born Hispanic
N = 423,932
Male: 49.2%
Mean Age: 53.3
Over 65: 16.3%
Age at Migration: 26.6
Naturalized: 39.3%

Non-Hispanic white
N = 5,257,945
Male: 48.8%
Mean Age: 57.2
Over 65: 26.4%

Non-Hispanic black
N = 648,383
Male: 45.4%
Mean Age: 55.2
Over 65: 19.9%

Mexican
N = 185,051
Male: 48.4%
Mean Age: 53.8
Over 65: 17.1%

Hispanic (non-Mexican)
N = 82,222
Male: 48.0%
Mean Age: 52.1
Over 65: 12.4%

Mexican
N = 299,509
Male: 51.6%
Mean Age: 51.9
Over 65: 12.9%
Age at Migration: 25.5
Naturalized: 36.1%

Hispanic (non-Mexican)
N = 194,423
Male: 46.5%
Mean Age: 54.8
Over 65: 20.1%
Age at Migration: 27.9
Naturalized: 43.1%

Source: ACS 2010–2014.

ACS disability measures are generally considered reliable for studying US disability patterns and trends (Elo, Mehta, and Huang 2011; Erikson 2012; Gubernskaya, Bean, and Van Hook 2013; Markides et al. 2007; Siordia 2016; Siordia and Ramos 2015). The survey includes six disability questions regarding hearing, vision, cognitive, ambulatory, self-care, and independent living difficulties, covering a

wide range of activities and health-related difficulties. We constructed a binary measure of overall 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 questions).

To estimate age-specific rates of disability for various groups (by gender), the individual-level data was aggregated by one-year age groups, using ACS provided person weights, *perwt,* normalized using Stata's analytic weight function. In addition to overall disability prevalence rates ("any disability"), we report results from separate analyses of the six underlying disability domains. We also analyzed total disability rates, calculated using the total number of disabilities reported across the six domains.

Focusing on age-specific prevalence allows us to study disability patterns adjusted for differences in age structure across the underlying populations. Such differences do exist (see next section), and they have been shown to meaningfully affect aggregate disability patterns based on crude rates (Sheftel 2017).

For evidence of an immigrant health advantage in disability that reverses, we look for crossovers in age-specific rates. Our sample sizes are generally large, but since we are reporting rates for single-year age groups (by gender) statistical precision may still be a concern. We report 95% confidence intervals in all graphs and comment on the statistical significance of rates.

3. Results

3.1 Sample descriptive statistics

The final analytic sample is composed of 6,597,533 US-born non-Hispanic whites, blacks, Mexicans, and Hispanics (non-Mexican) as well as foreign-born Mexicans and Hispanics (non-Mexicans). The mean age in the analytic sample is 56.5, and 24.4% of the sample is over the age of 65. The sample is 48.4% male and 91.7% US-born. Our primary focus is on the 299,509 foreign-born Mexicans in the sample since they are the largest subpopulation. However, as we note below, the patterns found for foreign-born Mexicans generally hold for foreign-born Hispanics from other countries. Foreign-born Mexicans are considerably younger than the overall sample, with a mean age of 51.9 and 12.9% over the age of 65. The mean age at migration is 25.5, and 36.1% 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.

3.2 Mexican-born vs. US-born

Table 2 shows age-specific prevalence rates of overall 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 US-born males and females for comparison (including US-born of Mexican origin).

As is evident from this first illustration of disability rates, both male and female foreign-born Mexicans start off with an overall disability advantage. In their 40s, they have the lowest rates of overall disability among the subpopulations investigated here. However, that advantage starts to decline with age, and it is reversed at old age. For example, at age 45, the overall disability rates for foreign-born Mexican males and females are 5.8% and 6.3%, respectively. This is compared to 11.1% for the US-born population. In contrast, 45.5% of Mexican-born males report having a disability at age 75 compared to 36.3% for US-born males. For Mexican-born females at this age, the rate is even greater at 49.8%, which compares to 36.3% for US-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 are near ages traditionally associated with retirement from the workforce (Munnell 2015). Figure 5 estimates that the average retirement age in 2013 was 64 for men and 62 for women. The conclusions are similar when using only US-born non-Hispanic whites as the comparison group.

Table 2: **Age-specific overall disability rates for selected populations (in percentages)**

Age	US-born all (NHW+NHB+ Mex+Hisp)	US-born females (NHW+NHB+ Mex+Hisp)	US-born males (NHW+NHB+ Mex+Hisp)	US-born NHW females	US-born NHW males	US-born Mexican females	US-born Mexican males	Foreign-born Mexican females	Foreign-born Mexican males
40	8.9%	8.8%	9.0%	8.3%	8.3%	8.1%	9.8%	3.9%	3.9%
41	9.2%	9.1%	9.3%	8.5%	8.6%	8.9%	10.9%	4.9%	4.5%
42	9.9%	9.8%	10.0%	9.1%	9.2%	9.0%	11.2%	4.5%	3.6%
43	10.1%	10.0%	10.2%	9.2%	9.3%	9.9%	11.8%	5.3%	4.3%
44	10.8%	10.6%	10.9%	9.8%	10.0%	9.7%	12.1%	6.2%	4.5%
45	11.1%	11.2%	11.1%	10.2%	10.3%	12.2%	12.2%	6.6%	5.8%
46	11.9%	11.7%	12.1%	11.0%	11.1%	12.2%	13.7%	6.5%	5.8%
47	12.2%	12.2%	12.3%	11.1%	11.4%	12.9%	13.4%	7.5%	7.0%
48	12.8%	12.6%	13.1%	11.4%	12.1%	13.3%	15.4%	9.1%	7.0%
49	13.4%	13.4%	13.5%	12.1%	12.5%	14.0%	14.3%	8.7%	8.1%
50	13.9%	13.8%	14.0%	12.7%	13.0%	15.5%	15.8%	10.6%	8.1%
51	14.8%	14.5%	15.2%	13.2%	13.8%	16.4%	18.2%	10.6%	8.6%
52	15.3%	15.3%	15.3%	13.8%	13.9%	17.3%	18.4%	11.5%	9.3%
53	15.9%	15.8%	16.0%	14.2%	14.7%	18.4%	18.3%	14.3%	10.5%
54	16.6%	16.5%	16.7%	14.8%	15.3%	19.2%	20.2%	14.7%	10.6%
55	17.0%	16.7%	17.3%	15.1%	15.9%	18.6%	20.0%	14.6%	11.9%
56	17.9%	17.5%	18.3%	15.9%	16.9%	17.5%	22.4%	16.0%	12.9%
57	18.2%	17.7%	18.8%	16.3%	17.2%	21.4%	24.6%	17.9%	15.0%
58	18.8%	18.2%	19.4%	16.8%	17.9%	22.0%	24.7%	17.1%	15.5%
59	19.5%	18.8%	20.3%	16.8%	18.7%	23.6%	26.4%	17.4%	14.2%
60	20.4%	19.4%	21.5%	17.3%	20.2%	27.1%	24.0%	22.1%	15.9%
61	20.8%	19.7%	22.1%	17.7%	20.7%	24.2%	26.6%	20.9%	19.5%
62	21.6%	20.2%	23.0%	18.4%	21.6%	25.7%	30.7%	22.8%	22.3%
63	21.9%	20.4%	23.4%	18.6%	22.1%	26.8%	29.9%	22.1%	21.3%
64	22.7%	21.2%	24.3%	19.3%	23.0%	30.2%	35.5%	26.8%	22.9%
65	23.0%	21.4%	24.8%	19.8%	23.6%	28.9%	35.0%	27.3%	24.2%
66	23.4%	22.0%	25.0%	20.4%	23.9%	28.7%	33.4%	27.6%	25.8%
67	24.2%	22.5%	26.1%	20.8%	24.9%	31.5%	35.9%	29.0%	28.5%
68	24.9%	23.7%	26.2%	21.8%	25.3%	33.1%	34.7%	32.9%	29.7%
69	26.0%	24.7%	27.4%	23.0%	26.6%	32.8%	36.8%	34.8%	33.1%
70	27.1%	26.0%	28.4%	24.3%	27.6%	33.4%	36.8%	35.6%	29.6%
71	28.0%	26.6%	29.7%	24.9%	28.9%	33.3%	39.0%	34.9%	34.6%
72	29.3%	28.3%	30.5%	26.4%	29.5%	40.3%	35.5%	37.8%	32.2%
73	30.5%	29.3%	31.8%	27.7%	30.9%	34.8%	42.2%	42.4%	40.4%
74	32.5%	31.5%	33.7%	29.7%	32.8%	38.2%	40.3%	47.1%	41.7%
75	35.6%	35.0%	36.3%	33.2%	35.5%	45.0%	43.9%	49.8%	45.4%
76	36.9%	36.2%	37.7%	34.5%	37.0%	44.2%	47.4%	51.4%	47.5%
77	39.4%	39.1%	39.8%	37.4%	39.0%	48.8%	50.5%	50.5%	47.6%
78	41.0%	40.6%	41.5%	38.9%	41.0%	52.0%	48.9%	54.0%	51.9%
79	43.3%	42.5%	44.4%	40.9%	43.9%	50.3%	53.0%	60.7%	48.5%
80	46.6%	46.4%	46.9%	44.8%	46.3%	55.7%	57.7%	60.9%	55.4%

Source: ACS 2010–2014.
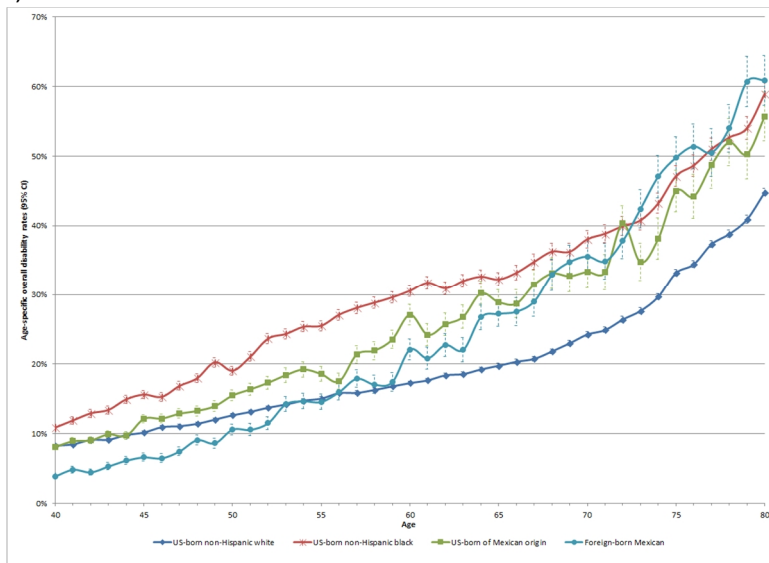
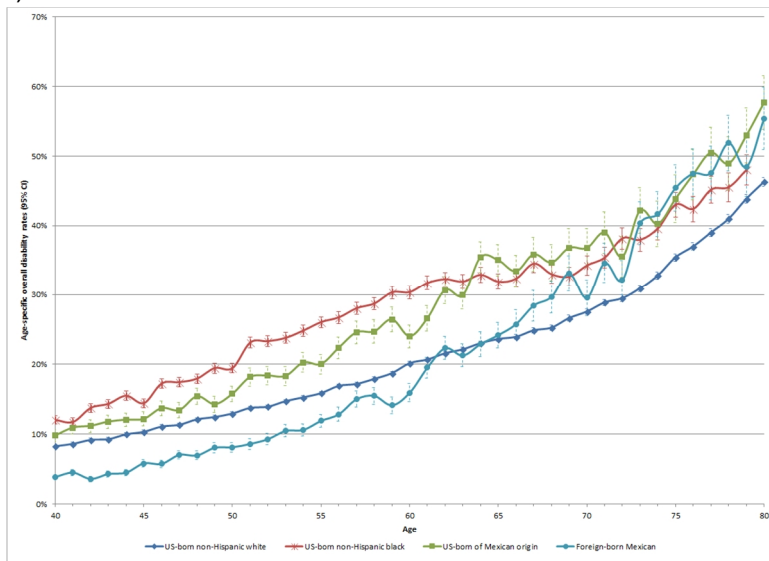**Figure 1:** **Disability rates: Mexican-born vs. US-born by gender**
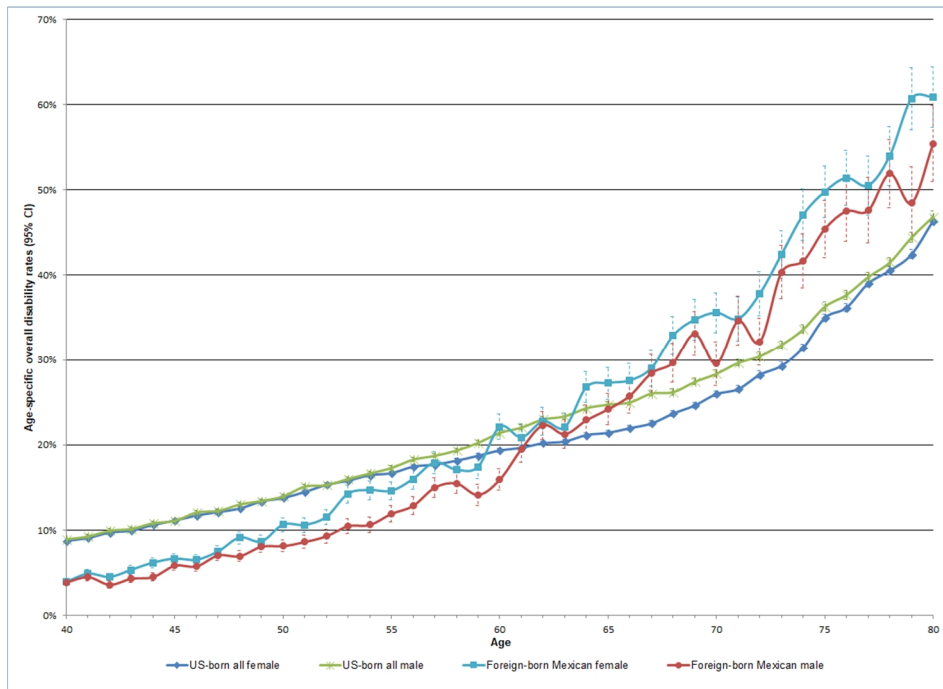
As shown in Figure 2a, the advantage in terms of lower disability prevalence among foreign-born Mexican females compared to US-born non-Hispanic white females at prime working ages ends at age 53; after age 59, the rates for foreign-born Mexican females are significantly greater. There is no sharp crossover age, but it is clear that the pattern reverses between ages 52 and 60. Among foreign-born Mexican and US-born non-Hispanic white men, a similar reversal of the disability advantage occurs between ages 60 and 66, as shown in Figure 2b.

Figure 2: Disability rates

a) Mexican-born vs. US-born females

b) Mexican-born vs. US-born males

Source: ACS 2010–2014.

In addition, Figures 2a and 2b compare foreign-born Mexicans to US-born non-Hispanic blacks. Of note is the fact that disability rates for both male and female foreign-born Mexicans also cross over those of blacks, albeit at older ages than they do for non-Hispanic whites. This crossover is noticeable despite the fact that blacks are consistently found to have significantly lower life expectancies than foreign-born Hispanics (Lariscy, Hummer, and Hayward 2015), but it is consistent with previous findings that Mexican Americans (including foreign and US-born) have higher rates of functional limitations than blacks (Warner and Brown 2011).

Finally, Figures 2a and 2b also show the contrast between foreign-born Mexicans and American-born Mexicans. Compared to US-born whites, US-born of Mexican origin display 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 pattern is in stark contrast to foreign-born Mexicans, whose disability rates are much below those of either American-born group at younger ages. At older ages, the disability rates of foreign-born Mexicans converge to the levels of those of Mexican origin born in the United States and, among foreign-born Mexican females, the levels even exceed those at some ages. Like the American-born of Mexican origin, foreign-born Mexicans display a more rapid increase in disability prevalence during working ages compared to US-born whites. However, while the gap between US-born of Mexican origin 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.

### 3.3 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 US-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, 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 male immigrants from Mexico crosses over the rate of US-born white males at ages 62–65, the disability rate for other male Hispanic immigrants remains at or below that of whites.

Figure 3:   Disability rates

a) Mexican-born vs. US-born of Mexican origin females
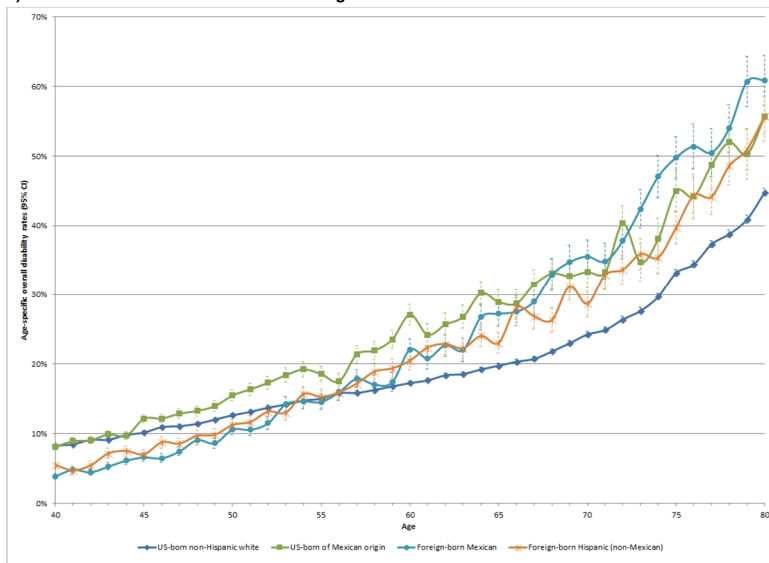
**b) Mexican-born vs. US-born of Mexican origin males**
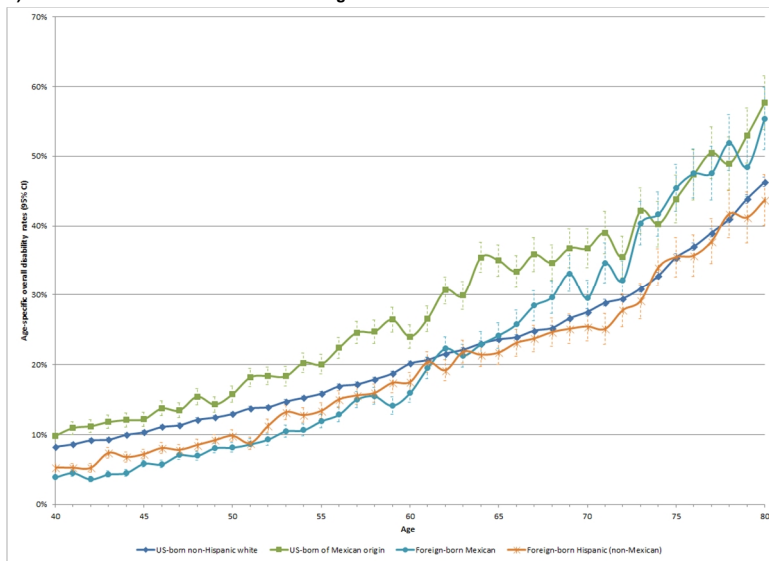
Source: ACS 2010–2014.

3.4 Mexican-born by age at migration

Figures 4a and 4b show the overall disability rates for Mexican-born Hispanic males and females by age at migration to the United States: immigrated by age 18 compared to immigrated between age 19 and 30. These groups were constructed to examine the potential role of (negative) acculturation. Previous studies have found that length of time in the United States and immigration at young ages have been found to be associated with poorer health outcomes consistent with an acculturation hypothesis (Markides and Rote 2015; Riosmena et al. 2015; Garcia et al. 2017; Garcia and Reyes 2017). The immigration literature traditionally distinguishes between those who immigrated as children and those who immigrated as adults because of their different acculturation trajectories (Oropesa and Landale 1997; Rumbaut 2004) and their impact on health and disability outcomes (Garcia et al. 2017; Garcia and Reyes 2017; Gubernskaya 2015; Gubernskaya, Bean, and Van Hook 2013).
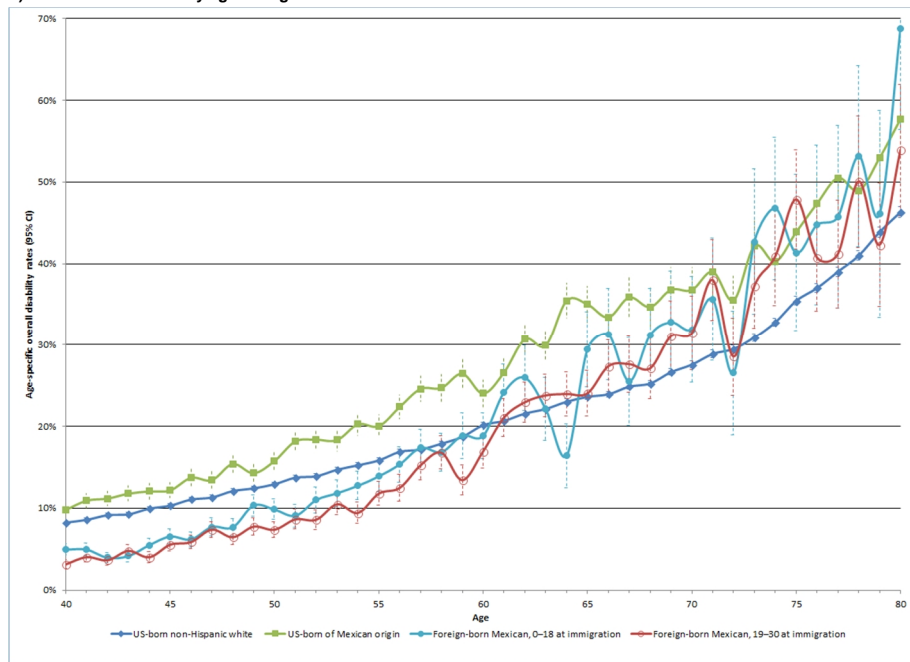
Figure 4:   Disability rates

a) Mexican-born females by age at migration
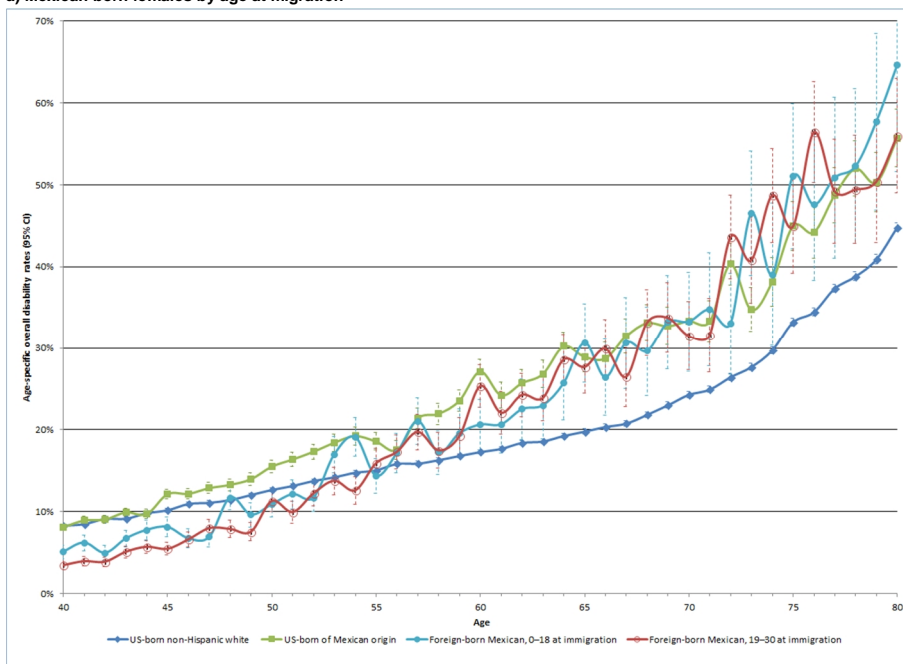
Figure 4:   (Continued)

b) Mexican-born males by age at migration

We see that the disability prevalence rates are fairly similar across the two age-at-migration groups. At ages 40 to 47, both female groups have lower rates of disability than non-Hispanic white women and women of Mexican origin born in the United States. This health advantage is reversed after age 59. There is evidence that those who immigrated at older ages have (slightly) lower rates of disability at ages 40 to 45 than those who immigrated as children or youth. After age 45, however, rates tend to be similar between the two immigrant groups. For men, disability rates tend to be similar for both age-at-migration groups and lower compared to whites up to approximately age 57. Past age 67, rates for both immigrant groups remain similar and tend to exceed the rates of whites (but those differences are often not statistically significant).

3.5 Mexican-born by education level

An alternative to the acculturation hypothesis is the idea that Hispanic immigrants are subject to disproportionate exposure to occupational risk (Kochhar 2005; Toussaint-Comeau 2006; Dong and Platner 2004; Smith et al. 2005). Unfortunately, occupation data is only available in the ACS for those individuals currently working and therefore not for those who have retired from the work force. We use educational attainment as a proxy for occupational (risk) environment. Specifically, to evaluate the possibility that the over-representation of foreign-born Mexicans in high-risk occupations contributes to higher disability rates at older ages, we divide our subgroups of interest by education level: those who have not completed a high school degree and those who graduated high school or completed a GED or have a higher level of education. Not having a high school degree tends to reduce the options in the labor market to more physically demanding occupations. If this is particularly true for foreign-born populations whose options are more limited to begin with, we would expect to see a more pronounced reversal pattern.

Figures 5a and 5b compare non-Hispanic whites to foreign-born Mexicans by education level (analysis by education level for additional groups available upon request). Figure 5a shows that foreign-born Mexican females without a high school degree have among the lowest disability rates at age 40, similar to their counterparts with a high school degree or more. However, the former group crosses over non-Hispanic whites with high school degrees by age 48, whereas the latter group retains its disability advantage until 57. For males, as shown in Figure 5b, a similar pattern holds, although the crossover points occur at older ages: 55 for foreign-born Mexicans without a high school degree and 66 for those with a high school degree or more.

Figure 5: Disability rates by education

a) Mexican-born females
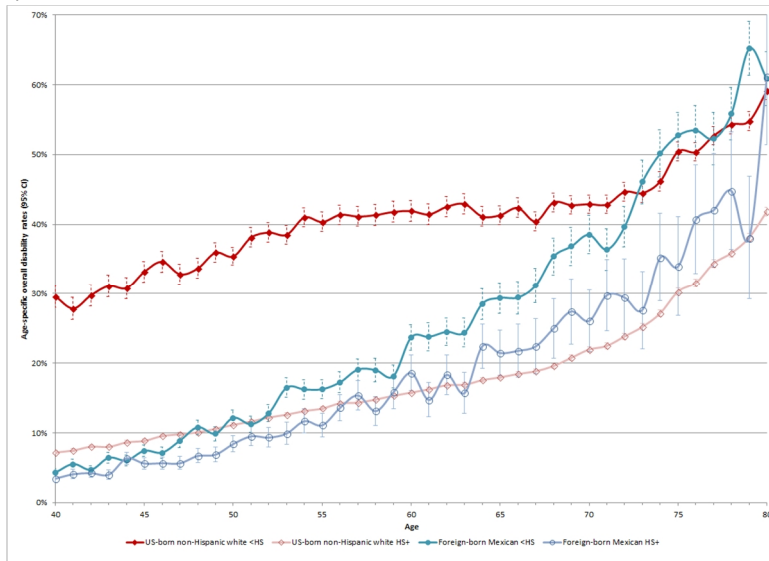
b) Mexican-born males
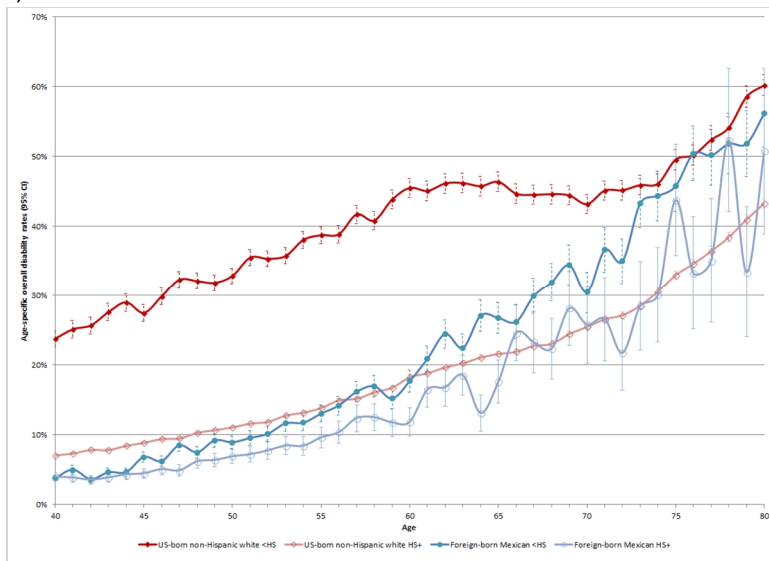
Source: ACS 2010–2014.

3.6 Specific disabilities

This section looks at the six components underlying the overall disability measure used above. Domain-specific analysis allows us to parse out the contribution of each component to the overall pattern and can help distinguish between different mechanisms and explanations for crossovers. The six disability domains are (1) ambulatory (Figures 6a–b), (2) cognitive (Figures 7a–b), (3) independent living (Figures 8a–b), (4) self-care (Figures 9a–b), (5) vision (Figures 10a–b), and (6) hearing (Figures 11a–b).

Across domains, 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 ages and the highest at old age. Third, the crossover 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.
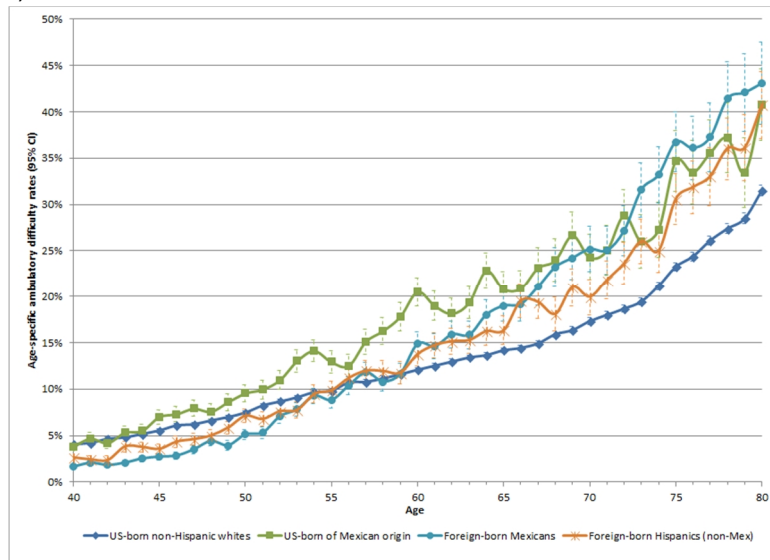
3.6.1 Ambulatory disability

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

Figure 6:   Ambulatory disability rates
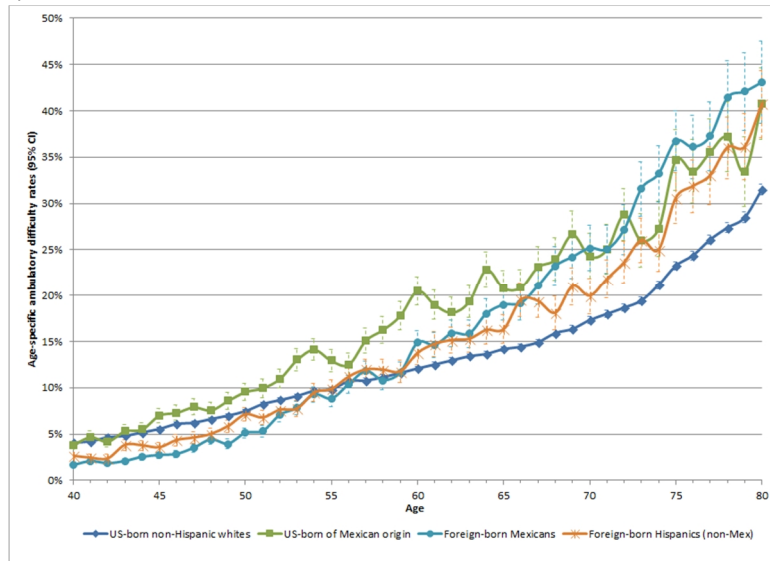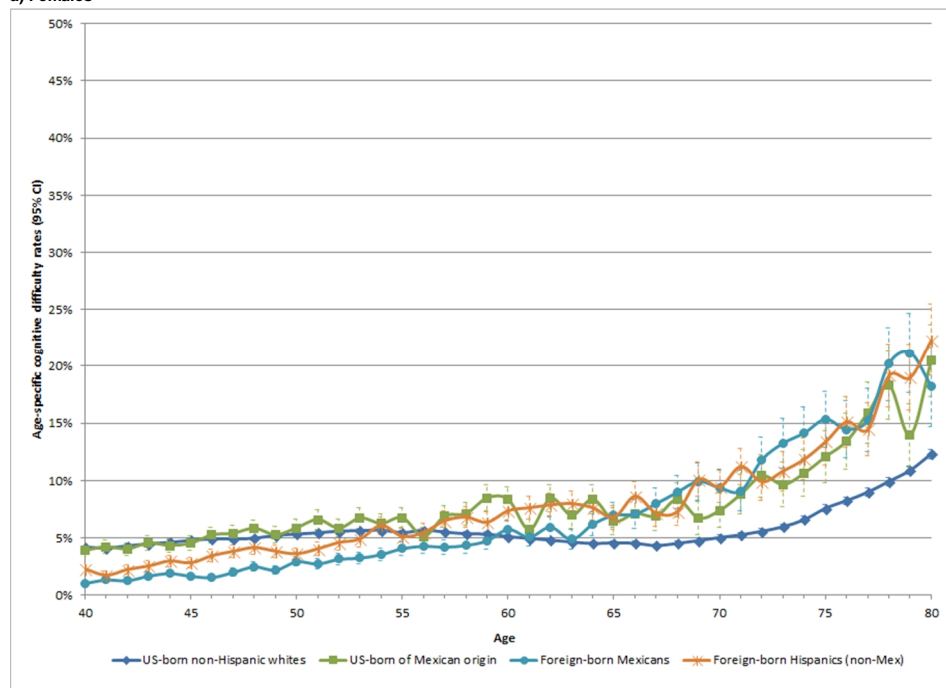
a) Females

b) Males

Source: ACS 2010–2014.

3.6.2 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: rates fluctuate but tend to be about double those of white males (14% vs. 7%, 16% vs. 8%). (See Figures 7a and 7b.)
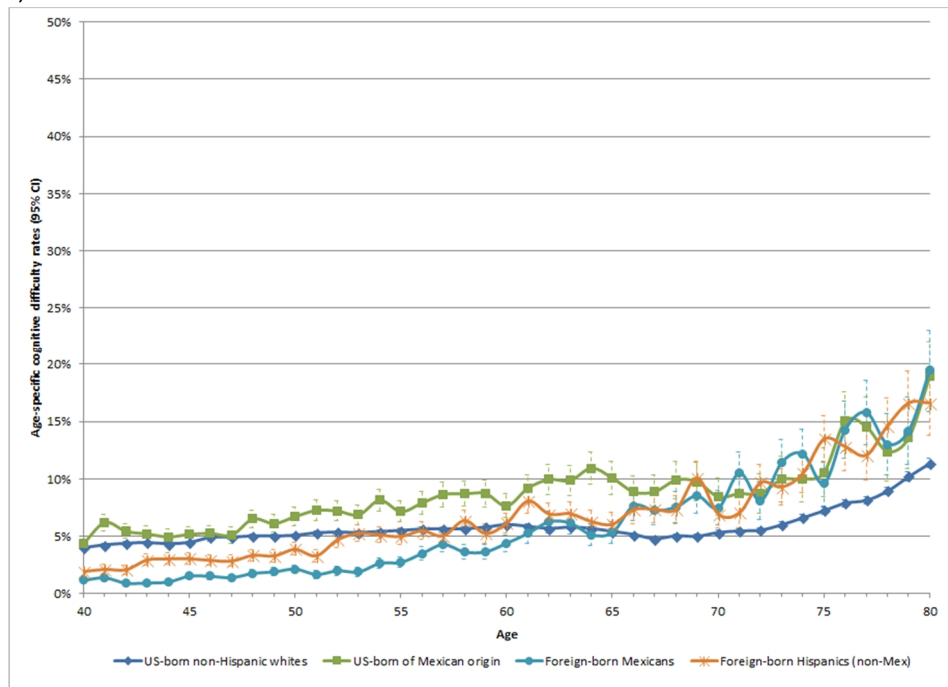
Figure 7:   Cognitive disability rates

a) Females

**Figure 7:** **(Continued)**

b) Males

Source: ACS 2010–2014.

### 3.6.3 Difficulty with independent living

Rates of difficulty living independently are greater among foreign-born Mexican females compared to whites by age 59 and then are the highest of all the subgroups by age 70, with as much as 17 percentage point difference. For men, rates cross over at age 63 and, although they fluctuate, are about 5 percentage points higher at old age. (See Figures 8a and 8b.)

Figure 8:   Independent living difficulty rates
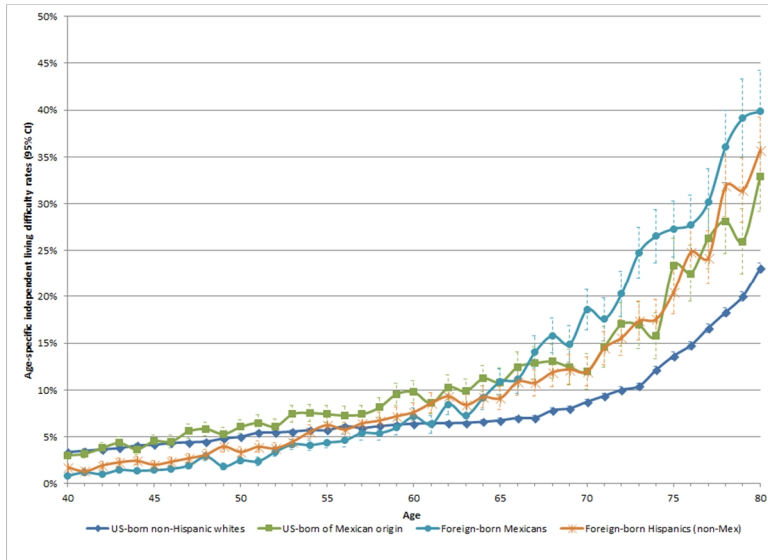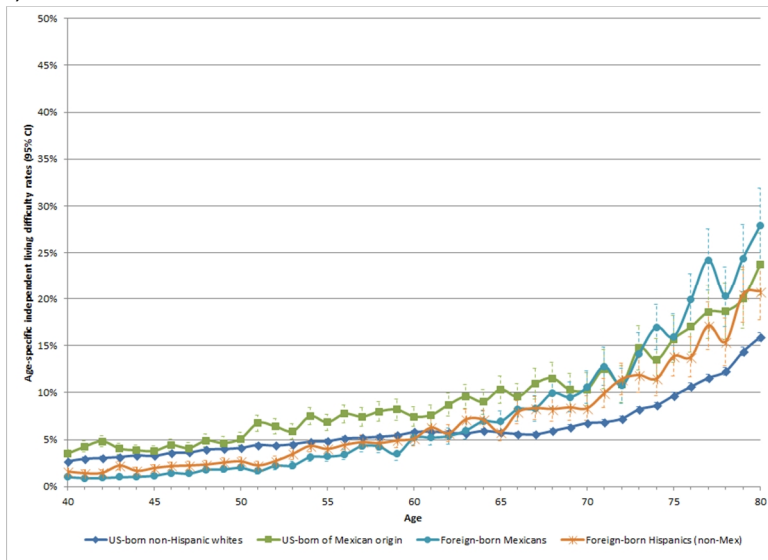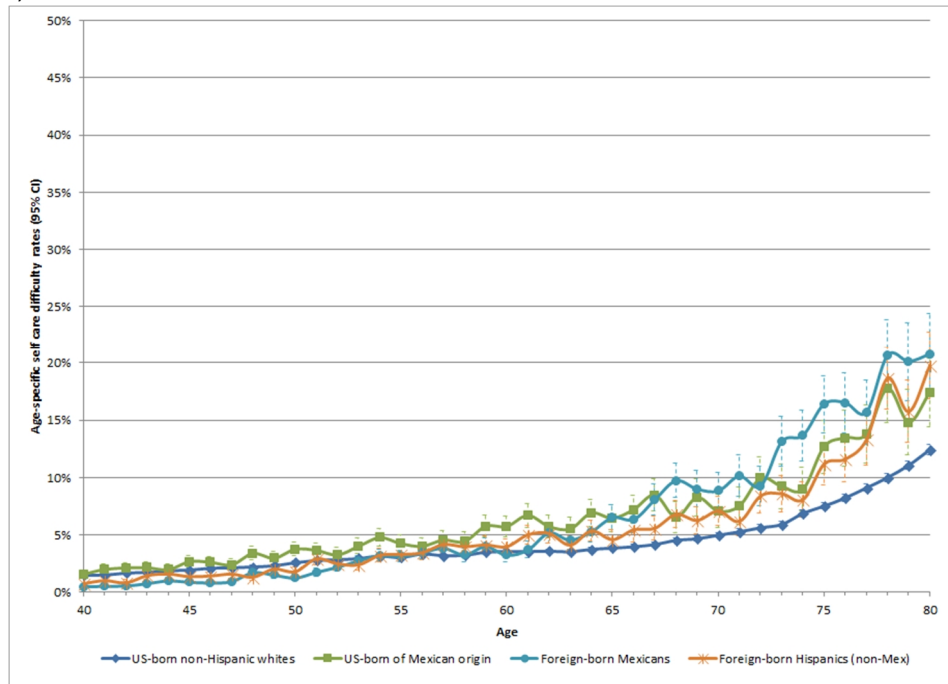
a) Females

b) Males

Source: ACS 2010–2014.

3.6.4 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 9a and 9b.)

Figure 9:   Self-care difficulty rates

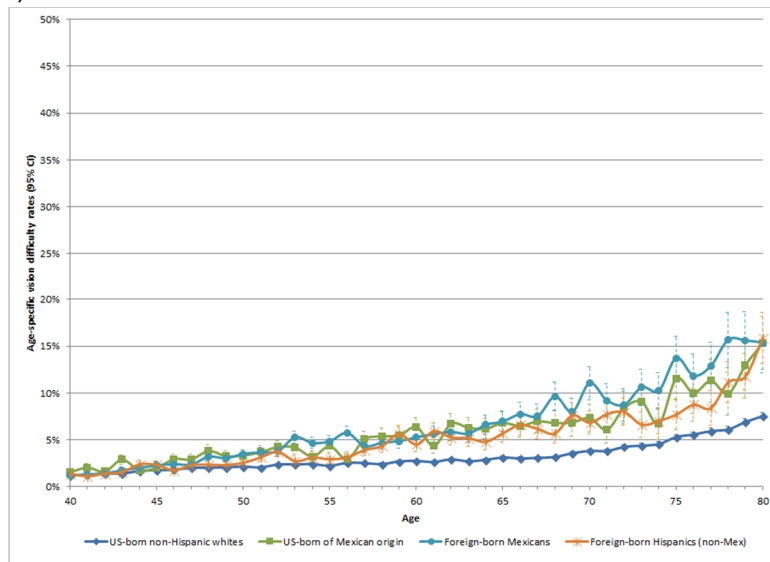a) Females

Figure 9:   (Continued)

b) Males
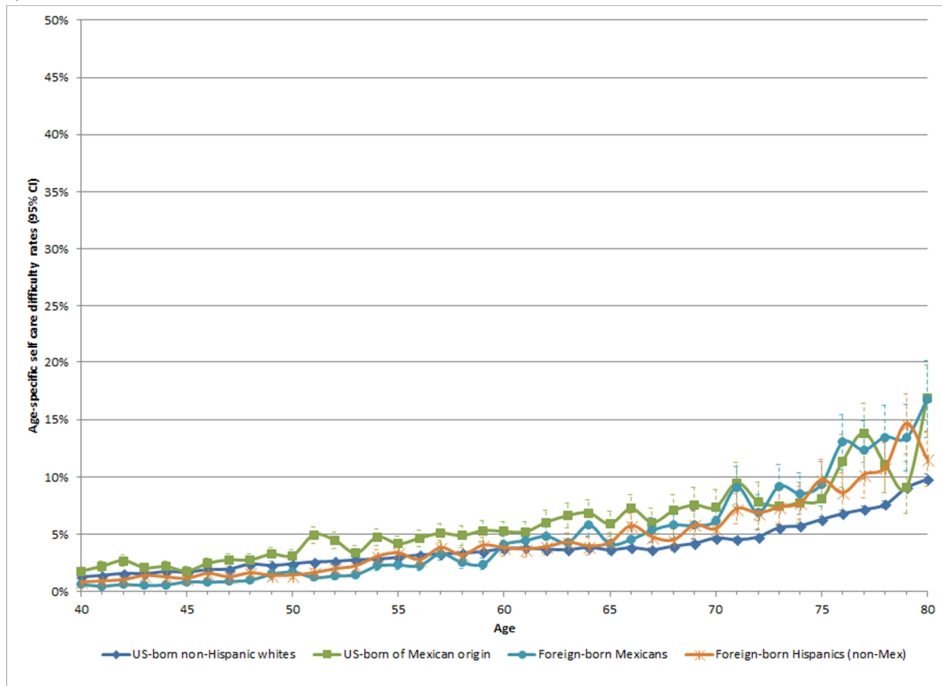
Source: ACS 2010–2014.

3.6.5 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 males, 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 10a and 10b.)

Figure 10:   Visual disability rates
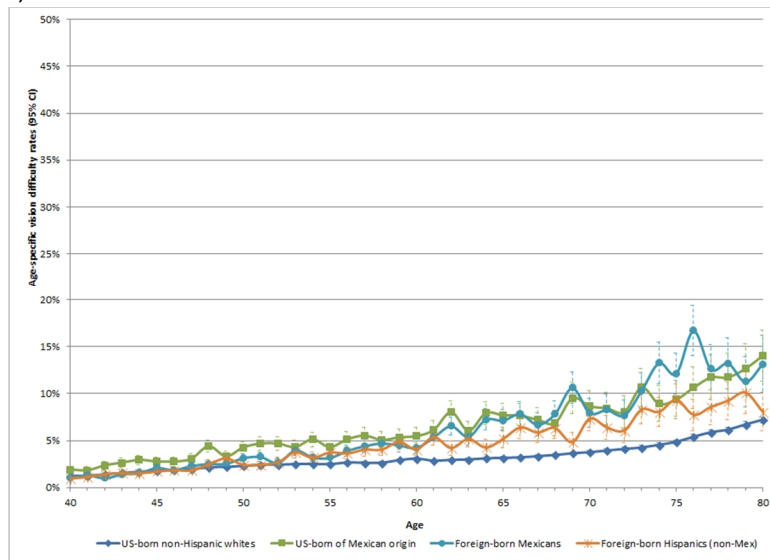
a) Females

b) Males

3.6.6 Auditory disability

Rates for auditory disabilities fluctuate but are consistently higher for foreign-born Mexican females than whites by age 65. However, the differences are not as great as for the other disabilities. For foreign-born Mexican males, hearing difficulties fluctuate but are mostly below whites, so this dimension is not a driver behind the pattern of disadvantage in overall disability. (See Figures 11a and 11b.)

Figure 11:   Auditory disability rates

a) Females
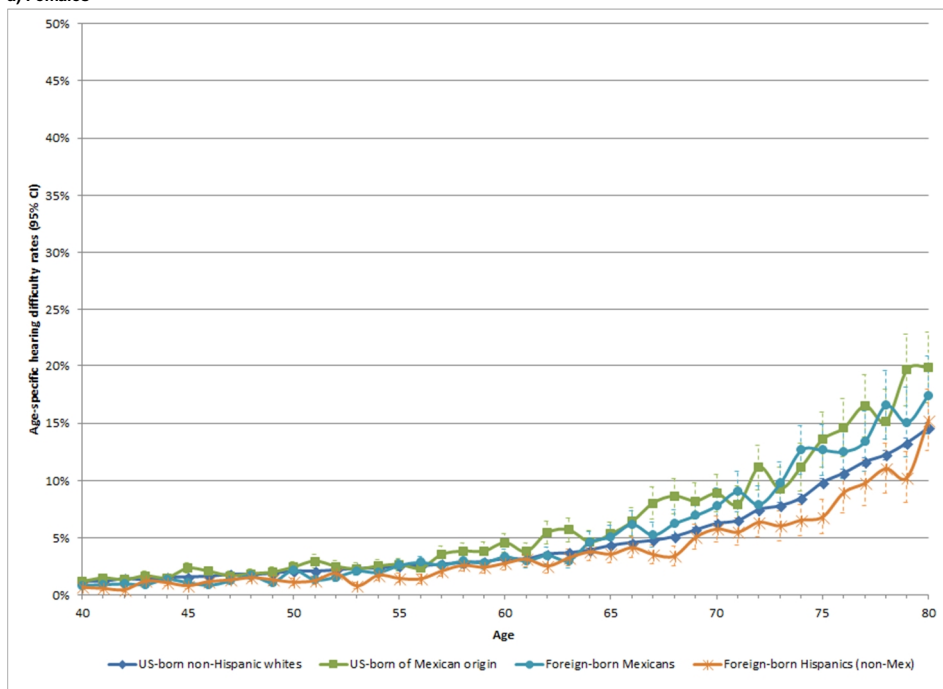
Figure 11: **(Continued)**

b) Males

4. Discussion and conclusion

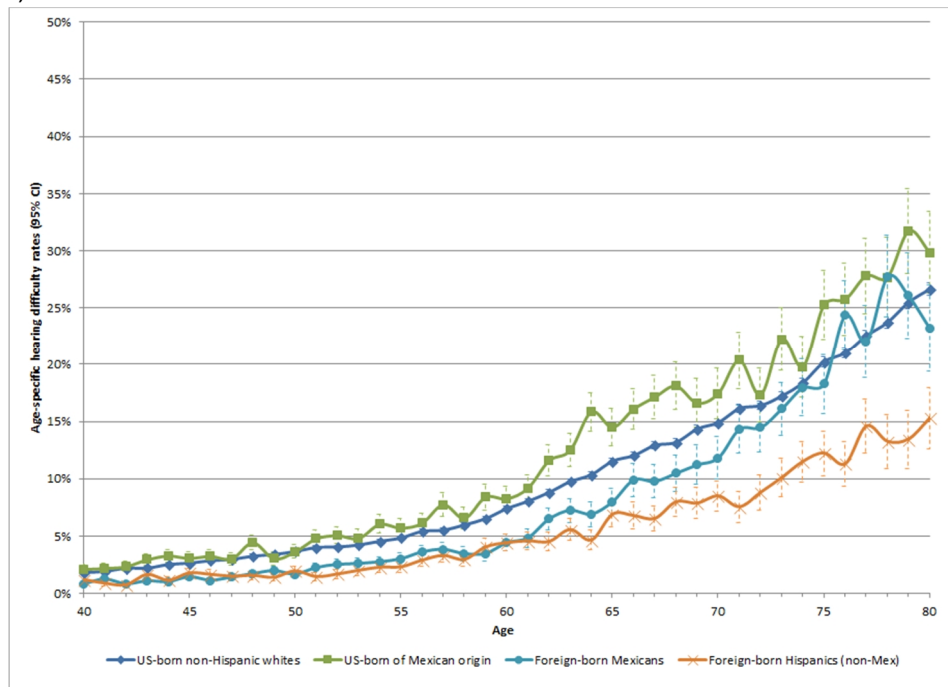We show that Hispanic immigrants generally, and Mexican immigrants specifically, consistently have the lowest disability prevalence rates at working age and the highest rates at old age. The latter result confirms previous findings of a Hispanic immigrant disability disadvantage at older ages (Crimmins, Hayward, and Seeman 2004; Eschbach et al. 2007; Hayward et al. 2014; Hummer, Benjamins, and Rogers 2004; Markides et al. 2007; Mehta, Sudharsanan, and Elo 2013; Melvin et al. 2014; Sheftel 2017). By including younger ages and estimating rates for single-year age groups, we are the first to document the exact pattern of reversal of the disability health advantage among Hispanic immigrants. The reversal occurs at relatively young ages: disability prevalence for foreign-born Mexican women is consistently lower until age 53 (age 61 for men)

and significantly greater after age 59 (66). Within these ages, disability rates for foreign-born Mexicans cross over those for non-Hispanic whites (of their respective gender). These "disability crossover" patterns are confirmed by additional analyses of specific disability domains and total number of disabilities (see Appendix Figure A-1).

The gender-stratified results reported here are consistent with the broader research on aging of the general population, which generally finds worse health outcomes for females as compared to males (e.g., Arber and Cooper 1999; Warner and Brown 2011). We document greater rates of disability prevalence among older foreign-born Mexican females, in aggregate as well as for specific disability domains, 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 a doubly disadvantaged population.

Potential explanations for this reversal in old age are ongoing and fall into three categories. First are those explanations that attribute the findings to the specific composition of immigrant populations. Specifically, there may be bias from nonrandom selection at work here. Young Mexicans with disabilities may not migrate in the first place for fear that disability may reduce employment opportunities and, for the same reason, those who become disabled at young ages after migrating may be more likely to return to their country of origin – processes that reduce the share of disabled migrants at young ages. This "healthy migrant hypothesis" or "salmon bias" in the Hispanic health paradox literature has been found to partially explain the lower mortality rates of immigrant populations. The fact that this analysis is based on cross-sectional data further implicates compositional differences driven by cohort variation over time. To substantiate this explanation, for Mexican immigrants born before 1960, educational attainment in Mexico was substantially lower and work conditions in the United States were harsher (Massey, Durand, and Malone 2002), both factors pointing to higher risk of disability. Given use of cross-sectional data, we cannot rule out these cohort-specific trends. Future research using longitudinal data is needed to investigate individual age–health trajectories and test specific explanations regarding immigrant disability.

The second realm of explanations implicates health outcomes among the Mexican immigrant population. High rates of diabetes, obesity, and sedentary life styles found among this population, while not coinciding with higher mortality rates, may account for higher disability rates (Markides et al. 2007). Further, the "health behavior and acculturation explanation" from the Hispanic health paradox literature (Abraido-Lanza, Chao, and Florez 2005; Akresh 2007; Antecol and Bedard 2006; Cho et al. 2004; Fenelon 2013; Finch et al. 2009; Jasso et al. 2000; Kimbro 2009; Riosmena, Wong, and Palloni 2013) could be at work here. It posits that higher acculturation (measured by nativity and time in the United States) is associated with increased unhealthy behavior (drinking alcohol, smoking, diet) and worse health status (BMI) among Hispanics in the

United States. Healthier behavior among Hispanic immigrants and acculturation is consistent with a health advantage in disability at younger ages that subsequently narrows (to the extent that age proxies for time in the United States). However, our analysis by age at migration (see Figures 4a and 4b) finds similar disability rates between the two groups, contrary to what one would expect in the presence of important acculturation effects.

Finally, behavioral and environmental exposure factors make up the third category of explanations. Hayward et al. (2014) suggest that the apparent contradiction between low mortality rates but high disability rates among the (older) Hispanic immigrant population points to a decoupling of the typical connection between chronic disease and disability. Verbrugge and Jette's (1994) sociomedical model of the disablement process, which describes the pathway from pathology to disability, highlights 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) with high rates of workplace injury (Dong and Platner 2004; Smith et al. 2005) is one such risk factor, and heightened disability rates among foreign-born Hispanics at older ages (Hayward et al. 2014; Melvin et al. 2014) may also reflect a cumulative effect of this risk factor.

We find evidence consistent with this third hypothesis in our analysis. 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 instruments mirror the familiar ADL and IADL measures (Brault 2009) that are known to be elevated among agricultural and construction workers. Consistent with our age-specific patterns, Weigel, Armijos, and Beltran (2014) find elevated functional disability rates, specifically among middle-aged 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 due to occupational injury (Schwatka, Butler, and Rosecrance 2012). As Hummer and Hayward (2015) note, employment in these occupations may mean more "wear and tear" (p. 23) over the years, with a high risk of disablement but not necessarily mortality. Our analysis of foreign-born Mexicans by educational attainment, while not directly testing exposure to occupational risk, does suggest that those foreign-born Mexicans with lower levels of education who are more likely to be employed in risky occupations like construction cross over US-born non-Hispanic whites with high school degrees at younger ages than their counterparts with high school degrees. However, this analysis also indicates that occupational risk, and more generally socioeconomic status, is not the only factor contributing to the crossover pattern, since foreign-born Mexicans with high school degrees or more also end up with a disability disadvantage later in life.

Socioeconomic and residential disadvantage, and disparities in access to health care and health insurance (Derose, Escarce, and Lurie 2007) are additional environmental risk factors leading to a cumulative health disadvantage for low socioeconomic status immigrants like Mexicans (Warner and Brown 2011). Low levels of health insurance coverage, especially among the large undocumented Mexican population, are associated with lower rates of health care utilization (Ortega et al. 2007), which may exacerbate the disablement process over time. While these causal mechanisms remain in the realm of hypothesis here, they point to important directions for future research that would use longitudinal data to address change over time.

Taken as a whole, these potential explanatory mechanisms point to processes that heighten the risk for disability among the Mexican immigrant population but do not necessarily contribute to mortality. Thus, our findings are consistent with previous research concluding that low mortality rates together with high disability rates mean that Mexican immigrants are living a protracted period with disability at older ages (Markides et al. 2007). Further research modeling these processes is necessary beyond these largely descriptive findings.

The evidence presented here of a reversal in the Hispanic immigrant health advantage based on disability is subject to several caveats. Mortality differentials between the US-born and foreign-born populations may affect our results. If mortality is lower among older foreign-born Hispanics than natives, the most severely disabled US-born non-Hispanic whites may die earlier, leaving a positively selected (i.e., lower disability) comparison group. We cannot rule out that mortality selection is a contributing factor but note that disability rates cross at relatively young ages when mortality rates are relatively low and are similar between the two populations. Further, there is evidence that Hispanics are more health pessimistic than other demographics (Angel and Guarnaccia 1989; Bzostek, Goldman, and Pebley 2007; Hummer, Benjamins, Rogers 2004; Markides et al. 2007; Shetterly et al. 1996; Viruell-Fuentes et al. 2011). There may also be differences in self-reports based on language (Spanish vs. English) of the interview (Tirodkar et al. 2008). We note that our group comparisons within the Hispanic population would presumably remain valid, even in the presence of these types of measurement error (Chandola and Jenkinson 2000).

Despite these limitations, this research is an important step toward a more complete understanding of the health of immigrants. Our finding that a crossover in disability rates occurs at or even before traditional retirement ages highlights the importance of adopting a life course perspective of the disablement process (Dannefer 2003; Verbrugge and Jette 1994). Hummer and Hayward (2015) note that the Hispanic population over age 65 is expected to quintuple between 2012 and 2050. Especially coupled with their disadvantaged socioeconomic position, disability trends are alarming for this rapidly growing population. Our findings suggest that Hispanic immigrants face

comparatively larger disablement risks during their working years, even among the more highly educated sector of the population. For policy makers and service providers, this implies that measures to reduce health disparities should be focused at even younger ages.

5. Acknowledgements

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Appendix

This appendix provides greater detail specific to the use of American Community Survey (ACS) data in this paper:

1. ACS measures of disability

The six disability-related instruments measuring hearing, vision, cognitive, ambulatory, self-care, and independent living difficulty in the ACS and (comparable instruments from the Census long form) are commonly used in disability research (e.g., Elo, Mehta, and Huang 2011; Gubernskaya, Bean, and Van Hook 2013; Markides et al. 2007; Siordia and Ramos 2015; Stern 2004). They are similar to questions found in other surveys and censuses worldwide (Verbrugge 2016). In particular, self-care and independent living difficulty measures mirror the widely used *Activities of Daily Living* (ADL) and *Instrumental Activities of Daily Living* (IADL) measures (Brault 2009). The ACS hearing, vision, cognitive, ambulatory, and self-care disability instruments have been shown to provide reliable measures; the independent living instrument has been found to be somewhat less reliable (Stern 2004).

Following is the wording for each of the six survey questions related to disability:

- Hearing Difficulty: "Is this person deaf or does he/she have serious difficulty hearing?"
- Vision Difficulty: "Is this person blind or does he/she have serious difficulty seeing even when wearing glasses?"
- Cognitive Difficulty: Because of a physical, mental, or emotional condition, does this person have serious difficulty concentrating, remembering, or making decisions?"
- Ambulatory Difficulty: "Does this person have serious difficulty walking or climbing stairs?"
- Self-Care Difficulty: "Does this person have difficulty dressing or bathing?"
- Independent Living Difficulty: "Because of a physical, mental, or emotional condition, does this person have difficulty doing errands alone such as visiting a doctor's office or shopping?"
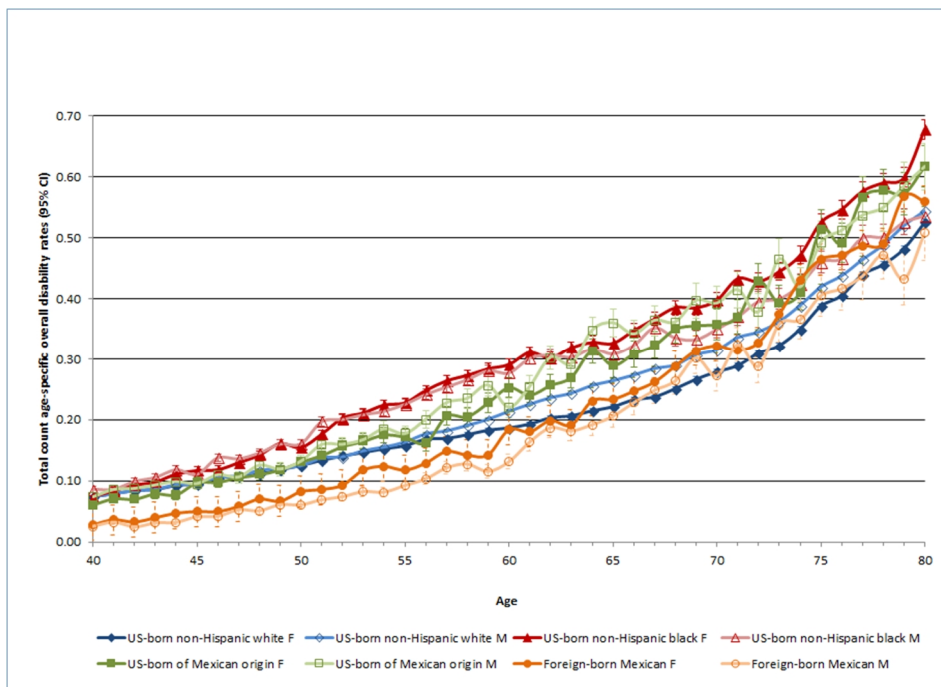
2. Site of ACS data collection

Data collection for the ACS takes place in individual households; institutional group quarters, which include nursing homes, correctional facilities, and mental hospitals; and in noninstitutional group quarters, which include college dormitories, military barracks, group homes, missions, and shelters. While a separate analysis of those in nursing home facilities specifically would be valuable for this age group, the public-use data does not allow disaggregation by individual type of institutional group quarters, precluding a *separate* analysis of nursing home residents. See https://www.census.gov/topics/income-poverty/poverty/guidance/group-quarters.html for more details.

3. Underreporting of Hispanics in the ACS

There is evidence of underreporting of Hispanics in the ACS (Lowenthal 2006; Siordia and Ramos 2015). Compounding issues of underreporting, rates of allocation (procedures used by the Census Bureau to address illogical and missing responses) of ACS data vary by race/ethnicity and disability, leading to greater uncertainty in the estimates for some subgroups and disability domains, including Mexicans (Latinos and Latinas) and Spanish-only-speaking households, as well as self-care and vision disabilities (Siordia and Young 2013). However, undercounting by ethnicity may be less consequential here given our focus on subpopulations. Further, while there is also evidence of undercounting of undocumented populations (Judson and Swanson 2011; Van Hook et al. 2015; Woodrow-Lafield 2012), a population that is particularly vulnerable to health risks, undercount rates are low for older immigrants and Mexicans, making this concern, in the context of this paper, less significant (Passel and Cohn 2016).

Figure A-1: Total count of age-specific overall disability rates by gender, race/ethnicity, and nativity

Source: ACS 2010–2014.